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PREFACE

Economic development refers to the improvement of activities in the economy, which leads to progressive changes in the socio-economic structure and the rising of living standards. Given that the objective of sustainable economic development is elimination of poverty, inequality and unemployment - thus leading to social inclusion and improvement of the quality of life; it is necessary in analysis of this important issue apply extremely multidisciplinary approach.

Faculty of Business Studies, Mediterranean University - Podgorica, Montenegro; University of National and World Economy - Sofia, Bulgaria; Faculty of Commercial and Business Studies - Celje, Slovenia; Faculty of Applied Management, Economics and Finance - Belgrade, Serbia and the Association of Economists and Managers of the Balkans have recognized following issue and organized in Budapest on May 23, 2019 at the Hotel Vitta Superior Fifth International Scientific Conference titled: ***Knowledge based sustainable development - ERAZ 2019***.

The conference objective was to bring together academic community (experts, scientists, engineers, researchers, students and others) and publication of their scientific papers for the purpose of popularization of science and their personal and collective affirmation. The unique program combined interactive discussion and other forms of interpersonal exchange of experiences and presentation of the latest scientific developments in following areas.

- Microeconomics and macroeconomics,
- Economic policy,
- International Economics and Trade,
- International Business,
- Economic diplomacy,
- Lobbying,
- Globalization,
- European business,
- Modern management and innovation,
- Business and Public Finance,
- Fiscal policy,
- Stock exchange and financial markets,
- Risk management,
- Insurance and reinsurance companies,
- Financial Management and Banking,
- Modern forms of entrepreneurship and investment,
- Investment Management,
- Enterprise and Learning,
- Women and Entrepreneurship,
- Corporate entrepreneurship,
- Agribusiness Strategy,
- Marketing and trade,
- Marketing services,
- Marketing of non-profit sector,
- Research in marketing,
- Marketing in education,
- Marketing in sport,
- Marketing in culture,
- Accounting and auditing,
- Quality management,
- Labor law,
- Business law,
- The role of the rule of law in the country's progress,
- Human rights and protection of minorities,
- Legal aspects of EU integration,
- Intellectual Property Law,
- The reform of corporate law in countries in transition,
- CEFTA,
- Ecology and energy,
- Renewable energy,
- Energetic efficiency,
- Information technology and business intelligence,
- The use and integration of new technologies,
- E-society and E-learning,
- Sustainable tourism,
- Hospitality

Within publications from ERAZ 2019 conference:

- 23 double peer reviewed papers have been published in the International Scientific Conference ERAZ 2019 – Knowledge Based Sustainable Development - **Selected Papers**,
- 52 double peer reviewed papers have been published in the International Scientific Conference ERAZ 2019 – Knowledge Based Sustainable Development – **Conference Proceedings**,
- 64 abstracts have been published in the International Scientific Conference ERAZ 2019 – Knowledge Based Sustainable Development – **Book of Abstracts**.

ERAZ 2019 publications have more than 750 pages. Besides that, seven papers were accepted for publication in conference **partner monograph** with great indexation in Web of Science and SCOPUS (previous editions) and 41 papers have been accepted for publication in the conference partner journals namely:

1. **Journal of Innovative Business and Management** is published by DOBA Faculty, Maribor (Slovenia) and referred in international scientific journal bases DOAJ, EconPapers, ResearchGate and RePec. It has been published since 2009 and since then it has been attracting more and more interest among the readers, who predominantly come from academia and business practice.
2. **Balkans Journal of Emerging Trends in Social Sciences (Balkans JETSS)** is an international scientific journal published by the Association of Economists and Managers of the Balkans. Aims and scope are economics, management, law and tourism. Balkans JETSS have indexation in Google Scholar, CEEOL (Central and Eastern European Online Library), ProQuest´s Serial Solutions, Summon, Primo Central, Alma, EBSCO´s EDS Discovery Service and Knowledge Base, TDNet and OCLC.
3. **Journal of Cukurova University Faculty of Economics and Administrative Sciences** is published twice a year as an open source. This international journal is dedicated to the wide scope of themes of economics, business, public finance, econometrics, international relations, labor economics and the theoretical, methodological and applications between these disciplines, and others in Turkish and English. It is indexed in DOAJ, DRJI and Index Copernicus.

4. **Serbian Journal of Engineering Management** is international scientific journal, published by the School of Engineering Management – Belgrade, Serbia and Society of Engineering Management of Serbia. This international journal is dedicated to the wide scope of themes in engineering management and industrial engineering and is published semi-annually.
5. **Central European Journal of Geography and Sustainable Development (CEJGSD)** starting with 2018 publishes relevant academic research papers in geography, sustainable development and other related areas. Journal has a reputable international editorial board comprising experts from Italy, Poland, Slovakia, Serbia, Bulgaria, Hungary, Romania, Israel, Russian Federation, Turkey. CEJGSD has indexation in Ulrich's Periodicals Directory, ELSEVIER Social Science Research Network (SSRN) and Scientific Publishing & Information Online (SCIPIO).

Participation in the conference took **273 researchers with the paper** representing **24 different countries** from different universities, eminent faculties, scientific institutes, colleges, and various ministries, local governments, public and private enterprises, multinational companies, associations, etc.

Authors' Affiliation

Albania
- Department of Industrial Chemistry, University of Tirana, Albania
- European University of Tirana, Tirana, Albania
- Faculty of Biotechnology and Food, Department of Agrifood Technology, Agricultural University of Tirana, Tirana
- Faculty of Economics, University of Tirana
- Faculty of Geosciences, Polytechnic University of Tirana
- Faculty of Technical Science, Department of Chemistry, University of Vlora
- University of Elbasan „Aleksander Xhuvani", Elbasan
- University of Tirana, Faculty of Economics, Tirana
- University of Tirana, Faculty of Natural Science
- University of Vlora, Faculty of Technical Science

Austria
- Graz University of Technology, Institute of Business Economics and Industrial Sociology, Graz

Bosnia and Herzegovina
- Constitutional Court of Bosnia and Herzegovina, Sarajevo
- Faculty of Information Technology – Slobomir P University, Slobomir
- Faculty of Law at University of "Vitez" in Vitez
- Prosecutor's Office of Bosnia and Herzegovina, Sarajevo

Bulgaria
- Department for Applied Informatics and Statistics, University of National and World Economy, Sofia
- Department for Economics and Social Sciences, Plovdiv University "Paissii Hilendarski"
- International Business School, Botevgrad
- International Business School, Sofia
- New Bulgarian University; Sofia
- South-West University "Neofit Rilski", Faculty of Economics, Blagoevgrad
- South-West University "Neofit Rilski", Faculty of Economics, Department of Finance and Accounting, Blagoevgrad
- Technical University of Varna, Varna
- University of Forestry, Sofia
- University of National and World Economy (UNWE) – department "Logistics and supply chains"; UNWE, Sofia
- University of National and World Economy (UNWE), Faculty of Finance and Accounting, Sofia

Croatia
- Faculty of Law, University of Zagreb
- Juraj Dobrila University of Pula, Faculty of Economics and Tourism „Dr. Mijo Mirković", Pula
- Office of the Mayor, City of Zagreb, Zagreb
- University of Rijeka, Faculty of Economics and Business, Rijeka
- University of Zadar, Zadar
- Zagreb School of Economics and Management, Zagreb
- Zagrebačka Banka, Unicredit Group, Zagreb

Czech Republic
- Department of Regional Development and Public Administration, Faculty of Regional Development and International Studies, Mendel University in Brno
- Faculty of Finance, University of Economics in Prague
- Faculty of Social and Economic Studies, Jan Evangelista Purkyně University in Ústí nad Labem
- Institute of Technology and Business in České Budějovice, Faculty of Corporate Strategy, Department of Management, České Budějovice
- Silesian University in Opava, School of Business Administration in Karvina, Karvina
- University of South Bohemia, Faculty of Economics, Ceské Budejovice

Germany
- Friedrich-Alexander Universität Erlangen-Nürnberg, Höchstadt a.d.Aisch
- University of Rostock, Institute of Business Administration

Hungary
- Budapest Business School
- Doctoral School of Earth Studies, University of Pécs
- Eszterházy Károly University, Eger
- National University of Public Service, Budapest
- Óbuda University, Doctoral School on Safety and Security Sciences, Budapest
- Széchenyi István University, Győr
- Szent István University, Faculty of Mechanical Engineering Institute of Mechanics and Machinery

India
- Chitkara University, Chandigarh-Patiala, Rajpura
- Department of Management Studies, Shaheed Sukhdev College of Business Studies: University of Delhi
- Faculty of Law, Symbiosis International (Deemed University), Rohan Mithila, Viman Nagar
- Global Business School and Research Centre, Tathawade, Wakad, Pune-33
- National Institute of Financial Management, Mumbai
- Ramaiah University of Applied Sciences, Bangalore
- S.S.Dempo College of Commerce and Economics, Deendayal Integrated Educational Complex, Cujira
- Sri Sri University, Cuttack, Odisha
- Symbiosis Law School, Pune Symbiosis International (Deemed University), Rohan Mithila, Viman Nagar
- Symbiosis School of Banking and Finance, Symbiosis International (Deemed University), Maval Taluka, Mulshi, Pune

Italy
- Consorzio di Bonifica del Gargano, Foggia
- Department of Management, Marche Polytechnic University, Ancona
- Parco Nazionale del Gargano, Monte Sant'Angelo
- Telematic University Giustino Fortunato, Benevento
- UNISALENTO, Centro Ecotekne, Lecce - Monteroni
- Università di Foggia, Dipartimento di Economia
- University „Giustino Fortunato", Benevento
- University of Sannio, Benevento
- University of Catania, Dept. of Political and Social Sciences, Catania

Macedonia (North)
- European University, Skopje
- Faculty of Economics, University of "St. Cyril and Methodius" - Skopje
- Faculty of Law Iustinianus Primus, University Ss. Cyril and Methodius, Skopje
- Ministry of Finance, Skopje
- School of Law, "University American College Skopje" – Republic of N. Macedonia, Skopje

Montenegro
- Faculty for Business Management, Bar
- Faculty of Arts and Communication, University of Donja Gorica – Podgorica
- Faculty of Economics and Business, Mediterranean University, Podgorica
- Faculty of Law, Mediterranean University, Podgorica
- Faculty of Mechanical Engineering, Podgorica
- Mediterranean University, Podgorica
- National Tourism Organisation of Montenegro, Ministry of Sustainable Development and Tourism, Podgorica
- Proconsult REV, Kotor
- University Mediterranean, Podgorica

Philippines
- Mindanao State University

Poland
- Department of Insurance, Poznań University of Economics and Business, Poznań
- Department of Investment and Real Estate, Poznań University of Economics and Business, Poznań
- Institute of Technology and Life Sciences, Poznań
- Poznań University of Economics and Business
- University of Economics in Poznań, Department of Accountancy, Poznan

Romania
- Bucharest University of Economic Studies, Bucharest
- Transylvania University of Brasov, Brasov

- Faculty of Architecture and Urban Planning, Technical University of Cluj-Napoca
- Faculty of Economics and Business Administration, „Alexandru Ioan Cuza“ University of Iasi
- Faculty of Economics and Public Administration, “Stefan cel Mare“ University of Suceava
- Politehnica University Temisoara Faculty of Engineering Hunedoara, Hunedoara
- University of Medicine, Pharmacy, Science and Technology of Târgu Mureș
- University of Oradea, Faculty of Economics, Oradea

Russia
- Faculty of „Economics and Management”, Volgograd State Technical University, Volgograd
- North-Eastern Federal University, Yakutsk, Republic of Sakha (Yakutia)
- Ural Federal University named after the first President of Russia B.N.Yeltsin, Ekaterinburg

Serbia
- Centre for Applied Mathematics and Electronics, Serbian Armed Forces
- College of Applied Professional Studies Vranje, Vranje
- Faculty of Applied Management, Economics and Finance, Belgrade
- Faculty of Economic Sciences Subotica, University of Novi Sad, Subotica
- Faculty of Economics, University of Kragujevac
- Faculty of Economics, University of Niš
- Faculty of Law for Commerce and Judiciary, University Business Academy, Novi Sad
- Faculty of Law, Megatrend University, Belgrade
- Faculty of Law, Niš
- Faculty of Political Science, Belgrade
- Faculty of Technical Sciences, University of Novi Sad
- Faculty f Business Economics and Entrepreneurship, Belgrade
- JKP Informatika Novi Sad, Novi Sad
- M fly consulting, Belgrade
- MEF, Faculty of Applied Management, Economy and Finance, Belgrade
- Military Technical Academy, University of Defence, Belgrade, Serbia
- Union – Nikola Tesla University Belgrade, Faculty of Law, Security and Management ‘’Konstantin Veliki’’, Niš
- Union – Nikola Tesla University Belgrade, Faculty of Management, Sremski Karlovci
- University Business Academy in Novi Sad, Faculty of Applied Management, Economics and Finance, Belgrade
- University of Belgrade - Faculty of Economics
- University of Belgrade, Faculty of Security Studies – Belgrade
- University of Nis, Faculty of Sport, Nis
- University of Prishtina temporarily settled in Kosovska Mitrovica, Faculty of Economics
- University of Defence, Military Academy – Belgrade
- VPŠSS Čačak, Zemun, Belgrade

Slovakia
- Comenius University in Bratislava, Faculty of Management, Bratislava
- Department of Finance and Accounting, Faculty of Economics, Matej Bel University in Banská Bystrica
- Department of Law, Slovak University of Agriculture in Nitra
- Dubnica Institute of Technology, Department of Education Didactics, Dubnica nad Váhom
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- Faculty of Management, University of Presov, Prešov
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- University of Economics in Bratislava, Faculty of Commerce, Bratislava
- Wyższa Szkoła Menedżerska w Warszawie, Faculty of Jan Amos Komenský in Karviná, Poprad

Slovenia
- Economics School Celje, Vocational College, EŠ VSŠ, Celje
- Faculty of Commercial and Business Sciences, FKPV, Celje
- School of Economics and Business, University of Ljubljana
- University of Maribor, Faculty of Tourism, Brežice

Switzerland
- ZHAW School of Management and Law, Winterthur

Turkey
- Bilecik Seyh Edebali University, FEAS, Dept. of Business Administration
- Department of International Trade and Logistics, Faculty of Economics and Administrative Sciences, Gaziantep University
- Department of Public Finance, Faculty of Economics and Administrative Sciences, Mustafa Kemal University
- Gaziantep University, Department of International Trade and Logistics

Ukraine
- Corporate Finance and Controlling Department, State University "Kyiv National Economic University named after Vadim Hetman", Kyiv

United Arab Emirates
- Al Ain University of Science and Technology, Al Ain
- Canadian University Dubai, Dubai

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- GlaxoSmithKline, London

POPULARISATION OF RESPONSIBLE MODEL OF EDUCATION FOR THE NEEDS OF TOURISM

Jasmina Gržinić[1]

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Abstract: *There is still insufficient awareness of the need for acquisition of knowledge about teaching methods. If we want to promote the Teaching and Learning, we have to bring tourism theory and practice together. The main hypothesis of the paper is that teachers at universities with their pedagogical competences should create excellent conditions for their students. The aim of the paper is to analyse pedagogical competences and satisfaction with the knowledge reflection from the student perspective. The purpose of the research is confirmation of insufficient representation of modern paradigms of education in tourism (from the aspect of courses, study outcomes and contributions to improvements in the educational process). Responsible models of education include: focus lessons, guided instruction, collaborative learning and independent work [1]. Teachers can make a critical analysis of changes in the society (tourism sector and tourism policies) and substantiate the importance of the role of university teachers in the area of higher education. Courses need to be modernised and integrated in line with the changes of the environment. Data were collected via a questionnaire among students of the two tourism faculties of the University of Pula during regular class time. The sample included 110 students. The survey of an anonymous character was conducted in mid-April of 2018. The paper's scientific results are conclusions about the level of education with the focus on tourism practice, collaborative learning and independent work through adaptation suggestions and techniques.*

Keywords: *teaching skills, tourism curriculum, student involvement, educational perspectives.*

1. TOURISM EDUCATION IN AN AGE OF TRANSFORMATION

1.1. Theoretical aspect

Teaching and research involve searching for knowledge where learning is a fundamental activity and they are both inherently exploratory activities [2]. 'Tourism Towards 2030' [3] has estimated that there will be 1.8 billion international arrivals over the period of next decade. So, teaching skills represent just a part of the pedagogical competences.

Authors analysed opinions about pedagogical competences in the field of Croatian tourism (from students of two tourism study courses). From their respective universities mostly do not cover the topic of a "new educational forms" from their respective. The aim of the research is to determine the level of significance of the course of study for students of tourism from a student perspective. The issue of education in tourism attracts attention of different research approaches related to its importance for professional development for tourism and hospitality employees through university and industry cooperation [4]. According to the concept proposed by [5], responsible tourists are those who critically consider the impacts of tourism development. The teacher has than a serious occupation in order to improve knowledge of teaching and learning that is responsible. Responsible teaching (from teaching skills, observations, theory to planning) – for responsible development. So, studying the importance of curriculum in tourism higher education is more important than ever [6].

[1] Juraj Dobrila University of Pula, Faculty of Economics and Tourism „Dr. Mijo Mirković", Zagrebačka 30, Pula, Croatia

Nestoroska & Marinoski [7] emphasize the "exciting challenge" that educational institutions in the field of tourism and hospitality have in the process of the fast-changing demands of the industry. Renfors [8] analyzed and reviewed the curriculum by using interviews and questionnaires. For example, survey-based analysis of undergraduate tourism education and educators [9] was important for conclusions about tourism policy development in modern Japan. Houle [10] considered factors contributing to the professionalization of an occupation. He suggested that the characteristics associated with the process of improving an occupation include: definition of the occupation's function, mastery of theoretical knowledge, capacity to solve problems, use of practical knowledge, self-enhancement, formal training, credentialing, legal reinforcement, and ethical practices.

Nguyen and Robinson [11] emphasize that it is essential to take into consideration the employers' requirements for staff working in hospitality. Tourism studies in the higher education in Sweden focusing on sustainability [12] teaching skills and pedagogical competences [13]. New education efforts should involve a new framework for sustainable educational growth around European teaching and learning perspective. Olsson, Mårtensson, & Roxå [14] support the view put forward by Sinatra and Pintrich [15] that the teacher largely should govern the process leading to development.

1.2. Methodology

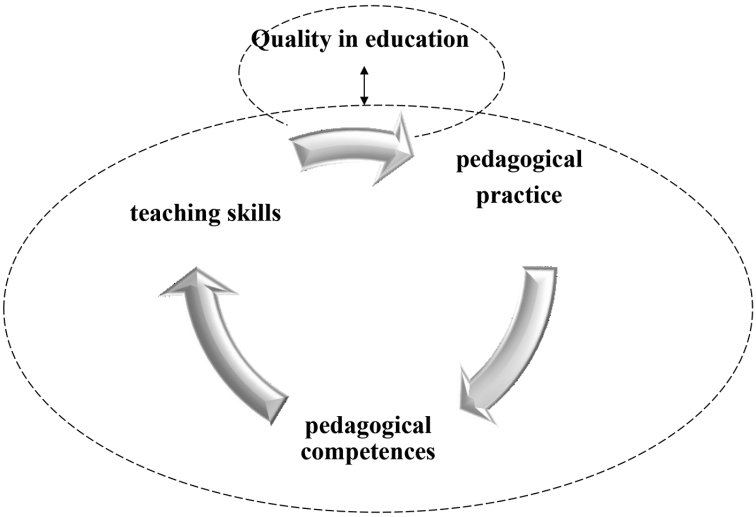
The research result processing led to the knowledge, which is described in the following sections. The research included students of the third-year undergraduate studies "Tourism" and "Culture and Tourism" and students of the fifth year of the graduate studies "Tourism and Development" and "Culture and Tourism" at the Juraj Dobrila University of Pula. A total of 112 students were surveyed (67 from the Economic studies, i.e. 100% of the enrolled year and 45 from the study of Culture and Tourism, i.e. 73% of the enrolled year).

The tourism course forms an integral part of Business Economics of the Faculty of Economics and Tourism "Dr. Mijo Mirković", Pula. The total number of the course 3rd and 5th year students is 59. The survey also includes 8 students of the distinctive course of *Introduction to Tourism*, who attended higher year lectures. The tourism course is also run within the Faculty for Interdisciplinary, Italian and Cultural Studies of the University of Pula. The Tourism and Culture study is of an interdisciplinary nature and therefore attracts students of cultural interests in tourism. The total number of the course 3rd and 5th year students is 62. The questionnaires were previously verified by experts in tourism science and sector. Two questionnaires are excluded.

The survey was conducted in mid-April of 2018 (14th to 17th April). The students were previously familiar with the aims and purpose of the research. The question structure is a closed type question (96% were of female gender). The research activity is based on the acquired information/knowledge about teachers' competences, pedagogical competences and teaching skills (scheme 1.).

The circle is not closed but very important as a circle of partnership of skills, practice and competences. Faculties with better quality and effectiveness of higher education knowledge will be recognised as a good international practice.

Teachers who teach with observing their surrounding demonstrate pedagogical competence and produce more from the student perspective. Theoretical approach should be reflected through theoretical discussions and analyses. Learning goals connected with case studies, critical opinions, learning relaxing, distance learning, teachers that teach from their own books will put the level of pedagogical competences on a higher level.



Scheme 1. Circle of "deep" knowledge and quality
Source: Author

Courses require innovation, proactive and strategic thinking and management of change. The transformation of tourism will also require the transformation of education. Adjustments are needed, but also system support through education and popularization of the importance of pedagogical competencies.

Table 1. Proposition of tourism activities, learning courses and competences

No.	Tourism activities	Tourism courses	Learning technique
	Level 1 – Tourism system		
1.	New steps to measure tourism's global impact	International Tourism	understand, apply, analyse, evaluate
2.	Understanding new tourism requirements	Tourism Specialisation, Hotel Specialisation	apply, create
3.	Destination – the centre of tourism sustainability	Tourism Destination, Resort Innovation, Organisational Behaviour	understand, apply, analyse, evaluate, create
4.	Hybrid business models and models in transition	Human Resource Management, Marketing in Tourism	remember, understand, apply
5.	Expansion of local business opportunities	Strategic Entrepreneurship, Small and Medium Entrepreneurs	create
6.	Purchasing local produce (coordination)	Innovation Management, Event Tourism	evaluate, create
7.	Small community-level projects (development)	Project Management, Communications and Professional Development	understand, apply, evaluate
8.	Tourism value chains	Tour Operators and Destination Management Companies, Eco Tourism, Food & Beverage Management	apply, evaluate, create
	Level 2 – New paradigm		
9.	Providing exceptional experiences (art, culture, local way of life)	Experience Economy, Special interest tourism*, Tourism Animation, Specialised Restaurant Service, Beverage Management	understand, create, design
10.	Transformational change	New Tourism Trends, Foreign Languages, Digital Media Management, Data Analytics, Learning and Research for Higher Education	understand, apply, analyse
11.	Necessary changes (support & identification)	Management of Change, Proactive Management	understand, apply, analyse, evaluate

No.	Tourism activities	Tourism courses	Learning technique
	Level 1 – Tourism system		
12.	Local security and safety	Management of Crises	remember, analyse, evaluate, create
13.	Incorporating sustainability into policy	Tourism Planning, Sustainable Accounting, European and International Tourism Policy	understand, apply, analyse, evaluate, create, design

* e.g. wellness, gastro, creative tourism, new experience or all of these combinations in one
Source: Author by [16], Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman.

The methods (learning technique) were categorized according to tourism courses and activities in terms of effectiveness in learning process. Improving educational outcomes will require efforts on many fronts such as effective learning techniques. The teachers should be engaged in pursuing various instructional and learning goals [17].

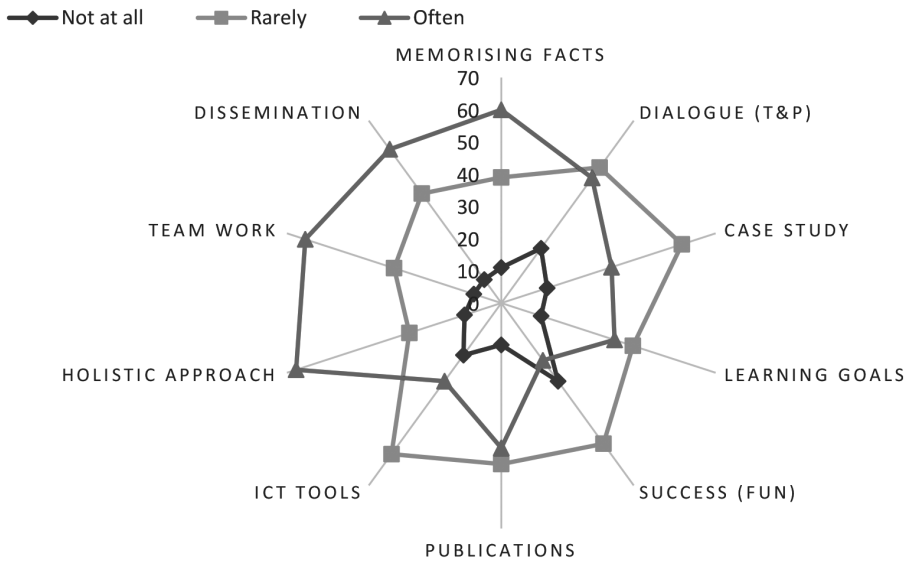
2. RESEARCH RESULTS

It is obvious that teachers involve own publications, practical knowledge and case studies (from the graph 1.). Also, students notice that knowledge dissemination are integral part of their education (category often is dominant, 67%), through holistic approach and team work. "Memorising facts" is dominant category but "Success through fun" or "ITC tools" are more rarely than often represented during the teaching or preparing the lessons by students. These categories need to be improved in order to adapt tourism as a transformative and sustainable activity.

The greatest interest among tourists is caused by such elements of culture such as art, science, religion, history, which play an important role in the development of tourism and industry [18]. That mean the modern education is formed under the influence of a significant transformation of tourism travel market. Students were asked whether pedagogical competences contribute to creation of cooperation between student and student and between teacher and student. They were also asked about "Smart specialisations" and "knowledge transfers" as a form of innovative teaching models. The lack of innovations, interdisciplinarity and smart specialisations in the education process point to the sluggishness of the system. Only 53% of answers are connected to innovations in the form of encouraging expansion of knowledge and experiences.

The contribution to destinations using a problem-solving approach is becoming a developmental priority. By 2018, tourism has become one of the world's leading industries (UNWTO, WTTC: 2018) so the quality of education associated with business excellence increases the involvement of an individual engagement. The client in tourism asks for an individualized approach and experience. The destination stakeholders are responsible for the realization, lifelong learning and coordination of the service. Graph 1 shows the range of answers through three offered categories: "Not at all", "Rarely" and "Often".

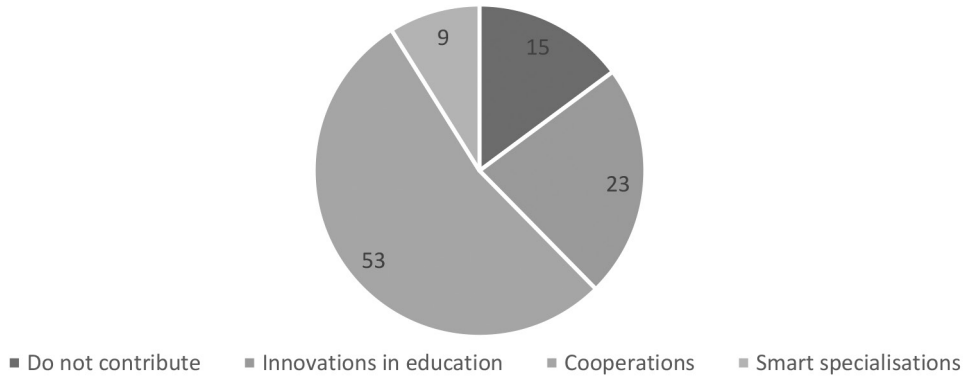
The role of higher education in tourism is sometimes more important than in other business sectors. Tourism demands appropriate employee structure that is necessary for all job positions (special knowledge gained through higher education and training according to the tourism trends).



*T&P = theory and practice.
Note: Frequency categories: "Not at all", "Rarely", "Often" (from narrow to broader)

Graph 1. Student opinions towards learning methods
Source: Processed by the author according to [19]

Tourism destination development is based on the number of hours spent in tourism activities by stakeholders in destination. As a result, numerous tourism attractions are connected in the "attraction network". So, tourism teaching is based on "teaching network and skills progress" recorded through the years. If there is no improvement it is important to monitor "the courses competences" from past to today and future (ICT tools, team work and holistic approach that is missing). Dialogue, case study learning method, clear learning goals, success through fun and own publications are rarely or not implemented as a leaning technique.



Graph 2. Pedagogical competences and educational process (in %)
Source: Author's

There is a cooperation between the teacher and the student (53%). It is necessary to improve other categories (smart specialisations – 9%, innovations – 23%, overall contribution – 15%). The relationship between education and tourism development is inevitable, and it is important to pay particular attention to this relation.

CONCLUSION

The proposed learning objectives and research results are a valid basis for determination of importance studies' curriculum ranks (future syllabus priority). The maturity of the curriculum subject (with no practice reflection and intention of interdisciplinary knowledge) will not provide a common mission of tourism stakeholders.

Tourism is a major economic sector in Europe, directly contributing, on average, 4.2% of GDP, 6.9% of employment and 21.7 % of services exports in the OECD area (OECD: 2018). Horizontal integration of management in tourism demands a horizontal linkage in the development of education.

This research systematizes how difficult it is to manage knowledge in order to train future employees and tourism managers. For this complex part of science as it is tourism, education competences are still not appropriate because the absence of specific knowledge and skills development. The main problem of great part of universities is that education about pedagogical competences is not always a priority and consequently recognised by the student.

Student participation was anonymously in order to freely express their attitudes towards the teacher and the learning process. Prior to completion of the survey questionnaire, students were acquainted with the term of pedagogical competences and the survey questions were clarified for them. From their side the need for improvement has been demonstrated.

Finally, institution should develop high standards and objectives about pedagogical competences. Croatian and other destinations will be sustainable destinations in the future development, according to this sensitive global surrounding and numerous influences.

Limitations of research may be questions of closed type. This opens up the possibility of broader qualitative research of causality between pedagogic process and learning outcomes in the future.

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REFERENCES

[1] Fisher, D. (2008). Effective Use of the Gradual Release of Responsibility Model, file:///C:/Users/Dalibor/AppData/Local/Microsoft/Windows/INetCache/IE/SV9G7P0O/douglas_fisher.pdf
[2] Bowden, J. and Marton, F. (1998). The University of Learning: Beyond Quality and Competence in Higher Education, Kogan Page.
[3] *UNWTO Tourism Highlights* 2017. available at: https://www.e-unwto.org/doi/pdf/10.18111/9789284419029 (2018).
[4] Breen, H. (2002). „An Investigation of Professional Development Education for Tourism and Hospitality Employees Through University and Industry Cooperative Education Partnerships", *Journal of Teaching in Travel & Tourism* 2(3):1-22. DOI: 10.1300/J172v02n03_01.

[5] Goodwin, H. (2011). Taking responsibility for tourism, Goodfellow Publishers Ltd.
[6] Wattanacharoensil, W. (2014), „Tourism Curriculum in a Global Perspective: Past, Present, and Future *International Education Studies,* 7(1):9-20. DOI:10.5539/ies.v7n1p9
[7] Nestoroska, I. & Marinoski, N. (2016). „Problems and perspectives for tourism continuing education in the Republic of Macedonia", *BITCO 2016: Tourism Education in the 21st Century: Policies, Practices, Internationalization*, Belgrade, Serbia.
[8] Renfors, S. (2018). Internationalizing higher tourism education: the case of curriculum design in the Central Baltic Area. *Journal of Teaching in Travel & Tourism*. 18(4), 315-331.
[9] Arima, T. et al. (2016). Tourism Education Program at Hakone Geopark in Collaboration with Teikyo University: Educational Effects and Impacting Factors. *Journal of Geography - Chigaku Zasshi*, 125(6), 871-891.
[10] Houle, C.O. (1980). Continuing Learning in the Professions, San Francisco: Jossey-Bass Publishers.
[11] Nguyen, P., & Robinson, A. (2010). Managing continuous improvement in Vietnam: Unique challenges and approaches to overcome them. *Quality Management Journal*, 17(2), 27–41. https://doi.org/10.1080/10686967.2010.11918268.
[12] Milinchuk, O. (2017). Tourism studies in the higher education in Sweden: focusing on sustainability. *Baltic Journal of Economic Studies*, 3(2), 93-100.
[13] Olsson, T. & Roxå, T. (2013). "Assessing and rewording excellent academic teachers for the benefit of an organization", European Journal of Higher Education, 3(1);40-61.
[14] Olsson, T., Mårtensson, K., & Roxå, T. (2010). "Pedagogical Competence – a development perspective from Lund University" In Å. Ryegård, K. Apelgren, & T. Olsson (Eds). *A Swedish perspective on pedagogical competence* (pp. 121-132), Uppsala University, Division for Development of Teaching and Learning.
[15] Sinatra, G. M. & Pintrich, P. R., Eds. (2003). Intentional Conceptual Change. Mahwah, NJ: Erlbaum.
[16] Anderson, L.W. and Krathwohl, D.R. (2001). Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Longman.
[17] Dunlosky et. al. (2013). Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. *Psychological Science in the Public Interest*, 14(1)4-58.
[18] Birzhakov M.B. (2011). *Special types of tourism*: a course of lectures, M.B. Birzhakov. SPb.: SPbGIEU, p.70.
[19] Sale, D. (2018), "Evidence-Based Creative Teaching: Key Components", SoftChalk, Talk-Blog, (February 12), https://blog.softchalk.com.

CHICKEN´S FRIENDLIER BREEDING HAS A HIGHER ECONOMIC EFFECT

Miro Simonič[1]
Anton Vorina[2]

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Abstract: *Due to the growing market competition to reduce the cost of breeding chicken's broiler, breeders' brokers are breeding them under worse conditions. An analysis of survey confirms economically-ethically important facts that consumers of chicken's meat are aware that chickens in the farms must have more light and more movement space. Chicken meat consumers are willing to pay a higher price for meat reared and labeled as „DÉDI -chicken-friendlier breeding" and to provide producers with greater profits.*

Keywords: *Chicken's-friendlier breeding, animal welfare, ethics for farmed animals, anthropocentrism, ecocentrism.*

1. CHICKEN´S BREEDING FOR FOOD

The more intensive breeding of broiler chicks began in Europe after the First World War, when chickens and hens had grown on larger farms. In the same time, hens were free to walk outside, and were originally cultivated because of the eggs that had a high value on the market. Among the two wars, however, the need for proteins increased due to the growth of the population, and the need for meat was also rising [1]. Farmer's began to deal with the rearing of chickens, so they started building dedicated buildings. The chickens had food and water in the farms, because they were no longer able to find them. Chickens have become entirely dependent on farmers. Since the farmers have begun to build a larger number of farms, they have concluded contracts with slaughterhouses, which are the barrels of chickens at the agreed price of a kilogram of live weight. As far as possible, slaughterhouses have paid farmers to lower prices, and they have kept increasing the number of chickens in existing farms. After 1980, tens of thousands of chickens were cultivated in the farms. When the farm premises became too small, some of the farm's built up floors.

The farms initially had no ventilation devices, and they had no basic sanitary conditions in the absence of heating facilities and animals. The chickens were not vaccinated against diseases which quickly spread rapidly because of the large number of animals, and the animal's mortality increased. After 1953, the United Kingdom started to use poultry feed which allowed healthier and faster chickens to grow [2]. More rapid growth was also provided by new breeds of chickens (Hubbard, Coob, Ross), which allowed the farmers to give a short period of chicken farming.

The end of the seventies and the beginning of the eighties has reached a climax. However, consumers have started to pay more attention to the farming method, and the growing intensity of the farming industry has gradually decreased. In 1999 the EU issued a directive on minimum standards for the protection of animals, so the farmers were forced to increase the chicken's living space and provide them with minimal living conditions [3]. Higher awareness of consumers has also

[1] Faculty of Commercial and Business Sciences, FKPV, Lava 7, 3000 Celje, Slovenia
[2] Economics School Celje, Vocational College, EŠ VSŠ, Maroborska 2, 3000 Celje, Slovenia

been made available to traders to buy chicken meat from producers who could be able to provide more animal-friendly breeding. The meat thus harvested must be marked in such a way that the purchaser detects that the chickens have been bred in accordance with animal-friendly standards.

2. ANIMAL'S-FRIENDLIER BREEDING

The first official document on the friendly treatment of animals was made in the 17-century Ireland (Act against Plowing by the Tayle and Pulling the Wooll off Living Sheep) and treats more friendly handling of sheep in their clipping [5]. In the United States of America, the Animal Protection Act of 1966 was signed by President L. B. Jonson [6]. This Act regulates and prescribes more friendly treatment with animals.

In Europe, the World´s Poultry Science Association (WPSA) was engaged in the compilation of poultry, founded in London 1912. Through the time periods of the previous century, the rearing was different. Since the First World War, the year 1950 was called „Traditional breeding", until the year 1990 „Convention for Breeding" (effective breeding) and in the last twenty years „Modern breeding" (with an average animal protection) [4].

In the farms, animals are bred because of their earnings, breeder's use many nutritional supplements to achieve their weight for sale as soon as possible. Additives may contain hormones and antibiotics, which are reflected in meat and meat products sold on the shelves of dealers. The breeding of animals must therefore meet certain standards which prevent the addition of harmful additives and lay down the minimum criteria to be met by farm-rearing facilities and animals in the farms. In recent years, more and more breeders have decided on organic farming, where livestock keepers use natural food and where the rearing must be as natural as possible.

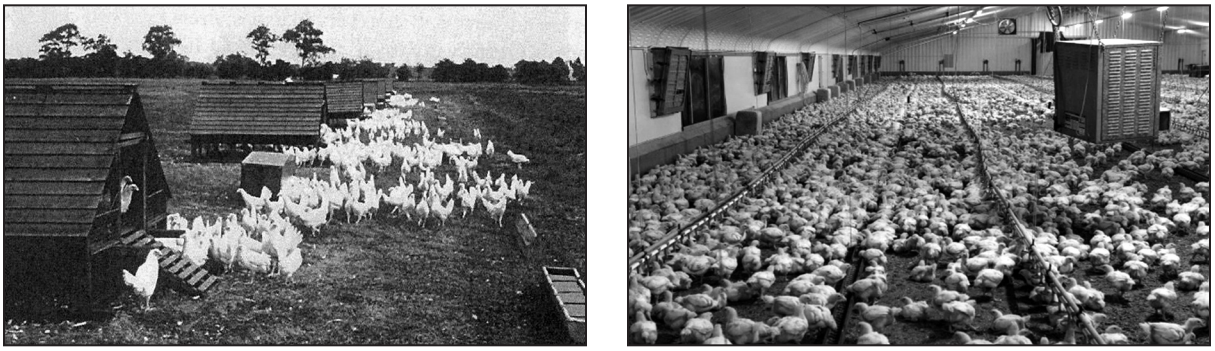


Figure 1: Farming in the years 1933 and 2017 in England (Suffolk) [4].

3. PROBLEMS RELATING TO THE INADEQUATE BREEDING OF CHICKENS

Intensive breeding, new breeds of chickens and fodder with growth-enhancing additives have allowed the period of time between 1950 and 1980 to reduce from 12 to 6 weeks. Such breeding continues to represent 70% of total farming in the United States, UK and Europe. Chicks spend a lot of their short lives in lying, and too fast growth also exerting their hearts and lungs. The lack of space for movement becomes lame and difficult to achieve food and water. Due to the excessive saturation of excrements and moisture, the microbial activity is also increased, causing the contact dermatitis of chickens [7].

Figure 2: Factory-farmed chickens are packed into overcrowded sheds – often with no natural light and only litter on the floor [8].

Due to the overstocking of animals, many diseases have been encountered during the conventional breeding period, which quickly spread to the entire flock in the farm. In the prevention of the disease, breeders have started preventively vaccinating several days of old chicks and use preventive medicines in fodder. In view of the unconsciousness of the consequences, the animals received excessive amounts of antibiotics. The rearing of the last few decades concerns that medicines work is increasingly rational. More recent methods of rearing chicks are committed to innovative approaches to animal cultivation without antibiotics. With additional training of farmers, better conditions in the farms, more air circulation, more quality feed, water and bedding, there is less chance of animal-burning [9].

The latest research carried out by Heike C. and Nguyen-Phuc H. [10] shows positive results of treatment with the method of appropriate temporal illumination in the farms. They compared the health status of chickens that had little illumination with chickens that lived in high-illumination rooms. The results of the survey showed that chickens in high-illumination farms were much healthier. They even proved that the affected chickens were healed in sufficiently bright areas without antibiotic treatment. This method will allow chickens in the future to be treated without the use of antibiotics in the case of intestinal conditions, which means very profound progress.

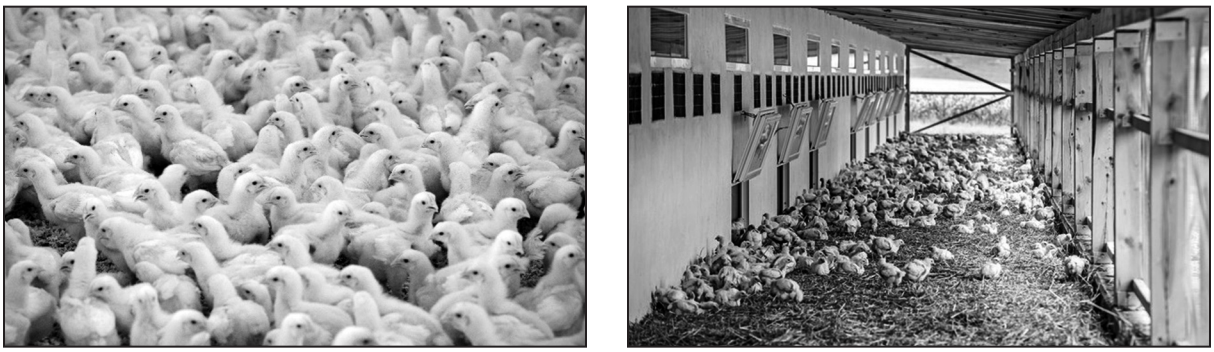


Figure 3: Chicken breeding in USA 2014 [11] and Chicken friendlier breeding in Slovenia (Outspace, Perutnina farm 2014) [12].

The protection of the environment is also increasing with more animal-friendly breeding. The lower concentration of animals in the farms is caused by fewer droppings, and these are also smaller environmental pollutants due to quality food. The smaller number of animals in the farms also consumes less water.

4. ETHICAL ATTITUDE TOWARDS THE BREDDING OF CHICKENS

With a desire for increasing profits, the farmers in the past have focused into increasingly intensive rearing of chickens. Economic profitability has promoted more productive breeding, which is contrary to animal-friendly breeding.

Already in ancient Greece, philosophers have addressed the relationship to animals. Some have advocated that all animals need to be treated as being related, as they are also related to the souls of humans and animals (animalism, Reincarnation, Vitalism). Others [13] have addressed animals from the point of view that they are created only for human benefits (anthropocentrism). In a later period, animal rearing is treated as if animals and humans are part of nature (ecocentrism).

Figure 4: Organic farm in UK [14]

5. ECONOMIC EFFECTS OF MORE ANIMAL-FRIENDLIER BREEDING

We can study the breeding of chickens from two aspects. The first aspect is farmers who raise chickens. Their goal is to maximize profits, which they must produce and sell as many more weight chickens in the shortest time as possible with minimum cost. Due to inadequate and increasingly more intensive farming, chickens in too large density suffer increasingly and begin to be affected, and consequently their mortality increases. From an economic point of view, the breeding of chickens for farmer is a loss of profit because it had to buy the chicken, but for him he consumed some food, vaccines, energy for ventilation and other costs associated with breeding.

The second aspect consists of buyers and consumers of chicken meat. Increasing awareness encourages customers to look for meat with markings that ensure that chickens have been bred in animal-friendly farming. Customers are aware that meat from animal-friendly farming has higher quality, since the animals have not been reimbursed unnecessarily during the breeding period and have been healthier because of the larger mobility space. For meat labeled with animal-friendly breeding they are prepared to deduct a higher price.

6. RESEARCH

The aim of the research is to determine how many customers of chicken meat are familiar with the indications that the chickens from which the meat is bred in an animal-friendly way. The Slovenian producer of chicken meat [12], which breeds chickens in the way of animal-friendly farming, denotes products from such farming with the mark DÉDI for Hungary market and PPR for Slovenia market. Furthermore, we were wondering whether buyers are aware that such breeding of chickens is associated with higher costs and that they are prepared to pay a higher price for such reared and labeled meat.

7. METHODOLOGY

In order to obtain data, we selected the quantitative method of interviewing respondents with a five-level Likert scale. Respondents were able to choose between following statements: 1 – strongly disagree; 5 –strongly agree.

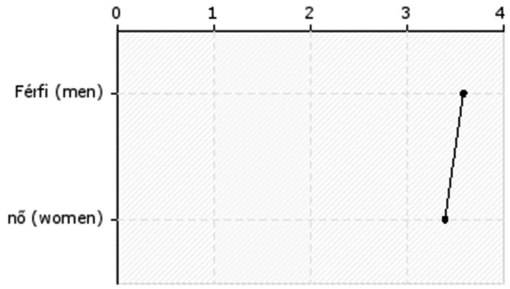
We sent the survey to respondents in Hungary. The questions we have created on the web portal "1ka" and were translated into Hungarian language. By analyzing the obtained data, we were looking for answers of questions about how many buyers of chicken are familiar with standard breeding and how many with friendlier chicken breeding (question Q1d). Furthermore, we were interested in whether customers are aware that the chicken-friendlier breeding associated with higher costs and whether they are willing to pay a higher price for products with designation of animal-friendlier breeding of chickens (question Q1e).

Respondents were asked 11 questions about the breeding of chickens and four demographic questions. A set of first six questions concerned the knowledge of standard breeding, and the second set of five questions on chicken-friendlier breeding. By responding to demographic questions, we wanted to find out the gender, age group, net monthly income and education of respondents.

8. RESULTS AND DISCUSSION

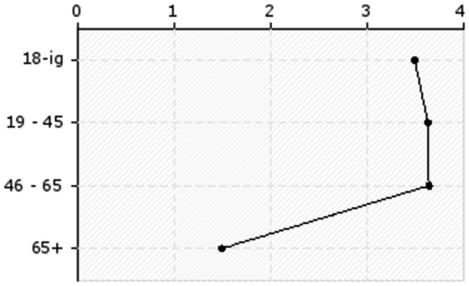
In the first part of the study, we compared the answers of the respondents to the established label about knowing or not knowing the label, which indicates an animal-friendlier breeding (DÉDI-chicken-friendlier breeding). We compared the answers we received with demographic data of respondents.

Statement Q1d: I know the label „DÉDI-chicken-friendlier breeding" on chicken meat and products.



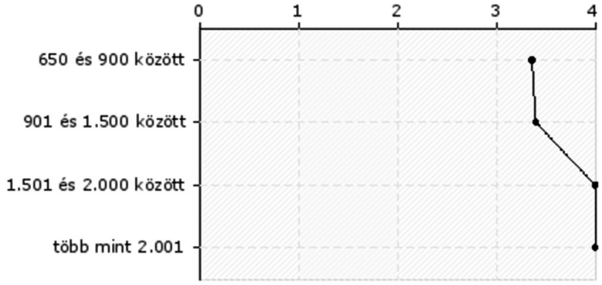
Graph 1: Gender vs Q1d question (I know the label „DÉDI-chicken-friendlier breeding" on chicken meat and products).

Comment: We received 47% of answers from females and 53% from males. The answers show that both sexes of respondents are familiar with labels that characterize animal-friendlier breeding, but this knowledge is very weak. The average response value was between 3 and 4.



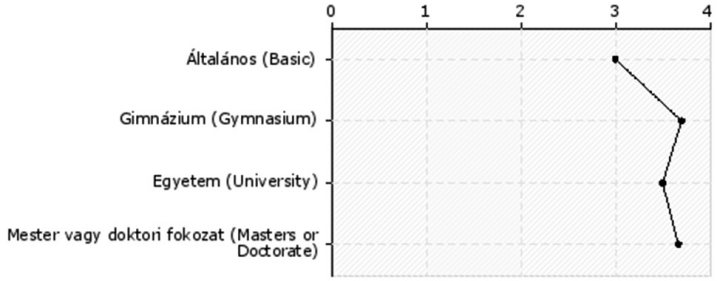
Graph 2: Age group vs Q1d question (I know the label „DÉDI-chicken-friendlier breeding" on chicken meat and products.)

Comment: From Graph 2 it can be seen that the label that characterizes the animal-friendlier breeding is mainly known by middle-aged respondents, while the younger ones are slightly lesser and older than 65 years of age know the DÉDI marking poorly (disagree).



Graph 3: Monthly net incomes vs Q1d question (I know the label „DÉDI-chicken-friendlier breeding" on chicken meat and products.)

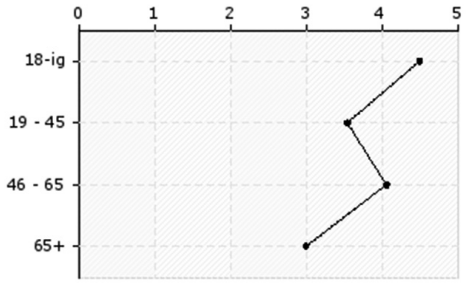
Comment: Graph 3 shows that respondents with higher incomes are better acquainted with the DÉDI designation, which indicates a more chicken-friendlier breeding.



Graph 4: Education vs Q1d question (I know the label „DÉDI-chicken-friendlier breeding" on chicken meat and products.)

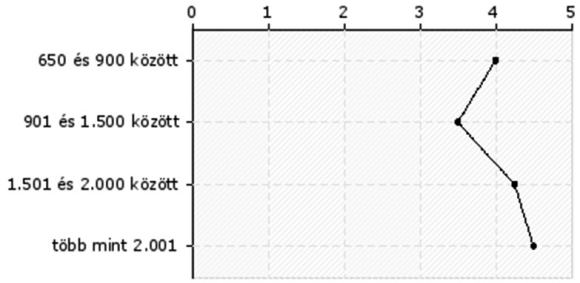
Comment: From Graph 4 it can be seen that respondents with a higher education have a slightly better knowledge of the DÉDI label for more chicken-friendlier breeding.

In the second part of the study, we compared the respondents' answers to the pledge on the willingness to pay a higher amount for meat from chicken-friendlier breeding, knowing that such breeding is associated with higher costs. We compared the response we received with demographic data of respondents.



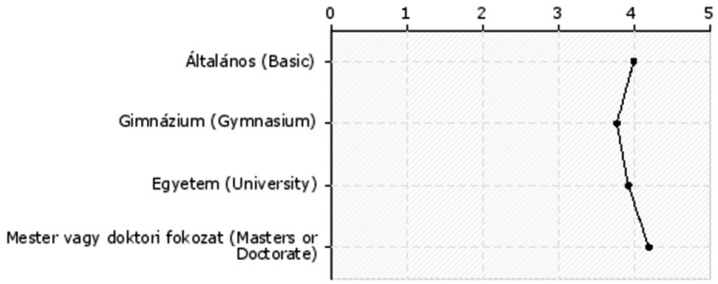
Graph 5: Age group vs Q1e question (For meat of chickens reared in „DÉDI-chicken-friendlier breeding", I am prepared to pay a higher price, since their production is more expensive.

Comment: Graph 5 shows that younger respondents are willing to pay a higher price for chickens labeled DÉDI chicken-friendlier breeding because they are aware that such breeding is associated with higher costs than standard breeding.



Graph 6: Monthly net incomes vs Q1e question (For meat of chickens reared in „DÉDI-chicken-friendlier breeding", I am prepared to pay a higher price, since their production is more expensive).

Comment: Graph 6 shows that respondents with higher net income are willing to pay a higher price for chickens labeled DÉDI chicken-friendlier breeding because they are aware that such breeding is associated with higher costs than standard breeding.



Graph 7: Education vs Q1e question (For meat of chickens reared in „DÉDI-chicken-friendlier breeding", I am prepared to pay a higher price, since their production is more expensive.)

Comment: Graph 7 shows that respondents with a higher education are prepared to pay a higher price for chickens labeled as "DÉDI chicken-friendlier breeding" because they are aware that such breeding is associated with higher costs than standard breeding.

9. ANALYSIS

From the answers received we can conclude that respondents of both sexes are already familiar with the DÉDI designation, which indicates that chicken meat was reared in chicken-friendlier breeding. This designation was known to younger respondents, those with higher income and higher education. On the basis of the above results, the company must direct its marketing activities to the specified target group of customers in order to achieve effective results.

From the answers to the question of how many respondents are willing to pay a higher price because of the awareness that costs for chicken-friendly farming are higher, we can see that the price can increase from 60 to 80 percent in relation to the price of meat from standard breeding.

CONCLUSION

A higher price can be achieved in real terms only with effective marketing advertising. Producers and traders must communicate sufficiently to buyers about a more prosperous breeding and the benefits that such a breeding provides.

Producers face great competition in the low price of chicken meat products from standard breeding. Consumer awareness that animals deserve better breeding conditions than mass standard breeding is increasingly present in all EU countries and beyond. The thinking of anthropocentrism in many countries already passes into ecocentrism, so it is definitely necessary to direct the chickens into a way of animal-friendlier farming. Products produced in this way will find more and more informed buyers on the market. Modern food companies, however, must always follow the trends that are dictated by informed buyers.

REFERENCES

[1] Beirne, P. (2009). *Confronting animal abuse: criminology, and human-animal relationships.* Rowman & Littlefield Publishers, Inc.
[2] Bessei, W. (brez datuma). Wellfare of broilers: a review. *World's Poultry Science Journal, Vol. 62, September 2006.* doi:DOI: 10.1079/WPS2005108
[3] *Better Chicken*. (2019). Available on: Buy Happy: https://betterchicken.org.uk/
[4] Comparison in world farming. About Chickens farmed for meat. Pridobljeno 2019 iz https://www.ciwf.org.uk/farm-animals/chickens/meat-chickens/
[5] Elson, A. Half a century of egg production - 1962 to 2012. *Poultry international,* str. 41(5): 8-16.
[6] Elson, H. A. (2010). Poultry housing and husbandry. Available on: http://www.lohmann-information.de/content/l_i_46_artikel11.pdf.
[7] Elson, H. A. (2011). Housing and Husbandry of Laying Hens: past, present and future. *ADAS Gleadthorpe. Vol. 46 (2), Oct. 2011, Page 16.* Meden Vale, Mansfield. UK: Lohmann Information.
[8] Elson, H. A., & Croxall, R. (2006). *European study on the comparative welfare of laying hens in cage and non-cage systems.* Available on: European-poultry-science: https://www.european-poultry-science.com/artikel.dll/m06-32mk_MTczNzMy.PDF
[9] Elson, H. A., & Croxall, R. *European study on the comparative welfare of laying hens in cage and non-cage systems.* Available on: European-poultry-science: https://www.european-poultry-science.com/artikel.dll/m06-32mk_MTczNzMy.PDF

[10] EUR-Lex. (1999). *Council Directive 1999/74/EC of 19 July 1999 laying down minimum standards for the protection of laying hens.* Available on: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31999L0074
[11] Fearing, J., & Matheny, G. (2007). The role of economics in achieving welfare gains for animals. In D.J. Salem & A.N. Rowan (Eds). *The state of the animals 2007 (pp. 159-173).* Washington DC: Humane Society Press.
[12] National Chicken Council. (2019). *What Consumers Need to Know.* Available on: https://www.nationalchickencouncil.org/about-the-industry/chickopedia/
[13] National Chicken Council. *What Consumers Need to Know.* Pridobljeno 2019 iz https://www.nationalchickencouncil.org/about-the-industry/chickopedia/
[14] Parliament of the United Kingdom. (2006). *Animal Welfare Act.*
[15] Perutnina Ptuj d.d. (2019). Premium poultry breeding. Ptuj. Available on: https://www.perutnina.si/en/products/natur-premium/
[16] Phillips, C. J. (2016). *Nutritition and the Welfare of Farms Animals.* University of Queensland, Gatton, Australia: Springer International Publishing Switzerland.
[17] Russell, A. (2019). Study: Poultry gut health better under fewer light hours. Available on: https://www.wattagnet.com/articles/37504-agrilife-research-study-shows-poultry-gut-health-improved-under-fewer-light-hours?utm_source=KnowledgeMarketing&utm_medium=email&utm_content=Poultry%20Update&utm_campaign=19_04_23_Poultry%20Update_Tuesday&eid=16247
[18] Ryder, R. D. (2000). Animal revolution: changing attitudes towards speciesism. Oxford: New York: Berg Publishers.
[19] United States Congress. (1966). Animal Wellfare Act of 1966. P. L. 89-544; 80 Stat. 350.
[20] *Veganuary.* (2019). Available on: https://veganuary.com/starter-kit/the-free-range-myth/

ANALYSIS OF THE STATE AND DEVELOPMENT OF AGRICULTURE IN BULGARIA BY STATISTICAL REGIONS AND IN THE DISTRICT OF DOBRICH IN THE CONTEXT OF RESTRUCTURING AND DE-CENTRALIZATION

Krassimira Zagorova[1]

DOI: https://doi.org/10.31410/ERAZ.S.P.2019.19

Abstract: *The substantial land ownership changes in the Republic of Bulgaria and the restructuring of the agricultural production structures was the primary goal towards the attainment of balance in the management and regulated usage of land resources as a major and specific means of production. The purpose of the paper is to analyze the state and development of agricultural production in the context of decentralisation and restructuring of land ownership in the agricultural sector in Bulgaria. More precisely, the paper examines the dynamics of the indicators relevant for the relative share of the utilised agricultural area by statistical regions of the country, the structure of agricultural produce grown in different regions, the distribution of the cultivated areas by the types of crops. Further extensive research was carried out not only into the structural portfolio of the cultivated crop production in the district of Dobrich, whose produce takes a leading position in the overall agricultural output of Bulgaria, but also into the cultivated areas by groups of agricultural crops conditional upon the specific climatic and physic-geographical factors of the region.*

Keywords: *Utilised agricultural area, Monocultural production, Agricultural (crop) production, District of Dobrich.*

1. INTRODUCTION

The change in land ownership and the restructuring of the structures of agricultural production was the principal objective for achieving the right balance between the regulated use and management of the land as a fundamental and specific means of production. The slower pace of implementation of the agrarian reform[2] in Bulgaria has contributed to the delay in the development of the agricultural sector, both at national and regional level.

Forced to work under conditions of high risk, predetermined not only by the seasonality of the production but also by the economic uncertainty in the country, including the shrinking domestic consumption, without access to foreign markets and centralized procurement, with no effective system of financing and genuine investment interest, using obsolete technologies and depreciated farm machinery, the farmers have further increased the „chaos" and widened the domestic market deficit.

The growing problems in the context of decentralised restructuring of the agriculture sector require the adoption of a national strategy for the development of agriculture in Bulgaria, aligned

[1] Technical University of Varna, Studentska 1 St., Varna, Bulgaria

[2] Agrarian reform in Bulgaria is associated with the transition from public to private governance and management of agricultural land in accordance with the Agricultural Land Ownership and Use Act adopted in 1991. The transition to private management and ownership of agricultural land is accompanied by the reorganization of state structures operating in the form of labour-cooperative agricultural farms, state farms and agro-industrial complexes and the creation of private agricultural production (farm) units.

and synchronized with the requirements set forth by the existing Agricultural Policy of the European Union (EU), and which, along with a medium-and long-term planning of agricultural production will neutralise or mitigate the adverse processes and effects upon its development. The control and management of the latter through appropriate mechanisms tailored to the specificity of the regions, including the region of the District of Dobrich is of utmost importance for that part of the population for which agricultural production is traditionally the main means of livelihood [4].

2. STATE AND DEVELOPMENT OF AGRICULTURE IN BULGARIA BY STATISTICAL REGIONS

2.1. Use of agricultural area in Bulgaria by regions

According to data of the Department of Agro-Statistics at the Ministry of Agriculture, Food and Forestry (MAFF) the District of Dobrich has the highest relative share of the utilised agricultural area (UAA) as of 2018 –7,3% of the country's UAA, followed by the District of Pleven with 6,6% and the district of Plovdiv covering 5,9% of the total usable agricultural area of the country as a whole (see Figure 1). According to the data from the cited source, the District of Dobrich takes a leading position in terms of the size of the arable agricultural land, which accounts for approximately 10,0% of the total arable land for the country and is the largest as compared to the other administrative districts of Bulgaria.

According to data of MAFF, as of 2018 the largest percentage of arable agricultural area is concentrated in the North-Western statistical area with a relative land share of 23,3%, followed by the North-Eastern and North Central region comprising 21,6% and 19,1% of the total arable land in the country, respectively.

The districts of Dobrich and Pleven have the largest percentage of arable land, amounting to 9,6% and 8,7% of the total cultivable areas of Bulgaria, respectively. This fact confirms the leading position of the District of Dobrich in the agricultural sector of Bulgaria as well as the structure-forming role of agricultural production in the regional economy of the district.

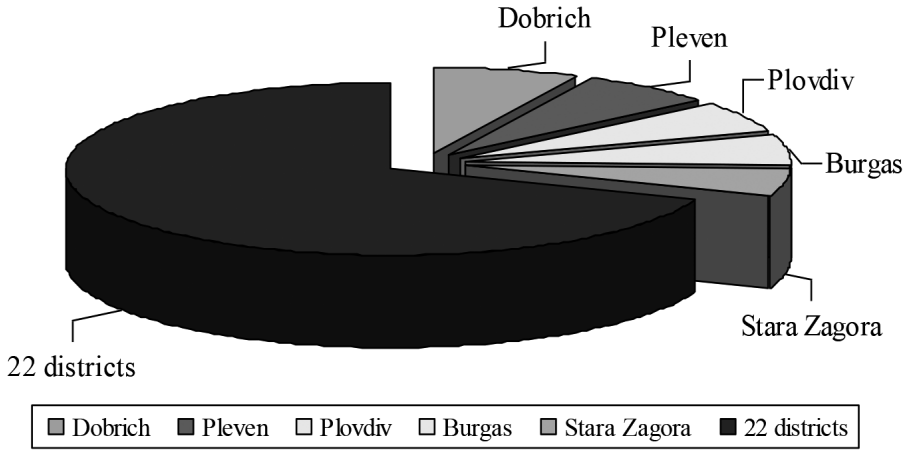


Figure 1: Distribution of the utilised agricultural area in 2017 by administrative districts[3]

[3] According to the data of the Department of „Agrostatistics" at the MAFF of the Republic of Bulgaria, Bulgarian Survey of the Agricultural and Economic Conjuncture BANCIK, 2018

2.2. Structural portfolio of the crop production in the district of Dobrich and in Bulgaria by regions

The development of agriculture in the district of Dobrich is characterized by certain advantages distinguishing it from the other administrative districts in the country that manifest themselves through extremely favourable combination of the region-specific natural and climatic features - i.e. plain flat terrain, good soil structure and ecologically clean natural surroundings -a pre-requisite for achieving high productivity and quality levels of the regional crop production, facilities for post-harvest on-site handling of crop output to high-quality end-products oriented primarily toward the domestic market, approximately 100% of tillage and cultivation of agricultural land and an active land market[4].

The region's prime conditions for raising crops are also reinforced by the high share of arable land – 332 172 ha, which amounts to 70,5% of the territory of the district with the country's average of– 31,3% and around 10% of the country's cultivable crop land.

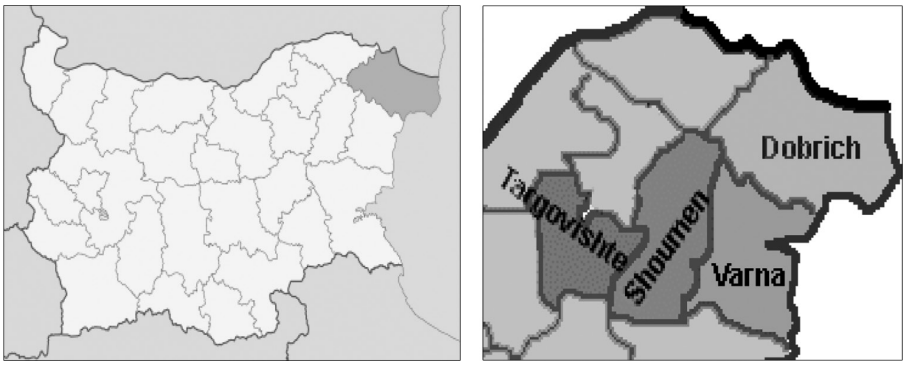


Figure 2: Location of the District of Dobrich within the territory of the Republic of Bulgaria

Despite the district's advantageous physic-geographical factors, the structural portfolio of the cultivated agricultural output in the region focuses mainly on the production of grain or cereal crops, oleaginous and fodder crops – wheat, maize, sunflower, rape and barley. In recent years there has also been a steady trend in increasing the areas being cultivated for the growing of lavender as a kind of essential oil crops, whose amount has been increasing progressively over the period 2014 -2017 from 4461 acre in 2014 to 24658 acres in 2017 [3].

The areas planted with industrial crops have a relatively small share, while those cultivated for perennial plants have the smallest relative share that accounts for 1,2% of the total usable agricultural area in the region.

Likewise, the areas for production of intensive vegetable crops through irrigation have also been extremely reduced to make up an average of 1,65% of the region's UAA. This, by all means, is due to the limited *surface* water sources on the territory of the district and the presence of plentiful but less easily accessible aquifers. The dynamics in the distribution of the cultivated land and UAA for the principal agricultural crop types of the District of Dobrich is provided in Table 1.

[4] The District of Dobrich is one of the four districts located in the North-East Planning Region of Bulgaria differentiated according to the Regional Development Act and in line with the requirements of the Common classification of territorial units for statistics implemented in the EU for the purposes of planning, management, resource provision and assessment of their regional development. To the north, the district borders on the Republic of Romania, to the east on the Black sea, to the south on the District of Varna and to the west on the District of Silistra (see Figure 2).

Table 1. Agricultural areas by groups of agricultural crops in the District of Dobrich, ha

Utilised agricultural area by crops	2015		2016		2017	
	Area	UAA,%	Area	UAA,%	Area	UAA,%
Grain or cereal crops	212 796	57,2	196 527	52,5	206 508	56,0
Oleaginous crops	101 137	27,2	116 287	31,1	106 930	29,03
Industrial non-oleaginous	1 124	0,30	3 462	0,92	5 004	1,36
Vegetables and flowers	5 619	1,51	6 619	1,76	8 069	2,19
perennial plants	4 291	1,15	3 869	1,03	3 727	1,01
UAA in Dobrich District	372 368 ha		369 421ha		368 282 ha	

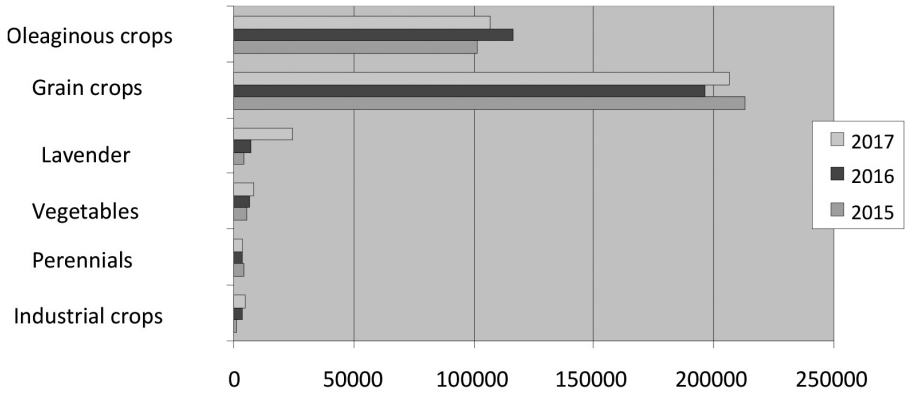


Figure 4: Distribution of the utilised agricultural crop area in the District of Dobrich[5]

The data provided for the distribution of utilised agricultural crop areas in the District of Dobrich highlight the particular disposition of the farmers in the region towards a more monocultural (unvaried) production which has some advantages, but also poses serious risks.

Monocultural production often disrupts the natural cycle of crop rotation and, consequently, results in deteriorated land productivity. There is also the additional risk of crop destruction caused by natural disasters in conditions of dynamic climate changes and underdeveloped crop insurance culture for the vast majority of farmers, incl. the tenants of large-scale agricultural land. The narrowly specialized production of a limited type of agricultural crops grown in other regions of the country will be unprofitable in view of the existing risk and increased overproduction.

The production of grain - fodder and oleaginous crops in large specialized farms across the District of Dobrich presupposes improved productivity levels and yields above the country's average, although, against the performance results of the countries with well-developed agricultural farms, the latter are significantly lagging behind. Large-scale cultivation of extensive crops is a long-established practice both across the entire country and on the territory of the district itself and is also encouraged and sustained by the equal direct payment scheme per unit of agricultural area provided through European Agricultural Fund.

The small size of the intensive agricultural crop areas determines the extremely restricted and insufficient amount of financial subsidies to support the farms in which they are grown. Under such circumstances, the production of intensive agricultural crops including fresh fruit and vegetables has been drastically curtailed, regardless of their increased demand, both domestically and internationally.

[5] Source: Territorial units for statistics Dobrich; Department of "Agrostatistics", MAFF, 2015, 2016, 2017

Grown in the District of Dobrich, for the needs of the local market, are certain types of intensive agricultural crops - mostly vegetables and orchards, as well as irrigated maize, the production of which is located in the lands of the municipalities of Kavarna, Shabla and, to some extent, in the municipalities of Balchik and Dobrich rural municipality. On the territory of the afore-mentioned municipalities the largest share of intensive agricultural crop areas relates to the growing of vegetables: pepper, bell-pepper, auberge, cabbage, potatoes, tomatoes, peas and others.

Cultivated in the lands of the municipalities Dobrichka – rural and Balchik are also farm orchard trees such as apples, peaches, apricots, walnuts.

Despite the scarcity of surface water sources on the territory of the district of Dobrich, experts claim that the lands of the municipalities of Shabla, Kavarna and Balchik, offer exceptional opportunities for irrigation, as regards the existence of «rich» aquifer horizons, which in the reconstruction of the fully operable irrigation systems, mainly on the territory of the above-named municipalities, would secure the region with irrigation water at a reasonable price.

As of 2017, the largest share of the cultivated areas in the surveyed region pertains to cereal and oleaginous crops, with the most widespread produce being that of wheat, maize and sunflower. It is for these crops precisely that the District of Dobrich takes a leading position in the country as compared to the other regions of Bulgaria with highly developed production of extensive agricultural crops.

Illustrated in Table 2, Figure 5, 6 and 7 [6] is the relative share and the size of the areas utilized for the growing of basic cereal and oleaginous crops in the country as of 2017 by statistical districts.

Table 2. Areas utilized for the growing of basic cereals and oleaginous crops, 2017.

Utilised agricultural crop areas, ha	Utilised area for Bulgaria	Utilised area – Dobrich District	
		Utilised area, ha	% of area under cultivation
Grain or cereal crops (wheat, barley, maize)	1 866 944	206 508	62,1
Oleaginous crops (sunflower, rape)	106 930	86 486	35,1

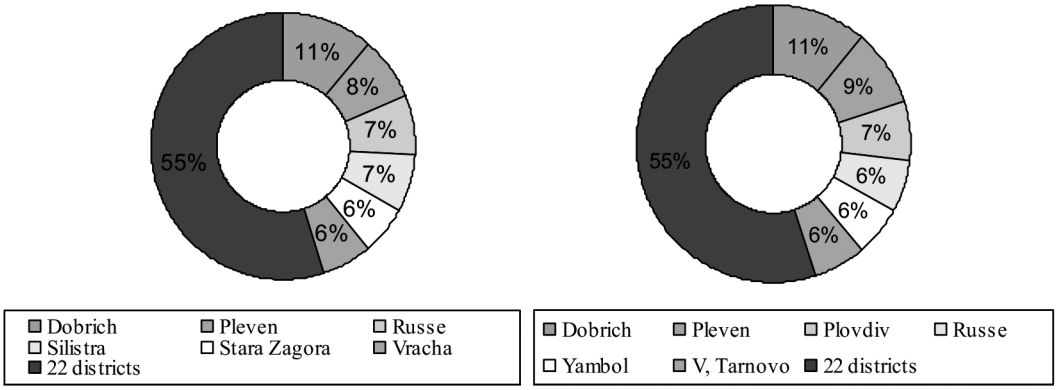


Figure 5: Structure of maize and wheat cultivated areas in the country by districts, 2017.

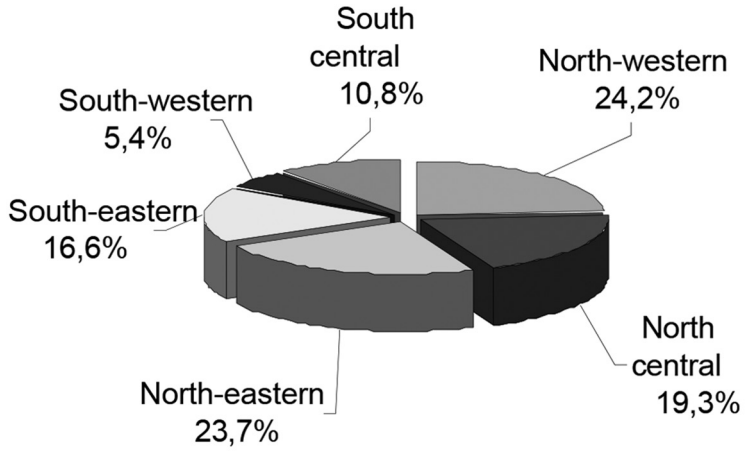


Figure 6: Structure of cereal crop areas by statistical areas of Bulgaria

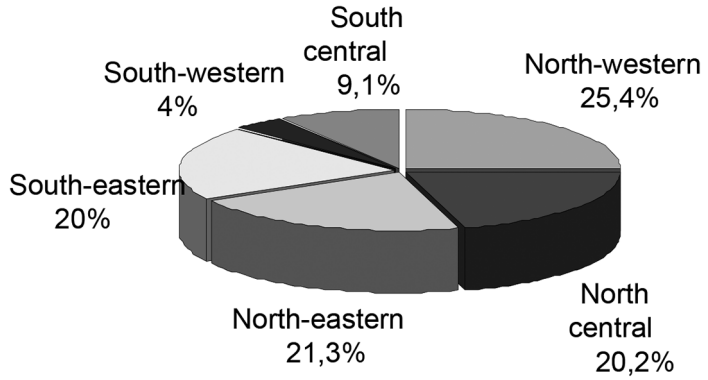


Figure 7: Structure of oleaginous crop areas in Bulgaria by statistical regions

3. CONCLUSION

From the generalized characteristics of the state and development of agriculture in Bulgaria by statistical regions, and, in particular, on the territory of the District of Dobrich, as part of the Northeast Planning Region of Bulgaria, the following conclusions could be drawn:

1. According to data released by MAFF, as of 2018, the largest percentage of cultivable agricultural area is concentrated in the Northwest statistical region with a relative share of the land comprising 23,3%, followed by the Northeast and North Central Region, with 21,6% and 19,1%, respectively, of the country's total cultivable land;
2. The largest size of cultivable land pertains to the districts of Dobrich and Pleven, comprising 9,6% and 8,7%, respectively, of the total cultivable area for Bulgaria;
3. Agricultural production within the region of the District of Dobrich has some advantageous characteristic features that set the district apart from the other administrative districts in the country, such as:
   - 3.1. extremely favorable combination of natural and climatic features – a prerequisite for achieving high productivity and quality levels of the regional crop production;
   - 3.2. a high percentage of arable cultivated area, accounting for 71% of the territory of the district with an average for the country – 58%;
   - 3.3. long-established identification of the agricultural sector as a priority in the structure of the district's regional economy.

REFERENCES

[1] Annual Agricultural Report of MAFF, 2016;
[2] Annual Agricultural Report of MAFF, 2017;
[3] Ivanova, D., Report on the Activities of the District Department of "Agriculture" Dobrich during the period of 01. 01. 2017 г. - 30.11. 2017, District Department of "Agriculture", Dobrich, 2017, p. 9;
[4] Nikolov, D., "Concept for Restructuring of Land Relations and Agricultural Production Structures in the District of Dobrich", Dobrich, 2010;
[5] Department of "Agrostatistics", MAFF, Vegetable production in Bulgaria –2015, 2016, 2017 harvest years;
[6] "Agrostatistics", BANCIK, Final results for the employment and land use of the territory of Bulgaria in 2017, pp. 9,10,17;
[7] "Agrostatistics", BANCIK, Final results for the employment and land use of the territory of Bulgaria in 2018, pp. 9,10;
[8] See News, Analysis of the Regional Economy and Opportunities for the Development of the District of Dobrich, October, 2017;
[9] NSI Reference Book for the Republic of Bulgaria, Territorial Units for Statistics– Dobrich, 2018;
[10] Zhekova, R., M. Zlateva, V. Valchinov, Analysis of the Internationalization of Small and Medium-Sized Enterprises in the Northeastern Region of Bulgaria, Projekt: INTRA Interreg Europe, November, 2017;
[11] *http://bg.guide-bulgaria.com/ne/dobrich.*

COMPARISON OF THE OLD AND NEW POLICY ON SUPPORTING INVESTMENT IN THE REPUBLIC OF NORTH MACEDONIA

Irena Kikerkova[1]
Elena Naumovska[2]
Katerina Toshevska-Trpchevska[3]
Elena Makrevska Disoska[4]

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Abstract: *In 2017 the authors of this paper created a Vector Error Correction Model to measure the impact of the Technological Development Industrial Zones (TDIZ) on attracting FDI in the country. TDIZ, as an exemption of the regular customs territory, enjoyed preferential treatment for foreign investors. The model confirmed the positive effect that TDIZ had upon the balance of payments; however, the expected effect upon diminishing the high unemployment rate in the country was lacking. This paper is going to compare the latest revision of the policy on investment support in the country with the previous one.*

Keywords: *FDI, Technological Development Industrial Zones (TDIZ), incentives for foreign investors, investment policy, Vector Error Correction Model, the Republic of North Macedonia.*

1. INTRODUCTION

In the last two decades the Western Balkan countries have been preoccupied with the issue of attracting foreign direct investment (FDI). Despite the creation of CEFTA-2006 and the latest effort to upgrade the free trade area into a regional economic area, the regional approach on attracting FDI seems to be difficult to be put in practice. There are many reasons for the dis-functionality of the area among which the most important seems to be the lack of political will. Countries within the region compete among themselves in offering foreign investors different sets of incentives and abundant state support in order to attract their interest.

The Republic of North Macedonia is not an exemption from the rule in the region. In the last 20 years the country made a lot of effort to create a favorable business environment for FDI by enforcing laws up to the standards of the EU, as well as according to the obligations undertaken with its membership into the WTO. However, the limited domestic market, the bad transportation infrastructure and complicated border procedures within the region, were some of the reasons why foreign investors were hesitant to invest in important projects in the country.

Back in the year of 2000, trying to increase the attractiveness of the economy for FDI, a law on creation of free economic zones as exemption from the enacted customs and fiscal rules was adopted. However, the zones were not active until 2008, when they were rebranded into Technological Development Industrial Zones (TDIZ). Foreign investors that would consider

[1] UKIM, Faculty of Economics – Skopje, Blvd. "Goce Delcev" 9V, 1000, Skopje, North Macedonia
[2] UKIM, Faculty of Economics – Skopje, Blvd. "Goce Delcev" 9V, 1000, Skopje, North Macedonia
[3] UKIM, Faculty of Economics – Skopje, Blvd. "Goce Delcev" 9V, 1000, Skopje, North Macedonia
[4] UKIM, Faculty of Economics – Skopje, Blvd. "Goce Delcev" 9V, 1000, Skopje, North Macedonia

investment within the zones in production aimed for export out of the country were provided additional incentives and abundant subsides by the state. This approach was severely criticized by the academia and the domestic business sector, as it openly discriminated domestic in favor of foreign investors. Last year the arguments against the used model on attracting FDI were accepted which resulted in adopting a new policy on investment.

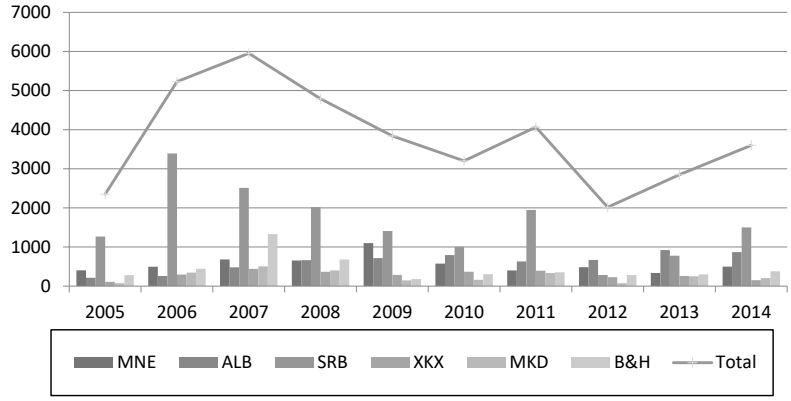
After a brief overview on the relevant theory on FDI, the paper analyzes the incentives on FDI provided in the former national policy on investment, than presents the most important finding of the VEC model on FDI run in 2017 for evaluating positive and negative effects from the incentives for foreign investors under the previous policy in the country, and at last, presents the new policy on investment defined at the end of 2018.

2. INCENTIVES PROVIDED FOR FOREIGN INVESTORS AND THE EFFECTS THEREOFF IN THE PERIOD FROM 2008-2017

The role of incentives for attracting FDI in countries of transition was thoroughly analyzed in the academic literature. Results of different researches led in this field were basically conflicting or with predominantly negative connotation. Most of the authors came to conclusion that the active approach in granting incentives to foreign investors might have strong negative impact upon the corruptive practices within the institutions of the system and might lead to withdrawal of the decision of a foreign investor to effectuate the investment. [1], [2] Cass F. investigated the role of fiscal and financial incentives, on one hand, and the policy applied by Investment Promotion Agencies (IPAs) in attracting FDI into European transition economies. [3] Abundant tax relieves usually have a negative impact on the total effect of the attracted FDI, as they increase the costs for the host country to an extent that might overcome the total positive effect of the effectuated foreign investment. It is even more important to point out that the up-to-date research in the area did not provide a proof on the statistically significant relation in attracting FDI neither with regard of institutional determinants nor in regard of financial and fiscal incentives. [4] Kalotay analyzed the FDI inflows in Bulgaria and Romania at the beginning of their EU accession process and found that despite the major labor costs and corporate tax advantages, these countries attracted relatively few efficiency seeking projects, mostly in garments and footwear. He further explains that in order to increase and materialize the FDI potential of these countries they need to improve the business environment by strengthening the judiciary system, fighting against corruption and organized crime in Bulgaria. [5]

Despite of the competition of providing various benefits and incentives for foreign investors, it is a fact that Western Balkan economies seem to be the least attractive for foreign investors. The main cause for this unattractiveness is the process of de-industrialization of WB economies. In 2014 the regional average share of manufacturing value added in GDP reached 12%, while the average share of services reached 62% of GDP. The regional average of realized FDI inflow was about 8% of the total GDP for the period from 2005-2014 and was more than two times bigger than the value of the same indicator calculated for the CEE economies at that time (3% of GDP). [6]

When speaking about the individual performance of the economies of the Western Balkans it is evident that the Macedonian economy has achieved very poor results and was overtaken by far by the Serbian economy which was considered to be the country with the biggest economic capacity for FDI in the region. However, the leading country by the amount of FDI per capita is Montenegro, which attracted 6,290 EUR per capita by the end of 2014.



Graph 1: FDI inflow in Western Balkans in the period from 2005 to 2014 (in million EUR)
Source: WiiW database

The FDI inflow in Macedonia during the last two decades remained very low and created approximately 2.5-3% of GDP per year. Foreign investors were unwilling to invest in a small, landlocked economy, with a limited domestic market, lack of access to fresh capital, low level of productivity deriving from inconvenient and technologically outdated economic structure and poor transport infrastructure. The government tried to improve the business climate by significant reforms of the legal system, therewith trying to provide liberal provisions on FDI and guaranteeing foreign investors national treatment. Since 2008 the most influential enacted law in this area has been the Law on Technological Development Industrial Zones. [7] According to this Law, companies functioning within the TDIZ enjoyed various customs and fiscal exemptions and reliefs, as well as state subsidies for covering the costs for building plants, free construction licenses and free connection to water and gas pipe infrastructure. The government also was due to provide subsidies for creation of new working posts within the TDIZ, for covering costs of employees' trainings, as well as exemptions from the employees' personal tax and from the payment of the corporate income tax. The most important incentives that the government provided for foreign investors in TDIZ are presented in Table 1.

Table 1: Government incentives for foreign investors within the TDIZ since 2008

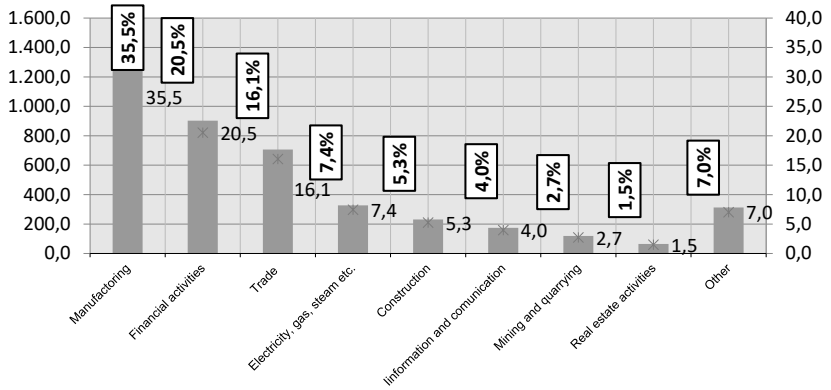
Incentives in infrastructure:	• Providing construction land for the new plants under a 99-year concession; • Free connection to the water and gas pipe infrastructure, free preparation of the construction land and free construction licenses; • Government participation in covering the building costs of new plants up to 500.000 Euro; • Tax exemptions for a 10-year period; • 0% of VAT; • 0% of Income Tax; • 0% of Personal Tax.
State subventions in cash:	• Subsidies on creating of new working posts; • Subsidies on the payment of the corporate income tax; • Subsidies on the employees' personal tax; • Subsidies on costs for employees' trainings.

Source: *Official Gazette of the Republic of Macedonia. No. 82(08,103),* p.8

The abundant incentives for foreign investors provided with the Law on TDIZ significantly changed the perception of the foreign companies of the business climate in the country. Nevertheless, the inflow of FDI did not experience any improvements. On a contrary, right after

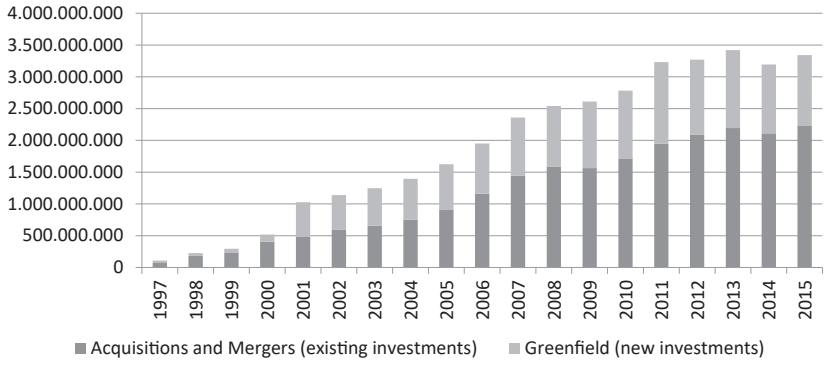
passing the Law on TDIZ and due to the economic crises in the EU back in 2009-2010, foreign investors started to withdraw money in the form of loans from their affiliations in the country. At the same time the amount of reinvested profit in the economy decreased substantially. Therefore, the amounts of outflow of capital overcame the inflows of capital in the economy. [8]

In the period since 2011 investment in the TDIZ intensified which resulted in strengthening of the position of the manufacturing sector, and within it, the position of the chemical industry. Other important manufacturing sub-sectors in the country that attracted additional foreign investment happened to be basic metals and fabricated metal products, food products, beverages and tobacco products, as well as motor vehicles, trailers and semitrailers. Graph 2 shows the economic structure of FDI at the end of 2015 in the country. [9]



Graph 2: FDI economic structure in Macedonia in 2015 (millions of euro and %)
Source: Data used from www.nbrm.gov.mk

Despite the fact that the average FDI inflow at annual level did not change, the structure of the invested foreign capital changed significantly not only in regard of the industries, but also in regard of the form in which it was invested. Thus, the participation of green-field investment in the total amount of FDI began to increase. Prior to 2011 the dominant form of investment in the economy was mergers and acquisitions with a ratio of 38% versus 61% of the total amount of FDI in favor of the later. The established TDIZ managed to attract about 1.13 billion Euros of FDI in the form of green-field investment until the end of 2015. Invested capital predominantly originated from European economies, among which the biggest investors came from Austria, Great Britain, Germany and Turkey. Data on the changing structure of FDI according to the form of investment is presented in Graph 3.



Graph 3: Greenfield investment and acquisitions & mergers in Macedonia in period from 1997 to 2015 (in EUR)
Source: Data used from www.nbrm.gov.mk

The concept of attracting FDI with abundant incentives provided for investment in the TDIZ was severely criticized by the business community, as well as by the academia. The basic arguments were that the fresh capital that was invested in the economy was of a rather limited scope, and that the costs for attracting foreign investors overcome the positive effects of the capital invested in the country. This was the motive for us to construct a VECM on selected endogenous and exogenous variables potentially connected to the FDI inflow. As endogenous variables we used economic growth, labor productivity, openness to trade and current account balance. The exogenous factors were represented by political and institutional variables that have only one-way potential influence upon FDI inflows. The results of the VECM confirmed that economic factors, such as the ability to generate higher profits, openness to trade and cheap skilled labor force, were the leading factors for investing in Macedonia. Considering the relation in regard of availability of cheap labor, in many cases in Macedonia foreign investors created jobs by employing workers who were already employed in domestic companies which made tax incentives and costs on education for the newly employed highly expensive and ineffective. The dynamic analysis of the current account deficit confirmed that the effect of TDIZ in the first five-year period was generally small and as such resulted from higher initial import of equipment and materials at the time of founding the new facilities in the initial investment cycle, while more significant effects were registered in the last two years, when the effect on the deficit contributed to narrowing the negative gap in the current account. [11]

3. THE NEW POLICY ON FINACIAL SUPPORT OF INVESTMENT

The applied policy on support of foreign investors was confirmed to be rather disputable in terms of open discrimination of domestic investors and of being a source of un-loyal competition on the labor market which made serious damage to domestic investors. The later lost the most skilled and experienced workers by not being able to offer them better payment due to the obligation to pay all duties and taxes to the government.

The severe critics on the previous model on FDI influenced the substitution of the old model with a new one that provides support of investment for both domestic and foreign investors on same terms. The basic preconditions for becoming a user of the state support are providing a prove on increment of company's revenues three years in a row with an unchanged average or with increased number of employees in the last year compared to the average number of employees in the last three years. [12] The short review on provided incentives with the new law are presented in Table 2.

Table 2: Eligibility for financial support according the new policy on investment

• Creation of new working posts: • Establishing and enhancing cooperation with domestic suppliers; • Technological R&D; • Investment project of significant economic interest; • Increment of capital investment and revenues; • Repurchase of equipment from enterprises facing difficulties; • Enterprises that increased their competitiveness on the market or increased sales on new markets.

Source: www.economy.gov.mk, last accessed on the 21st of May, 2019, pp. 3-4

The new model tries to eliminate or to improve some of the inconsistencies of the old model. Among the most important is termination of the predatory practice of overtaking well experi-

enced and skilled workers from domestic companies by defining a precondition for using the offered support only for new employees who were out of work for at least three months and were not employed by the same employee at least 12 months before; that are out of work because of bankruptcy of the company in which they used to work or were employed in public or state administration. [13]

The previous model did not create any spill-over effects for the Macedonian manufacturing companies, as only a dozen of small firms were engaged as suppliers of components for foreign investors' companies. This model provides financial support in amount of 1% of total value of supplied materials or a total of 300,000 Euros per year for companies that used at least 15% of the value of total input for their production in the previous calendar year from domestic sources. [14]

As projects with significant economic impact eligible for financial support is recognized investment of at least 4 mil. Euros that are going to create at least 300 working posts or investment of at least 20 mil. Euros. [15]

The financial support is going to be provided from 3 to a maximum 10-year period of time. [16]

CONCLUSION

The new model on financial support of investment was proposed at the end of 2018. Therefore, it could not be tested in practice, yet. Although, it tries to eliminate some defects of the old model especially in regard of open discrimination of domestic investors and predatory overtaking of skilled and experienced working force from domestic companies, the proposed model is still based on a direct state support and supports the existence of TDIZ. The incentives provided with the new model may cumulate with the incentives provided with the previous ones if the old agreement is still active and the company fulfills the new rules. It does not seem to create real opportunities for elimination of the influence of political and institutional inefficiencies. This model could also be disputable on a long run as the existence of TDIZ and abundant direct state support are not in compliance with the EU regulation.

REFERENCES

[1] Zemplinarova, A. (1996): *Incentives and Disincentives for FDI in Transition Economies,* Economic Institute of the Academy of Sciences, Prague
[2] Cleeve, E. (2008): "How effective are scale incentives to attract FDI to Sub-Saharan Africa?", *The Journal of Developing Areas*, 46(1), pp.135-153
[3] Cass, F. (2007): "Attracting FDI to transition countries: the use of incentives and promotion Agencies"*, Transitional Corporations* 16 (2), p. 77
[4] Assuncao, S., R. Forte, and A. C. Teixeira (2011): "Location Determinants of FDI: A Literature Review", *FEP Working Papers*, Universidade do Porto, Faculdade de Economia do Porto, Porto, p. 433
[5] Kalotay, K. (2008): "FDI in Bulgaria and Romania in the Wake of EU Accession", *Journal of East-West Business,* 14(1)
[6] The Viena Institute for International Economic Studies (WiiW) Database on Foreign Direct Investment
[7] Law, C.P., (2002): *Official Gazette of the Republic of Macedonia No. 82(08,103),* p. 8
[8] Kikerkova, I. (2013). "Empirical Evidence on Foreign Direct Investment Impact upon the Economic Growth of the Republic of Macedonia", *Scientific Conference on Innovative Ap-*

proaches to the Contemporary Economic Problems, 27-29 September 2013 Dubrovnik, Croatia, University of Dubrovnik, Department of Economics and Business Economics, p. 14
[9] www.nbrm.gov.mk
[10] ZMAI (2015): *The effect of the subsidized foreign direct investment upon the Macedonian economy,* Brochure II part, ZMAI, USAID and the Foundation of the Opened Society, (in Macedonian language), Skopje, p. 8
[11] Kikerkova, I. 7 all: "Vector Error Correction Model on FDI and Their Impact in the Republic of Macedonia" in Zagreb International Review of Economics and Business, Vol. XXI, No. 2, Zagreb, November, 2018, pp. 19-36
[12] "Law on financial support of investment" (in Macedonian language), www.economy.gov.mk, last accessed on the 21st of May, 2019, pp. 3-4
[13] "Law on financial support of investment" (in Macedonian language), www.economy.gov.mk, last accessed on the 21st of May, 2019, pp. 4-5
[14] "Law on financial support of investment" (in Macedonian language), www.economy.gov.mk, last accessed on the 21st of May, 2019, pp. 6-7
[15] "Law on financial support of investment" (in Macedonian language), www.economy.gov.mk, last accessed on the 21st of May, 2019, p. 8
[16] "Law on financial support of investment" (in Macedonian language), www.economy.gov.mk, last accessed on the 21st of May, 2019, pp. 1-16

APENDIX I

THE LONG-RUN TREND OF THE FDI/GDP INDICATOR IN MACEDONIA

The long-run trend of the FDI inflow/GDP indicator represents a statistical analyzes, as well as an econometric estimation with regard of certain economic, political and institutional variables in Macedonia for the period from 2003 until 2015.

In our analysis the variables that have a potential influence upon FDI inflows are divided into two categories. The first category is represented by endogenous variables with a potentially mutual influence upon and from FDI. It consists of the following set of economic variables: economic growth, labor productivity, openness to trade and current account balance. We have used quarterly data for a period of 13 years (from the first quarter of 2003 to the fourth quarter of 2015) obtained from the National Bank of the Republic of Macedonia and the State Statistical Office of the Republic of Macedonia. The second category is represented by exogenous (political and institutional) variables with potential one-way influence upon foreign investment inflows. These variables are calculated as indexes based on yearly data obtained from the World Bank, World Governance Indicator database for the period from 2003 to 2015.

Table 1 presents the specification of endogenous (2-5) and exogenous variables (6-7) included in the econometric model, as well as the signs, calculation, source and results expected for each variable.

Table 1: Endogenous and exogenous variables taken into account

Variable	Sign	Calculation	Source	Expected sign
Foreign direct investment inflow	FDI	FDI inflow/GDP	NBRM	+
Economic growth	GDPG	Real GDP growth rate	NBRM	+
Trade openness	OPEN	(Export + Import)/GDP	NBRM	+
Labor productivity	LABPRD	GDP per employee (rate of growth)	NBRM	+
Current account balance	BP	Current account balance/ GDP	NBRM	+ -
Index of institutional factors	INSTIT	Calculated as Index based on Corruption and Rule of law percentile rank for a country	World Governance Indicator, World Bank	+
Index of political factors	POLICY	Calculated as Index based on Political stability, Government Effectiveness and Regulatory Quality percentile rank for a country	World Governance Indicator, World Bank	+

A simple statistical approach provides an opportunity to obtain certain information and warnings, and draw some conclusions. However, these findings need to be further tested and validated by applying more complex models and methods. The econometric approach tries to explain the level of FDI inflows as a function of certain economic, political and institutional variables.

The FDI/GDP ratio is calculated as a function of certain fundamental variables and the "normal value" of this ratio is assessed. For this purpose, we have used VECM (the Vector Error Correction Model) in the following form:

$$\Gamma_0 \Delta y_t = \alpha\, [\beta' : \eta'] \begin{bmatrix} y_{t-1} \\ D^{co}_{t-1} \end{bmatrix} + \Gamma_1 \Delta y_{t-1} + \ldots + \Gamma_p \Delta y_{t-p} + B_0 x_t + \ldots + B_q x_{t-q} + CD_t + u_t \quad (1)$$

Where y_t is a vector of endogenous variables (FDI, GDPG, BP, LABPRD, OPEN), X_t is a vector of exogenous variables (POLICY, INSTIT) and D_t contains all determinant components.

In order to investigate the possibility of non – stationarity in the dataset, we used Augmented Dickey Fuller test for stationarity, and the **results of the unit root test** showed non – stationarity in the endogenous variables. To check the validity of the VECM model, we did a few diagnostic tests and found that the residuals of the regressions have normal distribution and do not show any auto – correlation.

Table 1 (Appendix) presents the descriptive statistics of both the endogenous and exogenous variables of the model. It demonstrates the mean, median, maximum, minimum, standard deviations as well as skewness and kurtosis values of the 52 observations associated with each of the 7 variables used in the study. According to the information criterion in the Table 2 (Appendix), especially SC (Schwarz information criterion) and HQ (Hannan-Quinn information criterion) based on unrestricted VAR, the number of lags in the model should be one.
Table 2 presents the long-run relations and their significance between the FDI indicator and other economic, political and institutional variables.

Table 2: Estimation of the model co-integration equation

Variable	Coefficient	t-statistic
GDPG	1.072193	2.49731*
OPEN	0.967329	6.00903*
LABPRD	0.550584	1.97861**
BP	-0.136292	-1.46816***
POLICY	0.149369	0.72078
INSTITUT	-0,204886	-1.05004

Note:
* means level of significance of 1%,
** means level of significance of 5%,
*** means level of significance of 10%

According to the results obtained, there is a long-run relationship between endogenous (economic) variables and the FDI indicator, with different levels of significance for each variable. The highest level of significance of 1% is found for the long-term relationship between FDI on one side, and economic growth and openness to trade, on another side. The level of significance of the labor productivity long-term parameter is 5%, while the current account balance parameter has the lowest level of significance of 10%. Additionally, there is an insignificant long-term influence of the political and institutional variables on FDI inflows. According to the results obtained, we can conclude that economic factors (primarily the ability to generate higher profits, openness to trade and the cheap skilled labor force) constitute leading factors for investing in Macedonia.

Table 3: Descriptive statistics parameters

	FDI	GDPG	BP	LAB PRD	OPEN	POLICY	INSTITUTIONAL
Mean	3.8	3.4	-4.1	1.7	98.3	47.1	47.6
Median	2.6	3.4	-3.8	0.5	103.6	46.8	51.7
Max	21.4	10.7	7.2	12.6	120.0	61.0	57.9
Min	-1.1	-3.7	-21.1	-10.5	67.5	36.5	32.4
Std. Dev.	3.7	3.7	6.4	5.1	15.1	6.4	7.4
Skewness	2.3	0.2	-0.7	0.2	-0.4	0.2	-0.6
Kurtosis	11.0	2.2	3.6	2.9	2.0	3.0	2.2
Observations	52	52	52	52	52	52	52

The long- run parameter of the economic growth (**GDPG**) is positive and highly significant, showing that if real GDP growth rate increases by 1 percent, then the FDI inflows will increase on average by 1.072193 percent, assuming all other factors unchanged. Moreover, this positive relation is in accordance with our initial expectations and has credible theoretical background by its own definition. As a rule, the market size has a positive relation with FDI, which means that a larger market and a market that is increasingly growing will receive larger inflows of FDI. On the other hand, growth enhancing the acceleration of FDI inflow suggests that the increase in FDI causes a positive reaction to the economic growth in Macedonia.

With regard to the openness of the economy (**OPEN**), a positive and highly significant long-run relation has been obtained, assuming all other factors unchanged. The research points to the importance of an open economy for attracting FDI. This is in accordance with our initial expectations and is also found in some previous empirical studies. Countries that want to attract more FDI ought to increase foreign trade exchange as well (Aiedu, 2006). At the same time, some empirical studies (Aiedu, 2006; Vijayakumar et al. 2010) argue that countries which receive less FDI would be more attractive if they implemented reforms that liberalize their foreign trade.

Table 4: The number of lags in the model

VAR Lag Order Selection Criteria
Endogenous variables: FDI GDPG BP LABPRD OPEN
Exogenous variables: C POLICY INSTITUTIONAL
Sample: 2003Q1 2015Q4
Included observations: 48

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-527.9205	NA	69274.48	22.49669	22.96449	22.67347
1	-491.1196	62.86813	29344.33*	21.62999	22.72152*	22.04248*
2	-477.4098	21.13605	33091.90	21.72541	23.44067	22.37361
3	-464.2882	18.04221	39353.52	21.84534	24.18434	22.72925
4	-439.8703	29.50489*	30516.08	21.49460*	24.45733	22.61422

* indicates lag order selected by criterion

The labor productivity (**LABPRD**) long-run parameter is positive and significant, with a lower level of significance of 5%, which shows that if the labor productivity increases by 1 percent, then the FDI indicator will increase by 0.550584 percent on average, assuming all other factors unchanged. Given the growth rate of labor productivity is increasing the amount of GDP per

employee we can conclude that attractiveness for investment in Macedonia is increasing with the ability to generate more revenue per employee. Taking into consideration that FDI enable the creation of new jobs, productivity growth would mean faster GDP growth relative to the increase in number of employees. On the other hand, as a result of FDI, application of modern technology and know-how is expected, which would in turn encourage the growth of productivity. Even though the result was in line with our initial expectations and theoretical background in mind, it is necessary to take into account the fact that the relationship is at a lower level of significance of 5% and this long-term placement of parameters is not as pronounced in this respect. Therefore, it is necessary to take into account the fact that in many cases foreign investors create jobs by employing workers who were already employed in domestic companies. In this case of unchanged number of employments, the state faces higher costs due to its state tax incentives and education for the newly employed.

The long-run parameter of the current account balance (BP) is negative and with a weak level of significance of 10%. The inverse relation is a result of the FDI inflow influences in reducing the current account balance of payment's deficit. This is in accordance with the NBRM paper analyzing the effects of companies' activity in TDIZ on the balance of payments of the Republic of Macedonia, where it is stated that the operation of new companies improved (narrowed) the current account deficit by an average of 0.3 percentage points of GDP in the past seven years. Namely, the average current account deficit in the period 2009-2015 amounted to 2.6% of GDP, while if the activity of the new companies was excluded it would be 3.0% of GDP. The dynamic analysis of the current account deficit is a useful explanation of our results relating to the weak significance between FDI and current account balance, showing that the effect of TDIZ in the first five-year period is generally small and such dynamics of the current account balance results from higher initial import of equipment and materials at the time of founding the new facilities and the initial investment cycle, while more significant effects were registered in the last two years, when the effect on the deficit contributed to narrowing the negative gap in the current account.

If we look at the institutional and political variables with potential influence on FDI separately, we can consider that the Index of Political Factors **(POLICY)** based on Political Stability, Government Effectiveness and Regulatory Quality percentile ranks for a country, has a positive relation with the FDI indicator. This index captures the perceptions of the ability of the government to formulate and implement sound policies and regulations, quality of public services, the degree of independence from political pressures, as well as the likelihood of political instability. Hence, greater government credibility and political stability have greater potential to accelerate the FDI inflow in the country.

The Index of Institutional Factors **(INSTITUT)** is calculated as an index based on the Corruption Percentile Rank for a country (captures the perceptions of the extent to which public power is exercised for private gain) and the Rule of Law Percentile Rank for a country (captures the perceptions of the extent to which agents have confidence in the quality of contract enforcement, property rights, the police and the courts). According to the results obtained, there is an inverse insignificant influence of the index of institutional factors on FDI in Macedonia. The inverse relation between FDI and institutional factors may indicate that the lack of transparency, low quality of contract enforcement, insufficient control of corruption and inefficient courts may attract more FDI inflows as a result of greater opportunity for profit generation in a country with lower levels of institutional regulation.

BEHAVIORAL TENDENCIES OF SUPPLY CHAIN MANAGERS IN CONTEXT OF GLOBALIZATION

Mária Nagranová[1]

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Abstract: *This paper presents the results of research study focused on changes in behavior of supply chain managers through the lens of globalization. The main aim is to examine the impact of globalization on supply chain managers' tendencies towards partnership creation. This research was conducted on a sample file of Slovak businesses throughout the ten years of their supply chain activities. Significant changes were examined in managers' focus on structure of supply chains, partnership creation, the importance of foreign suppliers and customers, as the key components of globalization impact on businesses. Multivariate Regression Analysis was used as a main method to perform statistically significant examinations. Findings provide an overview of how globalization can affect supply chains of business companies.*

Keywords: *Supply chain management, globalization, business partnerships.*

1. INTRODUCTION

Supply chain management was developed in the last decades as a response to various novel challenges and pressures put on companies globally. However, its implementation by companies has not been an easy process, especially since its termination should consist of the measures designed to achieve sustainability of all supply chain activities. The key elements of its success are managers responsible not only for day-to-day activities, but also for the strategic goals and approaches adopted by these companies. Moreover, these managers remain the ones who carry the burden for innovation of supply chains in order to adapt to external disruptions and to gain competitive advantage for their company or whole supply chain. Their decisions affect whether the company's is able to approach to markets quickly and is also able to spend less money doing so. Nowadays, it is the role of supply chain managers to ensure the cost minimization, production disruptions avoidance and profitability of company or even the whole supply chain. The task is immense and complex, however not impossible.

In the history of contemporary business activities in supply chains numerous factors have strongly shaped the development of companies' competitive focus and their challenge to deal with market problems in order to reach sought-after outcomes. Globalization has recently become a major business factor, especially in the last decade. Its affects are vast and can vary depending on differences in markets. There is a significant pool of current literature on measuring the effects of globalization on business operations such as [1], [2], [13], [21], [27], and [30]. However, the changing results of global supply chains provided impactful evidence that it is not sufficient for companies to face their competition by themselves as described by [27]. Nowadays, the competition is not just among companies, but among their supply chains as proven by many research studies investigating the potential links between supply chain performance and quality of relationships among its members such as [10], [14], [3] and [22]. The role of supply chain manager is therefore crucial in creating the advantage for their company and achieving desirable results in terms of supply chain performance.

[1] Wyższa Szkoła Menedżerska w Warszawie, Faculty of Jan Amos Komenský in Karviná, Lúčna 14, Poprad 05801, Slovak Republic

According to [28], [25] and [8] modern growth of the economies worldwide is characterized by an evolutionary transition from the industrial stage of economic reproduction to the stage of information-network interaction. Such a transition is accompanied by a radical change in the principles and methodology of economic activity, a change in the structure of the economy and the globalization of the markets for goods and services. Therefore, to analyze the impact of globalization on supply chains, it is necessary to take a closer look on their key component – the person responsible for supply chain activities in company. All of such managers have different approach to supply chain partnerships and this approach can also evolve in time due to outside pressure. According to [16], [17], partnerships are based on mutual trust. [12], [19] and [23] added two additional key components that are indispensable for successful partnership, which are reliability and commitment. Supply chain partners share a common objective and are committed to work together to achieve it since they are aware that superior outcomes can be obtained in synergy. Therefore, these four main components of partnerships in supply chains directly affect its performance. Many authors such as [4], [5], [11], [20], [31] focused on this issue, however, their point of view is from a certain company or production industry. In supply chain, the final product is obtained as a result of series of transformation activities that serve as an integrated unit in its corresponding process as proved by [6], [9], [24], [18], [7], [15], [29]. The extent of supply chain activities stretches from the primarily supplier of raw materials to the ultimate consumers and supply chain managers are responsible for smoothness of all of these processes, consequently for its performance.

The literature field is vast, however, there is a research gap. No studies have yet examined how globalization changed the tendencies of supply chain managers. Such changes can have significant impacts on supply chain partnerships and consequently on supply chain performance. Therefore, this research study aims to cover this lack of information and provide a novel focus on supply chain management through the lens of globalization.

2. METHODOLOGY

The main aim of this research study was to examine the impact of globalization on supply chain managers' tendencies towards partnership creation. The examination of supply chain managers' preferences was based on assumption that globalization has created changes in importance of different aspects of partnerships throughout supply chains. Therefore, managers responsible for supply chains had been constantly pressured to reconsider their priorities in terms of supply chain performance and risk management.

The source of data was two separate surveys conducted ten years apart on the same sample file. This research was conducted on a sample file of Slovak businesses throughout the ten years of their supply chain activities. Questionnaires were used to collect data which were distributed electronically via e-mail sent directly to supply chain / logistics managers or managers responsible for supply chain activities and processes. Since base file consisting of all Slovak companies would be too large and diverse to provide information on globalization changes, a single industry was selected. Therefore, corresponding managers of Slovak automotive industry were contacted; however, not all of them complied with the request to provide data for this research study. Table 1 provides data on sample files from both surveys. Since the period of 10 years is a relatively long time, it was not possible to get responses from the same managers during both rounds of questioning. However, the same companies were selected for participation. Only one manager from each company participated on the survey.

Table 1: Sample files

Number of employees	*Number of companies in 2008*	*Percentage*	*Number of companies in 2008*	*Percentage*
0 - 9	115	57,50%	127	59,62%
10 - 49	36	18,00%	42	19,72%
50 - 249	31	15,50%	28	13,15%
over 250	18	9,00%	16	7,51%
Total	200	100,00%	213	100,00%

The representativeness of the sample file was verified using the Chi-square test. The criterion was set on size of company structured by the European Standard No. 2003/361/EC. The null hypothesis was set to assume that the sample is representative. The alternative hypothesis is an assumption of non – representativeness of the sample. From the mathematician point of view the hypothesis are formulated as:

$$H_0 = F(x) = G(x); H_1 = F(x) \neq G(x) \quad (1)$$

Statistics testing in SPSS software is based on formula 2 previously used by [26]:

$$X^2 = \sum_{j=1}^{r} \frac{(n_j - m_j)^2}{m_j} \approx X^2_{(r-1)} \quad (2)$$

where:

X^2 - is Pearson Chi-square statistics,
r - is line,
n - is overall frequency in the base set,
m - is measured frequency.

Significant changes were examined in managers' focus on structure of supply chains, partnership creation, the importance of foreign suppliers and customers, as the key components of globalization impact on businesses. Multivariate Regression Analysis was used as a main method to perform statistically significant examinations.

Multivariate Regression Analysis was used to test assumed significant relationships. The confidence level was set at 95 %. The model for the analysis was formulated as follows:

$$Y = \beta_0 + \beta_1 \times X_1 + \beta_2 \times X_2 + \beta_3 \times X_3 + \beta_4 \times X_4 + \sigma(Y) \quad (3)$$

where:

Y is level of changes in tendencies of supply chain managers caused by globalization,
β_0 is intercept,
$\beta_1 - \beta_6$ are regression coefficients,
$\sigma(Y)$ is residual standard deviation,
X_1 is age of supply chain managers,
X_2 is education of supply chain managers,
X_3 is gender of supply chain managers,
X_4 is years of experience of supply chain managers in this business area.

3. RESULTS AND DISCUSSION

The impact of globalization on tendencies of supply chain managers was examined through the main aspects of supply chain partnership. These factors contained four main partnerships prerequisites for success as described by various literature sources. They are the importance of trust among supply chain partners, the importance of commitment of supply chain partners, the importance of reliability of supply chain partners and the extent of information shared with supply chain partners. The personality of supply chain manager plays a key role in all of these aspects.

The importance of these three main supply chain partnership components has changed during the examined period. In 2008 the trust was the most significant prerequisite for successful partnership as stated by 87 % of supply chain managers. However, the situation changed since trust became the least significant component out of all three in 2018. Over 93 % of managers in 2018 consider partner's reliability to be the most important factor, even though reliability ranked on the third place in 2008. In this ranking the commitment of partners is the only component whose importance has not changed significantly. Figure 1 shows how the importance of these three components changed during the decade.

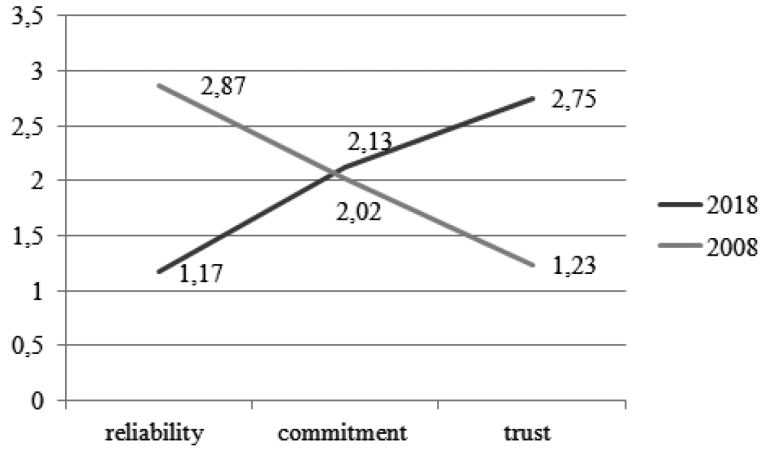

Figure 1: Changes in importance of partnership components

The extent of information shared by supply chain managers with their partners has also change drastically. Whereas, in 2008 managers only shared in average 32.85 % of information with their partners, in 2018 this percentage has grown up 59.03 % to in average.

Multivariate Regression Analysis model was used in order to describe how the opinions and perceptions of supply chain managers on these partnership aspects have changed throughout a decade. Significant relationships were identified between various characteristics of supply chain managers and examined supply chain partnership aspects. It was discovered that managers' education in terms of its length and studied field has no impact on importance of any supply chain partnership aspects. It is very similar for gender. This characteristic has no impact on changes in behaviour of managers caused by globalization. On the other hand, the age of managers is a factor of great importance. There is a significant indirect dependence between manager's age and his or her changes in tendencies caused by globalization. Therefore, it is possible to assume that younger managers are more affected by processes of globalization than managers above 40 years. The trend was however, exactly opposite in terms of their experience. It was discovered that there is a direct significant dependence between these factors. It means that more years of experience managers have in supply chain management, more likely they are to change their behavior and decisions due to globalization.

These two significant relationships that were discovered by the model were further explored in greater detail. The model considers the changes in behaviour caused by globalization as an overall effect combining all of its aspects together. It was necessary to create the Multivariate Regression Analysis model as such in order to identify significant relationships. However, once these dependences are discovered, it is possible to use both managers' age and their years of experience and correlate them with individual aspects of supply chain partnerships. Table 2 provides data on individual correlation coefficients.

Table 2: Correlation coefficients

Partnership aspects	***2008***		***2018***	
	manager's age	***manager's years of experience***	***manager's age***	***manager's years of experience***
trust	- 0.620	0.792	- 0.653	0.784
commitment	0.281	0.143	- 0.193	0.072
reliability	- 0.683	0.728	- 0.747	0.804
extent of information shared	0.301	- 0.272	0.246	- 0.153

According to the data provided in Table 2, it is possible to conclude that two main partnership aspects that both manager's age and years of experience correlate with are trust and reliability. Changes in partner's commitment and extent of information shared are mostly not affected by these manager's characteristics, therefore were not the source of changes in their behavior due to globalization.

CONCLUSION

The main aim of this research study was to examine the impact of globalization on supply chain managers' tendencies towards partnership creation. A Multivariate Regression Analysis was performed to evaluate significant relationships. Two such relationships were identified and explored. It was discovered that manager's years of experience directly correlates with changes in his or her behavior caused by globalization. On the other hand, age of manager correlates with such changes indirectly. Supply chain partners' trust and reliability are the main aspects on such partnerships with later being the most significant nowadays.

There were a few similar studies conducted on the topic of globalization's influence on supply chain. A study by [27] also focused on trust, commitment and reliability of partners within supply chain, however the focus was on entire companies. Therefore, the role of supply chain managers was omitted. Furthermore, [11] focused on exploring the dynamics of globalization through the lens of supply chains, however they examined the changes based on the risk management approach. The way managers' personality can affect such changes was not analyzed. Other studies such [10] and [25] combined the issue of globalization with other factors like economic growth and sustainability. Our study thus provides novel information that has not yet been explored by researchers. Findings can serve as guidelines for further interdisciplinary studies into behavioral changes caused by globalization and its effects on business activities.

REFERENCES

[1] Bentu, P. (2017). The Globalization of Inequality. *Political Studies Review*, 15. pp. 464-464.
[2] Blackledge, P. (2017). Globalization and the Critique of Political Economy: New Insights from Marx's Writings. *Political Studies Review*, 15 (3). pp. 423-424. doi: 10.1177/1478929917708112.
[3] Chen, J. V. et al. (2014). A causal model for supply chain partner's commitment. *Production Planning & Control: The Management of Operations*, 25 (9). pp. 800-813. doi: 10.1080/09537287.2013.764578
[4] Chen, Y. (2012). Study on the Selection and Evaluation of Supply Chain Partners Based on AHP. *Advanced Research on Material Engineering and its Application*, 485. pp. 233-238. doi: 10.4028/www.scientific.net/AMR.485.233
[5] Chopra, S., Sodhi, M.S. (2014). Reducing the Risk of Supply Chain Disruptions. *MIT Sloan Management Review*, 55. pp. 73-+.
[6] Das, K. (2011). Integrating effective flexibility measures into a strategic supply chain planning model. *European Journal of Operational Research*, 211 (1). pp. 170–183. doi: 10.1016/j.ejor.2010.12.006
[7] Dzuke, A. Naude, M.J.A. (2017). Problems affecting the operational procurement process: A study of the Zimbabwean public sector. *Journal of Transport and Supply Chain Management*, 11. pp. doi: 10.4102/jtscm.v11i0.255
[8] Glushova, S. et al. (2019). The economy of developing countries in the context of globalization: Global supply chain management. *International Journal of Supply Chain Management*, 8 (1). pp. 876-884.
[9] Gong, Z. (2008). An economic evaluation model of supply chain flexibility. *European Journal of Operational Research*, 184 (2). pp. 745–758. doi: 10.1016/j.ejor.2006.11.013
[10] Gozgor, G., Can, M. (2017). Causal Linkages among the Product Diversification of Exports, Economic Globalization and Economic Growth. *Review of Development Economics*, 21 (3). pp. 888-908. doi: 10.1111/rode.12301
[11] Kalafsky, R.V., Conner, N. (2015). Exploring the dynamics of globalization: supply chain vulnerability to natural disasters. *Journal of Geography in Higher Education*, 39 (1). pp. 173-181. doi: 10.1080/03098265.2014.965666
[12] Lin, Y.-K. et al. (2016). A simple algorithm to evaluate supply-chain reliability for brittle commodity logistics under production and delivery constraints. *Annals of Operations Research*, 244 (1). pp. 67-83. doi: 10.1007/s10479-014-1741-0
[13] Nakagawa, J. (2013). Global supply chains and FTAs in East Asia and the Pacific. *Asian Journal of WTO & International Health Law and Policy*, 8 (2). pp. 439-460.
[14] Patnayakuni, R. et al. (2014). Relational antecedents of information flow integration for supply chain coordination. *Journal of Management Information Systems*, 23 (1). pp. 13-49. doi: 10.2753/MIS0742-1222230101
[15] Peidro, D. et al. (2010). A fuzzy linear programming based approach for tactical supply chain planning in an uncertainty environment. *European Journal of Operational Research*, 205 (1). pp. 65-80. doi: 10.1016/j.ejor.2009.11.031
[16] Pongsathornwiwat, N. et al. (2017). Developing Evaluation Criteria for Partner Selection in Tourism Supply Chain Networks. *International Journal of Knowledge and Systems Science*, 8 (1). pp. 39-52. doi: 10.4018/IJKSS.2017010103
[17] Pun, H., Ghamat, S. (2016). The value of partnership under competition: When competitors may be R&D joint-venture and supply-chain partners for a critical component. *International Journal of Production Economics*, 177 (1). pp. 1-11. doi: 10.1016/j.ijpe.2016.03.018

[18] Raghupathy, R., Amirthagadeswaran, K.S. (2014). Optimization of Casting Process Based on Box Behnken Design and Response Surface Methodology. *International Journal for Quality Research*, 8 (4). pp. 569-582.
[19] Rahmani, D., Mahoodian, V. (2017). Strategic and operational supply chain network design to reduce carbon emission considering reliability and robustness. *Journal of Cleaner Production*, 149. pp. 607-620. doi: 10.1016/j.jclepro.2017.02.068
[20] Rajaguru, R., Matanda, M. (2013). Effects of inter-organizational compatibility on supply chain capabilities: Exploring the mediating role of inter-organizational information systems (IOIS) integration. *Industrial Marketing Management*, 42 (4). pp. 620-632. doi: 10.1016/j.indmarman.2012.09.002
[21] Sačkov, I., Smreček, P., Tuček, J. (2014). Forest transportation survey based on airborne laser scanning data and GIS analyses. *GIScience and Remote Sensing*, 51 (1). pp. 83-98. doi: 10.1080/15481603.2014.883213
[22] Sodhi, M. S., Tang, C. S. (2012). Strategic approaches for mitigating supply chain risks. *International Series in Operations Research & Management Science*, 172. pp. 95-108.
[23] Taki, P. et al. (2016). Risk-pooling strategy, lead time, delivery reliability and inventory control decisions in a stochastic multi-objective supply chain network design. *Annals of Operations Research*, 244 (2). pp. 619-646. doi: 10.1007/s10479-016-2115-6
[24] Veselovská, L. (2017a). Study of Impacts the Quality of Information Systems have on Measures used to Increase Supply Chain Flexibility in Slovak Tourism Industry. *International Journal of Applied Business and Economic Research*, 15 (25), pp. 391-403.
[25] Veselovská, L. (2017b). Factors influencing countries on their path to sustainable development: implications for organizations. *Problems and Perspectives in Management*, 15 (2), pp. 475-486. doi:10.21511/ppm.15(si).2017.01
[26] Veselovská, L. et al. (2018). Relationship between information sharing and flexibility in management of enterprises in automotive industry: an empirical study. *Serbian Journal of Management*, 13 (2). pp. 381 – 393. doi: 10.5937/sjm13-17474
[27] Veselovská, L., Závadský, J. (2017). Impact of Globalization on Quality of Partnerships in Service Supply Chains. *Globalization and its Socio-Economic Consequences*. Proceedings of 17th International Scientific Conference, Žilina: The Faculty of Operation and Economics of Transport and Communications, University of Žilina, 2017. pp. 2849-2855
[28] Volodina, E.V. et al. (2020). Optimization of logistics business processes based on the implementation of cognitive information technology. *Smart Innovation, Systems and Technologies*, 138. pp. 455-464. doi: 10.1007/978-3-030-15577-3_44
[29] Wang, W. et al. (2009). Inner and outer loop optimization in semiconductor manufacturing supply chain management. *Computational Management Science*, 6 (4). pp. 411-434. doi: 10.1007/s10287-008-0081-4
[30] Závadská, Z. et al. (2016). Consistency of the performance management system and its quantification using the Z-MESOT framework. *International Journal for Quality Research*. 10 (4). pp. 665-684. doi: 10.18421/IJQR10.04-01
[31] Yan, T., Azadegan, A. (2017). Comparing inter-organizational new product development strategies: Buy or ally; Supply-chain or non-supply-chain partners?. *International Journal of Production Economics*, 183 (A). pp. 21-38. doi: 10.1016/j.ijpe.2016.09.023

IMPACT OF SELECTED CORPORATE GOVERNANCE DETERMINANTS ON CORPORATE SOCIAL RESPONSIBILITY REPORTING IN SLOVAK INSURANCE COMPANIES

Janka Grofčíková[2]
Katarína Izáková[3]
Dagmar Škvareninová[4]

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Abstract: *Corporate governance (CG) creates important signals that the company sends to its surroundings. It affects the performance of the company and consequently the satisfaction of owners and employees, the trust of creditors, clients and all other interest groups. There are several ways to gain their trust and satisfaction. One of them is to present information on financial support for activities of corporate social responsibility (CSR). The application of CSR in practice is all the more important in companies providing insurance services, which are often referred to in the literature as trust-based products. There is little attention paid to the research of corporate governance in relation to CSR in insurance companies. Therefore, in our paper, we examine the impact of selected determinants of corporate governance on CSR information disclosure in insurance companies based in Slovakia. We use the basic methods of regression and correlation analysis to quantify this relationship. The selection of explanatory determinants of CG is carried out in accordance with the assumption of stakeholders' theory of management. The goal is to find out which set of variables will better explain the impact of corporate governance on CSR reporting. We test the financial and non-financial determinants of CG separately for each party. We are looking for the best model for explaining the influence these parties have on reporting of CSR information.*

Keywords: *Corporate governance, corporate social responsibility, insurance companies.*

1. INTRODUCTION

The importance of the insurance industry for all segments of the economy is undeniable, since it results from its ability to mitigate unfavorable financial situation of individuals and businesses that arises as a result of negative events. The main role of the insurance industry is raising funds for the efficient coverage of risk. Therefore, trust in the clients by insurance companies is crucial. As a matter of course, insurance companies are expected to set the right standards for CG and CSR to be able to build this trust and keep their clients loyal. It is recommended to treat CG and CSR as two sides of the same coin, as it motivates companies to do their business with respect to the benefit of the whole society. At present, companies are more aware of the importance of their "goodwill", which is closely associated to CSR. According to surveys, companies that apply this concept are more successful in the long run. Insurance companies in the SR, as members of their parent multinational companies, follow the rules and policies of

[2] Department of Finance and Accounting, Faculty of Economics, Matej Bel University in Banská Bystrica, Tajovského 10, 975 90 Banská Bystrica, Slovakia

[3] Department of Finance and Accounting, Faculty of Economics, Matej Bel University in Banská Bystrica, Tajovského 10, 975 90 Banská Bystrica, Slovakia

[4] Department of Finance and Accounting, Faculty of Economics, Matej Bel University in Banská Bystrica, Tajovského 10, 975 90 Banská Bystrica, Slovakia

CSR, and thus contribute to their sustainable development and the development of the whole society. Specificities of CG have been studied by some authors. Apparently, with regard to systemic importance, their studies mainly focus on CG in the banking sector. Among them, [2], [6] examined CG and management of banks in the period before and after the financial crisis. Although the banking and insurance sectors are closely interconnected, the aspects of CG in insurance have yet to be investigated to a sufficient range. These issues are, however, partly examined in the work of [27]. Her work is devoted to seeking comprehensive and systematic insight into academic studies which are focused on analyzing recent legislation and interventions in the field of management and corporate governance in insurance.

In our paper we will try to interconnect these basic concerns. We will examine selected key determinants of CG and management of companies operating in the insurance sector in terms of two basic approaches to company management. Consequently, we will assess their impact on CSR. Therefore, the aim of our study is to examine the impact of selected CG and financial performance determinants on CSR reporting in insurance companies in Slovakia.

2. LITERATURE REVIEW

The importance of management and CG of companies have been investigated by several authors, e. g. [10], [28], [21] and others. However, they mainly focus on enterprises operating in the non-financial sphere. The concept of CG indicates the system by which companies are managed and controlled. With regard to this concept, the role of shareholders is to appoint the Director and auditors as well as to establish supervision to ensure that appropriate control structures are implemented [9]. [24] further completes this argument since he assumes that the application of CG principles, alongside the impact on innovation potential, also has an impact on business performance. CG research from different points of view and in different countries is exploring [32], [16], [17], [30], [14], [31], [22], [4], [19], [5], [26].

Institutions also deal with CG issues. One of them is the OECD. In 1999, this organization developed the first set of CG principles, which was subsequently revised and supplemented in 2004 and 2015. The current valid version was developed in cooperation with the OECD and G20 [15]. This document consists of 6 separate chapters. In the Slovakia, compliance with the principles of CG that relate to insurance companies is also regulated by Act [1], in which is implementing The European frame Solvency II.

The principles of CSR are purposefully integrated into EU strategic documents, (e.g. [12]) and are supported by many international organizations of the United Nations, OECD and governmental organizations, as part of the concept of sustainable global development. [23] concludes that the rhythm and pace of CSR growth varies across continents, countries, sectors and businesses. According to [8], corporate responsibility is a commitment of entrepreneurs to pursue the strategies and to make the decisions or carry out activities that are desirable from the point of view of the company's goals and values. [20] treat CSR as a separate field that exists alongside the company's management, but in any case, there is a close link between these two fields. They conclude that CSR includes economic, legal, ethical and philanthropic (charitable) responsibilities that society expects from the enterprise. Through the level of social responsibility, the company demonstrates its sensitive approach to society problems and at the same time it indicates the quality of cooperation with stakeholders. [11] and [7] analyze how business entities benefit from the policies of CSR.

The focus of CSR is to build relationships in order to involve all stakeholders in business activities and projects. Additionally, this concept also includes human resources, formal and legal conditions, and the protection of the environment on a voluntary basis. The aspects of CSR are basically defined in seven major areas: (1) CG, (2) employee behavior, (3) human rights, (4) integrity in customer relationships, (5) the environment, (6) business integrity, and (7) social obligations.

Within the assessment and reports on CSR, the Triple Bottom Line (TBL) concept is used by [13]. Three "P" mean Profit - (Economic Prosperity), People - (Social Capital - based on measurement of CSR activities of the company), Planet – (Environmental Component). Measurement of the "performance" of a CSR by TBL is through the relative objective quantification of indicators in several areas, as reported by [25].

In this paper, the "performance" of insurance companies in Slovakia that funded areas of CSR was monitored. These include education (traffic education, training for young people or experts, other assistance and support in education); health (support for cancer, protection and prevention of health); sports (support for selected sports, sports club, support for sport development); humanitarian aid (safe environment, sheltered workshops for disadvantaged groups, orphanages, schools, kindergartens); employees (programs for employees, employee loans, employee training, motivational programs); environment (environmental protection), R&D support and cultural events.

3. METHODOLOGY

This paper presents the results of research that focuses on the impact of selected corporate governance determinants on CSR reporting in Slovak insurance companies. In accordance with the records of the National Bank of Slovakia, there were 16 insurance companies headquartered in the SR and 22 branches of foreign insurance companies operating in the SR as of 31.12.2017. In compliance with the valid legislation, branches of foreign insurance companies are not obliged to establish management bodies, which are in the joint-stock companies represented by the Board of Directors and the Supervisory Board. The subjects of our research are, among other things, the corporate governance bodies. Therefore, our sample will consist of insurance companies that are based in the SR and set up by the governing bodies according to the law. One insurance company was excluded from the original set, because it was declared bankrupt in January 2018. Taking a statistical point of view into consideration, these entities form a basic set. All the insurance companies included in the research had established a dualistic inner structure system. We got all necessary information from the annual reports on 2017.

The dependent variable in our research is CSR disclosure (CSRD). We examined 26 reported social responsibility parameters in total. These are divided into 8 groups, namely: education (5 parameters), health (3), sports (5), humanitarian aid (5), employees (4), the environment (1), science and research (2) and culture (1 parameter). We have calculated the CSRD index for each insurance company as the ratio of the reported CSR information to the total number of monitored information, expressed as:

$$CSRD\ Index_i = \frac{\sum_{d=1}^{26} CSR_{d_i}}{\sum CSR_d} \quad (1)$$

where: i = the insurance company, CSR_{di} = the monitored CSR parameter in the insurance company "i", the binary coding was used in this case (code 1 denotes the case when the parameter was reported, code 0 denotes the case when the insurance company did not report the parameter), $\sum CSR_d$ = the grand total of the monitored parameters, which is 26. The mean of CSRD index was 22.3 %, deviation 17.99 %. Taking the 26 monitored parameters into consideration, this means an average of 5.8 parameters in a particular insurance company.

We intend to study CG through selected financial and non-financial determinants listed in Table 1. Our choice of determinants was based on the stakeholders' corporate governance model according to which the interests of all the groups involved should be taken into consideration for reason the shareholders are not the only risk bearers in the company [29]. Our research is focused on these interested parties: shareholders, management (members of boards), employees (executive staff and other employees), creditors and clients. In shareholders´ model we will take into account the determinants for parties 1 and 2, in stakeholders´ model we will calculate with all determinants.

Table 1: Financial and non-financial corporate governance determinants

	Symbol	**Description and measurement (interested parties' identifier)**
Non-financial CG determinants	SHL	Percentage of first largest shareholder (1)
	SHQ	Number of shareholders with qualified participation (1)
	BDM	Total number of Board of Directors members (with chairman) (2)
	BDW	Ratio of women in the Board of Directors (2)
	BDUD	Ratio of the Board of Directors members with university degree (2)
	BDF	Ratio of members in the Board of Directors with residence outside the Slovakia (2)
	BSM	Total number of Board of Supervisors members (2)
	BSW	Ratio of women in the Board of Supervisors (2)
	BSUD	Ratio of the Board of Supervisors members with university degree (2)
	BSF	Ratio of members in the Board of Supervisors with residence outside the Slovakia (2)
	EMP	Total number of employees (3)
	MAN	Ratio of middle managers on total number of employees (3)
Financial CG determinants	EQ	Equity (in EUR) (1)
	NP	Net profit (in EUR) (1)
	DR	Dividend ratio (dividend paid in 2017 / net profit for year 2016) (1)
	BMRA	Statutory, Executive and Supervisory Board members´ remuneration (BMR) (average per person, in EUR) (2)
	GPW	Gross premium written (in EUR) (2)
	PC	Total personnel costs (in EUR) (3)
	LR	Loss ratio (Total gross claims paid / Total gross premium written) (3)
	TI	Total indebtedness ((Assets-Equity)/Assets) (4)
	LIQ	Liquidity (Receivables+Cash)/Creditors) (4)
	GCP	Claims paid (gross amount in EUR) (5)

**(1) shareholders, (2) management, (3) employees, (4) creditors, (5) clients.*

The impact of the selected CG determinants on CSR is identified with multiple linear regression analysis and through assembling the following linear regression model:

$$\mathbf{y} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + \varepsilon \quad (2)$$

where: y = an explained, dependent variable, β = a regression coefficient, x = a selected independent, explanatory variable, ε = a random error, n = a number of explanatory variables.

The relation of the CG determinants to CSRD index is established by means of the correlation analysis. We shall use Pearson´s R and Somers´ d (H_0: $\rho = 0$; H_1: $\rho \neq 0$). The explaining ability of the regression model is verified by F test ANOVA (H_0: $\mu_0 = \mu_1 = ... = \mu_n$; H_1: $\mu_0 \neq \mu_1 \neq ... \neq \mu_n$). Adequacy of the respective explanatory variables included in the model are evaluated with T test (H_0: $\mu_0 = \mu_1$; H_1: $\mu_0 \neq \mu_1$). To assess multicollinearity of the explanatory variables entering the regression model, we use the VIF (Variance Inflation Factor) indicator. Variables with VIF < 10 can be assessed as weakly, insignificantly linearly interdependent. By means of Durbin-Watson test (DW) we assess residuals ε_i independence (H_0: residuals ε_i are independent; H_1: residuals ε_i are interdependent). If required, this might by complement with a test of statistical relevance of the autocorrelation coefficient of the first degree for unstandardized and studentized residuals. For the purpose of assessment of the used statistical methods we use significance level $\alpha = 0.1$.

4. EMPIRICAL RESULTS AND DISCUSSION

Table 2 shows the selected descriptive characteristics of all variables, whose impact on CSR was investigated for reason of their inclusion in regression models.

Table 2: Selected descriptive statistics

Non-financial CG determinants	**Variables**	**SHL**	**SHQ**	**BDM**	**BDW**	**BDUD**	**BDF**
	Mean	0.9312	1.5714	4.1333	0.2424	0.8867	0.2724
	Std. Deviation	0.0941	0.6462	1.2459	0.2055	0.1807	0.3150
	Variables	**BSM**	**BSW**	**BSUD**	**BSF**	**EMP**	**MAN**
	Mean	5.3333	0.2125	0.5745	0.6354	396.0667	0.1228
	Std. Deviation	3.1091	0.1810	0.3409	0.2698	441.5239	0.0677
Financial CG determinants	**Variables**	**EQ**	**NP**	**DR**	**BMRA**	**GPW**	**PC**
	Mean	77350533	10844133	0.6677	78000	137767353	10677200
	Std. Deviation	96790802	18419591	0.5062	57752	170295624	12525258
	Variables	**LR**	**TI**	**LIQ**	**GCP**		
	Mean	0.8923	0.8062	8.3670	78036533		
	Std. Deviation	1.1281	0.1141	24.9110	105583685		

Table 3 presents the results of the correlation analysis between the CSRD index and the examined independent variables. Calculations were performed in SPSS using Pearson' R and Somers'd, which measures the one - way dependence of variables. According to Somers'd, we found a strong negative correlation between CSRD index and SHQ, a weak negative correlation between CSRD index and BDF, BSUD and MAN, trivial in BSM, BSF, LR and LIQ. We identified positive dependence between the CSRD index and other variables. We identified statistically significant medium to strong dependence between CSRD and SHL, EMP, EQ, NP, DR, BMRA, GPW, PC and GCP.

Among the non-financial determinants of CG, BMRA and EMP have a significant positive effect on CSRD index and negative SHQ. From the financial determinants, with the CSRD index significantly positive correlate EQ, NP, DR, GPW, PC and GCP.

Table 4 presents the model summary results of a linear regression analysis of the impact of financial and non-financial CG determinants broken down by stakeholders. We performed the analysis in the SPSS program by enter and backward method. In the enter method, all variables are entered into the equation for relevant stakeholder group (see table 1). The backward method is a variable selection procedure in which the variable with the smallest partial correlation with the dependent variable is sequentially removed.

Table 3: Correlation analysis of explanatory variables

		SHL	SHQ	BDM	BDW	BDUD	BDF
CSRD dependent variable	Pearson Corr.	.447	-.541**	.238	-.028	-.012	-.289
	Sig. (2-tailed)	.109	.046	.394	.921	.967	.296
	Somers´ d	.321*	-.564***	.241	.065	.103	-.256
	Sig. (2-tailed)	.080	.001	.220	.796	.743	.197
		BSM	**BSW**	**BSUD**	**BSF**	**EMP**	**MAN**
	Pearson Corr.	-.128	.189	-.264	.122	.628**	-.282
	Sig. (2-tailed)	.650	.499	.342	.664	.012	.309
	Somers´ d	-.012	.220	-.211	-.069	.514***	-.248
	Sig. (2-tailed)	.955	.275	.346	.801	.000	.196
		EQ	**NP**	**DR**	**BMRA**	**GPW**	**PC**
	Pearson Corr.	.563**	.629**	.216	.849***	.616**	.654***
	Sig. (2-tailed)	.029	.012	.440	.000	.014	.008
	Somers´ d	.552***	.514***	.359*	.610***	.552***	.533***
	Sig. (2-tailed)	.000	.000	.078	.000	.000	.000
		LR	**TI**	**LIQ**	**GCP**		
	Pearson Corr.	-.229	.292	-.005	.490*		
	Sig. (2-tailed)	.412	.290	.986	.064		
	Somers´ d	-.019	.190	-.057	.590***		
	Sig. (2-tailed)	.937	.345	.753	.000		

** Correlation is significant at the 0.1 level (2-tailed). ** Correlation is significant at the 0.05 level (2-tailed). *** Correlation is significant at the 0.01 level (2-tailed).*

Table 4: Regression analysis for individual stakeholders

Model No	Stakeholder[a]	Method[b]	Predictors	Model Summary					ANOVA		Max. VIF (var.)
				R	R Sq.	Adj. R Sq.	Std. Err. of the Est.	DW	F value	Sig.	
1	1	E	DR, SHQ, EQ, SHL, NP	.830	.688	.494	.12482	1.618	3.534	.055*	4.78 (NP)
2		B	DR, SHQ, NP	.824	.679	.582	.11335	1.765	7.043	.008***	1.10 (NP)
3	2	E	GPW, BDW, BSF, BDUD, BSW, BSM, BDF, BDM, BMRA, BSUD	.941	.885	.599	.11391	1.241	3.093	.144	23.87 (BSUD)
4		B	GPW, BDW, BDUD, BSW, BSM, BDF, BDM, BMRA, BSUD	.941	.885	.679	.10189	1.242	4.296	.062*	8.35 (GPW)
5	3	E	LR, EMP, MAN, PC	.683	.466	.253	.15551	1.745	2.185	.144	21.77 (EMP)
6		B	LR, MAN, PC	.681	.463	.317	.14871	1.718	3.165	.068*	1.12 (PC)
7	4	E	LIQ, TI	.297	.088	-.064	.18556	1.691	.582	.574	1.03 (TI, LIQ)
8		B	TI	.292	.086	.015	.17856	1.653	1.216	.290	1.000
9	5	E	GCP	.490	.240	.181	.16282	1.676	4.097	.064*	1.000

** Correlation is significant at the 0.1 level (2-tailed). ** Correlation is significant at the 0.05 level (2-tailed). *** Correlation is significant at the 0.01 level (2-tailed). [a] (1) shareholders, (2) management, (3) employees, (4) creditors, (5) clients. [b] E - enter (all explanatory variables), B - backward (the best significant model).*

We evaluated the models No. 1, 2, 4, 6 and 9 as significant, all predictors in these models having VIF <10 and the models showing residual independence. According to Adj. R Square has the best denomination model number 4, which contains determinants representing the influence of managing authorities on CSRD. In this model, there is a strong correlation (R = 94.1 %) between CSRD index and explanatory variables. With this model, we can explain 88.5 % of the CSRD index variability, Adj. R Square is 67.9 %. Autocorrelation coefficient for unstandardized residuals is 0.11 and critical value is 0.328, therefore the residuals are independent. However, model 4 contains only one statistically significant variable (BMRA). The regression coefficients of the variables in models 1, 2, 4, 6 and 9 are shown in Table 5.

Table 5: Regression coefficients for selected stakeholders modelsa

Models		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
1	(Constant)	.043	.568		,075	,942	
	SHL	.232	.509	.125	.456	.660	1.915
	SHQ	-.102	.072	-.374	-1.415	.195	1.796
	EQ	-1.976E-10	.000	-.112	-.265	.798	4.573
	NP	6.743E-09	.000	.730	1.691	.129	4.780
	DR	.110	.078	.308	1.422	.193	1.201
2	(Constant)	.295	.103		2.855	.017**	
	SHQ	-.124	.049	-.456	-2.519	.030**	1.019
	NP	5.927E-09	.000	.641	3.418	.007***	1.096
	DR	.098	.067	.274	1.474	.171	1.076
4	(Constant)	-.225	.261		-.864	.427	
	BDM	.077	.048	.530	1.581	.175	4.910
	BDW	.501	.271	.572	1.848	.124	4.182
	BDUD	-.076	.221	-.077	-.346	.743	2.148
	BDF	.060	.126	.104	.474	.655	2.110
	BSM	-.027	.023	-.471	-1.211	.280	6.610
	BSW	.035	.194	.035	.178	.866	1.658
	BSUD	-.024	.116	-.045	-.204	.846	2.127
	BMRA	3.098E-06	.000	.994	2.696	.043**	5.939
	GPW	-2.027E-10	.000	-.192	-.439	.679	8.353
6	(Constant)	.202	.113		1.793	.100*	
	MAN	-.380	.622	-.143	-.612	.553	1.120
	PC	8.490E-09	.000	.591	2.524	.028**	1.124
	LR	-.026	.036	-.160	-.703	.497	1.061
9	(Constant)	.158	.053		2.985	.011**	
	GCP	8.342E-10	.000	.490	2.024	.064*	1.000

[a] Dependent Variable: CSRD. [*] Correlation is significant at the 0.1 level (2-tailed). [**] Correlation is significant at the 0.05 level (2-tailed). [***] Correlation is significant at the 0.01 level (2-tailed).

We were also interested in the impact of the explanatory variables broken down by financial and non-financial CG determinants (see Table 1). The analysis results are presented in Table 6. The variables are selected by the backward method. We consider both models to be significant. Non-financial determinants explain the higher proportion of CSRD index variability (95.4%) as a financial determinant of CG that explains 88.5% of the CSRD index variability. Residuals are independent in both models.

Table 6: Regression analysis for financial and non-financial CG determinants

Model No	CG determinants[a]	Predictors	Model Summary					ANOVA	
			R	R Square	Adj. R Square	Std. Err. of the Est.	Durbin -Watson	F value	Sig.
10	N	MAN, SHL, BDUD, BDM, BDW, BSUD, BSW, BSM	.991	.982	.954	.03773	1.890	34.488	.001***
11	F	TI, DR, EQ, BMRA, PC	.962	.926	.885	.06096	1.696	22.596	.000***

** Correlation is significant at the 0.1 level (2-tailed). ** Correlation is significant at the 0.05 level (2-tailed). *** Correlation is significant at the 0.01 level (2-tailed). [a] F - financial, N - non-financial.*

The regression coefficients for models 10 and 11 are shown in Table 7. The results show that all non-financial predictors included in model 10 are significant. In the model 11 for selected financial predictors, there are DR and BMRA significant.

Table 7: Regression coefficients for financial and non-financial CG determinantsa

Models[b]		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			VIF
10	(Constant)	.533	.182		2.922	.033**	
	SHL	.872	.142	.468	6.131	.002***	1.635
	BDM	.124	.015	.896	8.120	.000***	3.420
	BDW	.583	.084	.670	6.897	.001***	2.649
	BDUD	-.986	.092	-.947	-10.695	.000***	2.202
	BSM	-.057	.007	-.987	-7.934	.001***	4.345
	BSW	-.564	.091	-.594	-6.224	.002***	2.556
	BSUD	-.163	.049	-.318	-3.296	.022**	2.618
	MAN	-2.920	.260	-1.111	-11.240	.000***	2.742
11	(Constant)	-.238	.120		-1.984	.079*	
	EQ	-9.215E-10	.000	-.496	-1.823	.102	9.022
	DR	.172	.037	.484	4.698	.001***	1.294
	BMRA	2.908E-06	.000	.933	5.398	.000***	3.646
	PC	6.147E-09	.000	.428	1.267	.237	13.902
	TI	.156	.148	.099	1.052	.320	1.073

[a] Dependent Variable: CSRD. [b] F - financial. N - non-financial. Correlation is significant at the 0.1 level (2-tailed). ** Correlation is significant at the 0.05 level (2-tailed). *** Correlation is significant at the 0.01 level (2-tailed).*

Taking the results of these tests into account, we will formulate the following regression function, which the best explaining the CSRD index:

$$CSRD\ index = 0.533 + 0.872\ SHL + 0.124\ BDM + 0.583\ BDW - 0.986\ BDUD - 0.057\ BSM - 0.564\ BSW - 0.163\ BSUD - 2.920\ MAN + \varepsilon \quad (3)$$

In this model, the strongest correlation (R = 99.1%) is between the CSRD and the explanatory variables from all the models examined. 95.4% of the CSRD index variability can be explained by model containing non-financial CG determinants. This model is significant at 0.01 level. The results show a positive dependence between CSRD and SHL, BDM and BDW. Negative dependence is identified between CSRD and BDUD, BSUD, BSM, BSW and MAN.

5. CONCLUSION

Insurance companies do not sufficiently present their CSR activities in their annual reports. They only provide information on supported areas. They also do not mention the volume of funds provided. In order to model CSR, we found that the predictors describing managing authorities (2) and shareholders (1) could provide the best explanation. By comparing the models made up of predictors divided into financial and non-financial CG determinants, we found that CSR better explain non-financial parameters.

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REFERENCES

[1] *Act on Insurance No. 39/2015* and amending certain acts.
[2] Adams, R. B. (2012) Governance and the financial crisis, *International Review of Finance*, (12)1, pp. 7–38.
[3] Akbar, S., Poletti-Hughes, J., El-Faitouri, R., Zulfiqar, S. and Shah, A. (2016) More on the relationship between corporate governance and firm performance in the UK: Evidence from the application of generalized method of moments estimation, *Research in International Business and Finance*, Vol. 38, pp. 417-429.
[4] Ararat, M., Black, B. S., Yurtoglu, B. B. (2017) The effect of corporate governance on firm value and profitability: Time-series evidence from Turkey, *Emerging Markets Review,* Elsevier, Vol. 30, pp. 113-132.
[5] Bartkowiak, P., Borkowski, M. (2014) Financial review as an element of corporate governance in the Polish legal regulations, *Journal of International Studies*, (7)2, 2014, pp. 70-82.
[6] Beltratti, A., Stulz, R. M. (2012) The credit crisis around the globe: Why did some banks perform better?, *Journal of Financial Economics*, (105)1, pp. 1–17.
[7] Benetti, K. (2019) *Strategic CSR: the Importance of the CSR Filter,* Proceedings of the 12th International Scientific Conference European Forum of Entrepreneurship 2019“, Sustainable Socio-economic Development or Crisis on the Horizon?”, pp. 27-36.
[8] Bowen, H. R. (1953) *Social Responsibilities of the Businessman*, Harper Brothers, New York, 276 p.
[9] Cadbury, A. (2002) *Corporate governance and chairmanship: a personal view,* OUP Oxford, 280 p.
[10] Cadbury, A. (1992) *Report of the Committee on the Financial Aspects of Corporate Governance*, Gee & Co. Ltd., London.
[11] Carroll, A. B., Shabana, K. M. (2010) The business case for corporate social responsibility: a review of concepts, research and practice, *International Journal of Management Reviews*, 12 (1), pp. 85-105.
[12] Commission of the European Communities. (2001) Green *Paper: Promoting a European Framework for Corporate Social Responsibility*, [online], Brussel, 2001 [cit. 2019-5-5], Available on: http://europa.eu/rapid/press-release_DOC-01-9_en.htm, pp. 37.

[13] Elkington, J. (1998) *Cannibals With Forks: The Triple Bottom Line of 21st Century Business.* New Society Publishers, Stony Creek, 416 p.
[14] Fooladi, M., Zaleha, A. S., Norman, M. S., Romlah, J. (2014) The effect of corporate governance and divergence between cash flow and control rights on firm performance: Evidence from Malaysia, *International Journal of Disclosure and Governance,* Vol. 11(4), pp. 326-340.
[15] *G20/OECD Principles of Corporate Governance.* Retrieved February 2, 2019, Available on: http://www.oecd.org/corporate/principles-corporate-governance.htm.
[16] Grofčíková, J. (2017) Impact of globalization on the financial management processes*, Globalization and its socio-economic consequences*, 17th international scientific conference, Žilina, Slovakia, pp. 589-596.
[17] Grofčíková, J. (2016) Globalization and its impact on the corporate financial management and control, *Globalization and its socio-economic consequences,* 16th International Scientific Conference, Proceedings Part II, Žilina, Slovakia, pp. 547-555.
[18] Grofčíková, J., Izáková, K. (2018) Corporate governance and firm performance in Slovakia, *Globalization and its socio-economic consequences,* 18th International Scientific Conference, Rajecké Teplice, Slovakia, pp. 532-539.
[19] Halim, E. H., Mustika, G., Sari, R. N., Anugerah, R., & Mohd-Sanusi, Z. (2017) Corporate governance practices and financial performance: The mediating effect of risk management committee at manufacturing firms, *Journal of International Studies*, 10(4), pp. 272-289.
[20] Hučka, M., Malý, M., Okruhlica F. (2007) *Správa společností*, Kernberg Publishing, Praha, 276 p.
[21] Millstein, I. M. (1998) *Corporate governance: Improving competitiveness and access to capital in global markets: a report to the OECD,* Institutional investors, corporate governance and firm performance in Japan, *Pacific Economic Review*, 15(5), pp. 653-665.
[22] Mullerat, R. (2010) *International Corporate Social Responsibility: The Role of Corporations in the Economic Order of the 21st Century*, Kluwer Law International, Alphen aan den Rijn, 510 p.
[23] Musa, H., Musová, Z., Debnárová, L. (2014) *Responsibility in the corporate governance framework and financial decision making process,* Elsevier, Amsterdam, Vol. (23), pp. 1023-1029.
[24] Norman, W., & MacDonald, C. (2004) *Getting to the Bottom of "Triple Bottom Line",* Business Ethics Quarterly, 14(2), pp. 243-262.
[25] Procházka, D. (2017) The impact of ownership and other corporate characteristics on performance of V4 companies, *Journal of International Studies,* 10(2), pp. 204-218.
[26] Ricci, O. (2014) *Corporate Governance in the European Insurance Industry,* Palgrave Macmillan, Basingstroke, 154 p.
[27] Shleifer, A., Vishny, R. W. (1997) A Survey of Corporate Governance. *Journal of Finance*, (52)2, pp. 737-783.
[28] ***Škare, M., Hasić, T. (2015) Corporate governance, firm performance and economic growth – theoretical analysis,*** *Journal of Business Economics and Management,* 17(1), pp. 35-51.
[29] Vo, D., Phan, T. (2013) Corporate governance and firm performance: Empirical Evidence from Vietnam, *Journal of Economic Development,* Vol. 2018, pp. 62-77.
[30] Vu, N. H., Nguyen, T. (2017) *Impacts of corporate governance on firm performance, Empirical study of listed Singaporean companies,* [Online], Lund University, Available on: https://lup.lub.lu.se/student papers/search/publication/8917364.
[31] Zahroh, N., Hamidah. (2016) *The Role of Corporate Governance in Firm Performance*, SHS Web of Conferences 34, 13003(2017), 6 p.

THE NORDIC COUNTRIES AND THEIR TAX SYSTEMS. HIGHER TAXES, HIGHER WEALTH?

Andrei Ionut Husman[1]
Petre Brezeanu[2]

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Abstract: *The issue of taxation in the context of an increasingly globalized economy and the constant need for economic development is one of the main points of interest for all countries' governments. Even if we discuss about the northern EU Member States (i.e. Sweden, Finland and Denmark) or about Norway (non-EU state), the Nordic countries are well-known for their rigid tax systems with high tax burden. However, these countries record a high level of economic development. In this respect, the questions arise: is possible to have a high tax burden and a high wealth/welfare? If yes, how is this possible? Therefore, through this paper, we aim to perform certain analyses regarding the fiscal pressure registered by these countries (using the level of direct and indirect taxes) and the economic development (measured through the GDP per capita) based on the data provided by the OECD statistics database and Eurostat database. Also, we will draw econometric models to determine the relationship between the variables used. We expect the results of the analyses to show the efficiency of the Nordic tax systems, more precisely, we expect that the high tax burden to be offset by a high wealth/welfare of the Nordic population.*

Keywords: *Nordic countries, tax systems, taxation, tax burden.*

1. INTRODUCTION

It is well-known that, lately, taxation and its effects have been a subject of maximum interest among practitioners and academics. As regards the Nordic (Scandinavian) countries, they are known for their rigid tax systems with high tax burden. But, in the same time, these countries record a high level of economic development. Consequently, we note that these countries are in some way different from the other countries (either EU Member States or not), which can lead both academics and practitioners to be interested in analyzing these countries. Thus, by extending the questions mentioned above, other questions arise: whether it is possible to have a high tax burden and increased wealth? Does the tax burden affect or not the wealth of citizens? If yes, how?

Given the described context and the above-mentioned questions, we started in our analysis in order to identify the particularities of the tax systems applied by the Scandinavian countries, as well as the influence of the fiscal elements in the economic development, with an emphasis on the citizens' welfare expressed by the GDP growth per capita. This analysis can also be conclusive in determining the applicability of these systems to other countries, considering their effectiveness.

[1] Bucharest University of Economic Studies, Romania
[2] Bucharest University of Economic Studies, Romania

2. AIMS OF THE RESEARCH

Through this paper, we aimed to achieve four main objectives. Firstly, we performed a precise summary of the studies relevant for our research given by the specialized literature. Further, in order to better understand the Scandinavian tax systems, we have synthesized the main methodologies and tax rates of these systems. Finally yet importantly, we designed certain econometric models using the following elements;

- dependent variable: the GDP per head of population expressed in annual growth rates (reflecting the wealth growth);
- independent variables: corporate income taxes, personal income taxes, social security contributions and VAT;

We used these elements registered by Denmark, Finland, Norway and Sweden for the period 1971-2017, based on the OECD public database.

3. LITERATURE REVIEW

The topic of taxation, or more precisely the tax burden is a predilection for researchers, given the fact that the taxation is an important instrument for collecting revenues to the state budget and the methodologies based on which the taxation is applied and its burden affect the wealth of citizens.

As already stated, the Nordic countries are well-known for their rigid tax systems with high tax burden. But, in the same time, these countries register a high level of economic development and these facts lead to several questions for researchers.

Starting in the 1950s, the researchers found no relationship between the tax elements and economic growth, relevant to this being the studies of Bloom (1955) and Thompson and Mattilda (1959). Similar results were obtained by the late 1980s, an example being the study of Carlton (1979).

However, after this period, the studies conducted by the researchers had different results, and the latest studies analyze and demonstrate the important links between taxation and economic growth. Thus, by performing a study at the level of 48 countries, Helms (1985) concluded that there is a significant negative impact of state and local taxes on economic growth. A certain correlation between the tax rates and GDP per capita was found in case of developing countries by Burgess and Stern (1993), while in the case of industrial countries the authors did not find any correlation between these elements.

Braşoveanu and Obreja (2008) also found that both distortionary and non-distortionary taxes have a negative impact on economic growth in Romania.

The results obtained by Romer and Romer (2010) indicate that an increase in tax burden with 1% leads to a decrease of the real GDP with approximative 3%. Such results were also showed by Nálepová (2017), that concludes that at the level of OECD countries the income taxes affects in a negative way the economic growth and by Widmalm (2001) who conclude that at the level of 23 OECD countries the tax structure affects the economic growth in the sense that the personal income tax negatively affects the economic growth. Also, Widmalm (2001) found empirical evidence that the tax progressivity may be associated with low economic growth. The impact of certain taxation elements was also found by several authors such as Stoilova & Patonov (2012) and Szarowská (2013).

For the Nordic countries there are very few studies performed on the subject analyzed in this paper. However, for example, in their attempt to find the effects of taxation on the level and fluctuations of the household saving behavior, Kosketa & Viren (1994) [12] concluded that in the Nordic countries a higher income taxation together with a lower unemployment rate accounted a lower level of household saving ratio. Further, the authors found that in Denmark, Finland, Norway and Sweden the fluctuations in the household saving ratio are affected by real income growth and by the inflation rate in a positive manner, while the real housing prices have a negative effect on household saving ratio.

Furthermore, Livingston (2016) [13] concluded that in the case of the Nordic model of taxation there is a ”modestly” progressive taxation of individual income and a low level of taxation for passive income (dividend and capital gains). Also, the author states that the tax administration in Nordic countries is very sophisticated, with a high level of computerization.

A more recent study conducted by Stoilova (2017) [14] at the level of EU28 Member States proved that the government expenditure does not contribute to increasing the annual growth of GDP, while the total tax revenues appear to be less damaging to the economic growth, suggesting that the balanced budgets are growth-friendly. However, the author found that the Nordic countries (e.g. Denmark, Finland and Sweden) represent exceptions and they are registering the highest overall public spending and the highest tax burden (and also balanced budgets) in comparison with other EU countries. Another conclusion stated by Stoilova (2017) is that the economic growth may be supported by a tax structure based on selective consumption taxes, personal income taxes and property.

Given the above, the studies performed in this paper represent a reliable contribution to the existing literature and also can be a solid basis for further analysis in this field.

4. RESEARCH METHODS

Given the aims of the research described above, through this paper, we have contributed to the existent specialized literature with several analyzes on the level of Scandinavian countries that have specific tax systems.

In terms of research methods, the elements included are expressed as follows:

- GDP per head of population as growth rates (“GDPgr”): expressed in annual growth rates in percentage Corporate income taxes (“CIT”): in national currencies (millions) and which include taxes on income, profits and capital gains of corporates;
- Personal income taxes (“PIT”): in national currencies (millions) and including taxes on income, profits and capital gains of individuals;
- Employees’ social security contributions (“SSC”): in national currencies (millions)
- VAT: in millions national currencies.

The analyses were based on the values of these indicators registered for the period 1971-2017.

Further, the econometric tools were used through the EViews 7 software and multiple regression models were projected and analysed using the data mentioned above.
Also, we used certain tax guides issued by the Big4 consultancy firm EY in order to highlight the taxation methodologies and rates in these countries.

5. TAX SYSTEMS OF NORDIC COUNTRIES

Prior to the actual analyzes of the correlations between taxes an economic development, we should look at the characteristics of the Nordic tax systems. Therefore, based on the tax guides issued by EY [15] (based on the data available for 2018), we performed a synthesis of the tax systems (with an emphasis on tax rates) for the Nordic countries. This synthesis is presented in the Table 1 below.

As a side note, since the SSC were not included in the final econometric models designed, the table below does not contain the description of the SSC applied in these countries.

Table 1: Tax systems in Nordic countries

CIT rate: 22%	CIT rate: 22%	CIT rate: 23%	CIT rate: 22%
VAT rates: a) Standard:25% b) Zero rated c) Exempt	VAT rates: a) Standard:24% b) Reduced: - 10% - 14% a) Zero rated b) Exempt	VAT rates: a) Standard:25% b) Reduced: - 12% - 15% a) Zero rated b) Exempt	VAT rates: a) Standard:25% b) Reduced: - 6% - 12% a) Zero rated b) Exempt
PIT: • *8% mandatory labor market tax on all salary income + marginal income and labor market tax rates (approximative values):* - *First 50.000 DKK: 8%* - *Next 492,283 DKK: 42%* - *Over 542,283: 56%*	PIT: • *national tax: progressive rates from 0% to 31.25% +* • *municipal tax: flat rates that vary from 16.5% to 22.5% +* • *church tax: flat rates that vary from 1% to 2.2% +* • *YLE tax (Public broadcasting tax): at a maximum of 163 EUR per year*	PIT: • *general income tax: a flat rate of 23% +* • *personal income tax: progressive rates from 0% to 15.4%*	PIT: • *National tax:* • *20% for income over 468,700 SEK up to SEK 675,700* • *25% for income over 675,700 SEK +* • *Local taxes: ranging from 29% to 36%*

The tax systems of these countries are quite similar with corporate income tax rates of 22% or 23% and VAT rates of 25% or 24% (with similar reduced rates). These countries have a dual system of taxing the income of citizens, meaning that they apply progressive rates for the active income (salaries) and proportional tax rates for the passive income (capital income). Therefore, we can observe that these countries are very similar in terms of tax rates and tax methodologies. Also, the tax rates applied by these countries are above the EU average, hence the high level of the tax burden.

6. EVOLUTION OF TAXATION AND ECONOMIC GROWTH

As a further step in our research, in order to perform have an overview of the economic elements included in the analyzes and to be able to compare the evolution of these elements during the period analysed, in this chapter we include a graphical analysis and a short description of these evolutions.

The graphical analysis is splitted in two parts between the elements of taxation included (PIT, CIT, SSC and VAT) and the economic development (GDP_grate).

6.1. Evolution of taxation

In the following figures are presented the evolutions of the tax elements for each country.

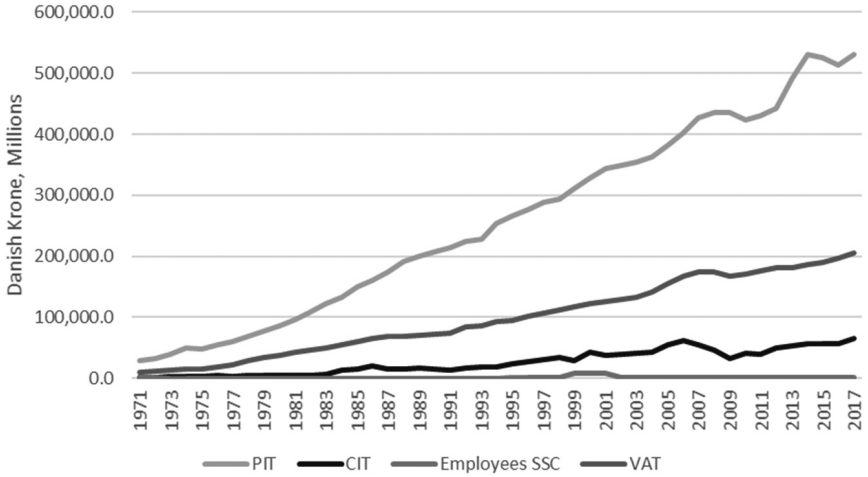

Figure 1: Taxation in Denmark (1971-2017)

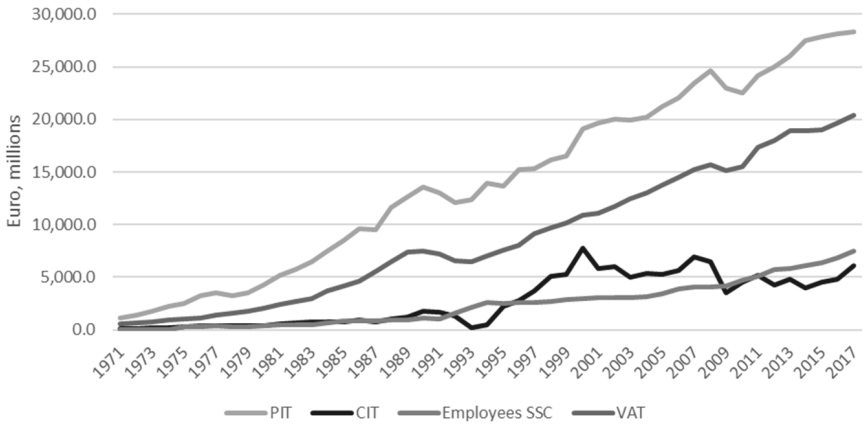

Figure 2: Taxation in Finland (1971-2017)

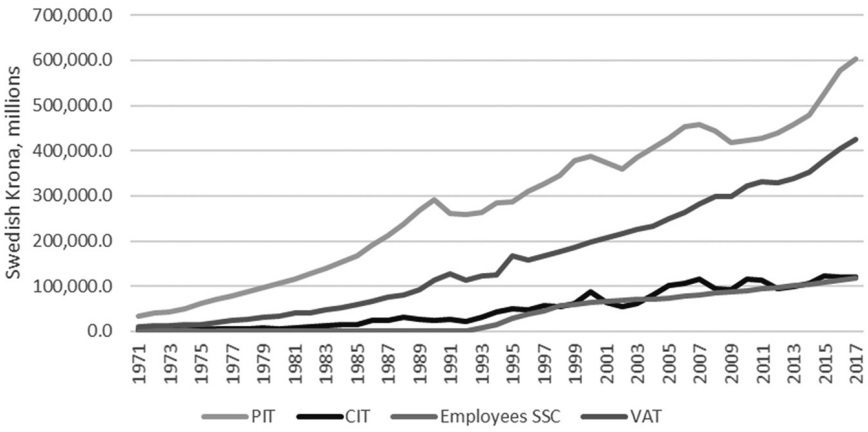

Figure 3: Taxation in Sweden (1971-2017)

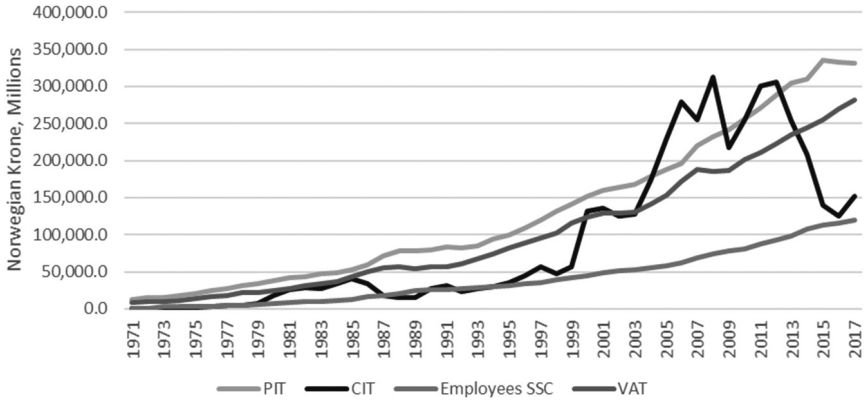

Figure 4: Taxation in Norway (1971-2017)

As we can observe in these graphics, the evolutions of taxation are similar in these countries with similar periods of decrease. We can see an exponential increase in cases of PIT, VAT and SSC. The volatility of CIT is very high in these countries, especially in Norway (which is not an EU country). The financial crisis started in 2008 affected all the countries and all the elements analyzed with the exception of SSC.

6.2. Evolution of the economic development

In the figures 5 to 8 below are presented the evolutions of the economic development expressed in annual growth rates of GDP per head of population for each country.

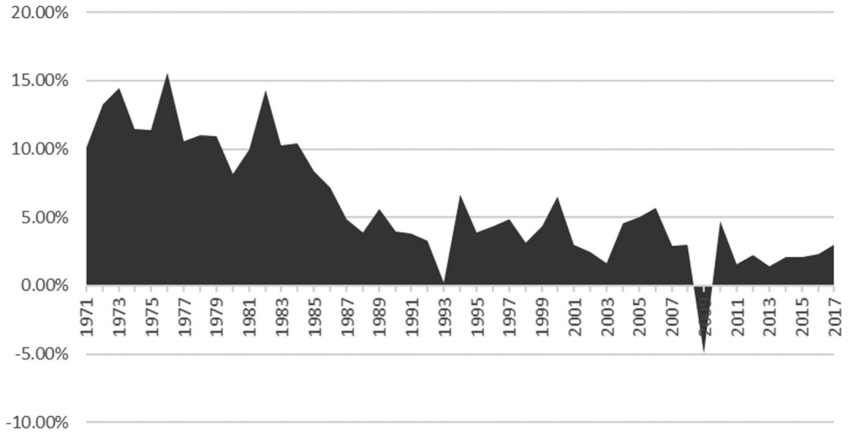

Figure 5: Evolution of the economic development in Denmark (1971-2017)

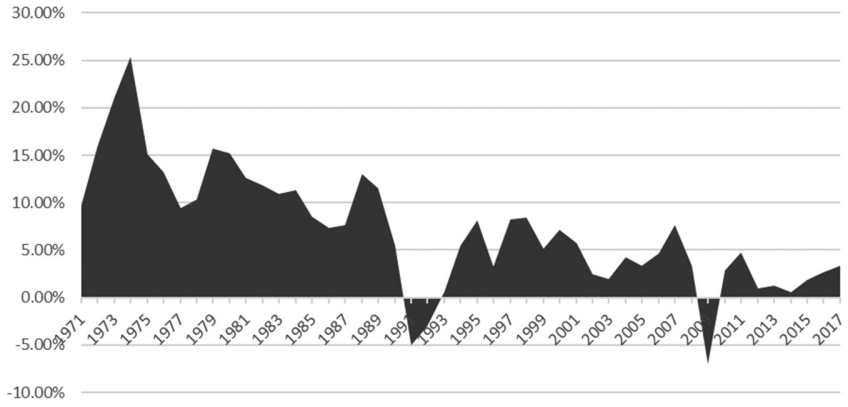

Figure 6: Evolution of the economic development in Finland (1971-2017)

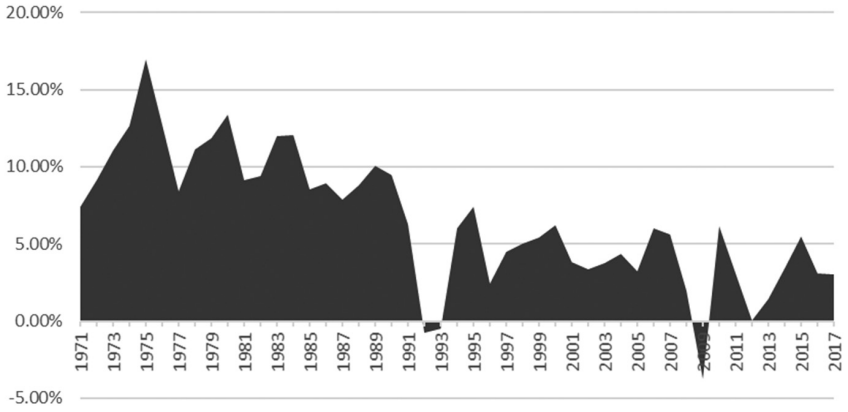

Figure 7: Evolution of the economic development in Sweden (1971-2017)

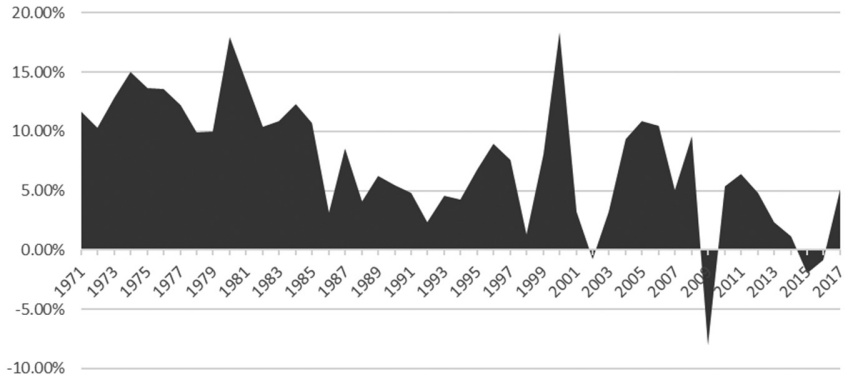

Figure 8: Evolution of the economic development in Norway (1971-2017)

Also, the economic development (expressed in GDP_grate) are similar in these countries, the same periods of decreases being registered over the 1990s, early 2000s and the last financial crisis (started in 2008).

7. ECONOMETRIC RESULTS

Going to the econometric results, the equation of the model from which we started is shown below:

$$GDP\_grate=\beta 0 + \beta 1 \times CIT + \beta 2 \times PIT + \beta 3 \times SSC + \beta 4 \times VAT + \beta 5 \times c \quad (1)$$

Following the tests made, the equations have been modified to obtain the most conclusive results from the econometric point of view for each country. In case of three of the four countries we proceeded to logarithm the independent variables in order to achieve a more relevant output.

Therefore, the outputs of the econometric models for each country are presented below.

7.1. Denmark

Dependent Variable: GDP_grate; Method: Least Squares; Sample: 1971 – 2017
Number of observations: 47

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log(CIT)	0.038047	0.017120	2.222329	0.0314
Log(PIT)	-0.094669	0.022888	-4.136266	0.0002
C	0.843331	0.117999	7.146937	0.0000
R-squared	0.763452	Mean dependent var		0.059504
Adjusted R-squared	0.752700	S.D. dependent var		0.043322
S.E. of regression	0.021544	Akaike info criterion		-4.775762
Sum squared resid	0.020422	Schwarz criterion		-4.657667
Log likelihood	115.2304	Hannan-Quinn criter.		-4.731322
F-statistic	71.00431	Durbin-Watson stat		1.752713
Prob(F-statistic)	0.000000			

Figure 9: The econometric results for Denmark

Following the tests made and given the fact that the independent variables SSC and VAT were found as not significant from the econometric point of view, we have eliminated them from the model and we proceed to logarithm the remaining independent variables. Therefore, the final equation resulted is:

$$GDP\_grate = 0.84 + 0.03 \times \log(CIT) - 0.09 \times \log(PIT) \quad (2)$$

In terms of economic interpretation, the econometric model obtained tells us that an increase of 1% of CIT determines an increase of 0.03 percentage points ("p.p.") of GDP_grate, while an increase of 1% of PIT determines a decrease of 0.09 p.p. of GDP_grate. For each variable, the interpretation is valid given that all other variables included remain constant.

7.2. Finland

Dependent Variable: GDP_grate; Method: Least Squares; Sample: 1971 – 2017
Number of observations: 47

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CIT	1.35E-05	4.79E-06	2.828677	0.0071
PIT	-2.25E-05	5.27E-06	-4.281601	0.0001
VAT	1.94E-05	6.83E-06	2.847921	0.0067
C	0.183270	0.015377	11.91834	0.0000
R-squared	0.646459	Mean dependent var		0.071085
Adjusted R-squared	0.621794	S.D. dependent var		0.062848
S.E. of regression	0.038650	Akaike info criterion		-3.587253
Sum squared resid	0.064236	Schwarz criterion		-3.429794
Log likelihood	88.30044	Hannan-Quinn criter.		-3.528000
F-statistic	26.20890	Durbin-Watson stat		1.190121
Prob(F-statistic)	0.000000			

Figure 10: The econometric results for Finland

For the same reasons as those mentioned in case of Denmark, we have eliminated the SSC. Therefore, the final equation resulted is:

$$GDP\_grate = 0.18 + 1.35 \times CIT - 2.25 \times PIT + 1.94 \times VAT \quad (3)$$

In terms of economic interpretation, the econometric model obtained tells us that, in terms of direct taxation, an increase of one unit (1,000 million EUR) in CIT determines an increase of

1.35 p.p. of GDP_grate, while an increase of one unit in PIT determines a decrease of 2.25 p.p. of GDP_grate. In terms of indirect taxation, an increase of one unit in VAT leads to an increase of 1.94 p.p. of GDP_grate. For each variable, the interpretation is valid given that all other variables included remain constant.

7.3. Norway

Dependent Variable: GDP_grate; Method: Least Squares; Sample: 1971 – 2017
Number of observations: 47

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log(CIT)	0.034397	0.011006	3.125258	0.0031
Log(PIT)	-0.093108	0.019443	-4.788849	0.0000
C	0.773266	0.117233	6.596092	0.0000
R-squared	0.502081	Mean dependent var		0.073539
Adjusted R-squared	0.479448	S.D. dependent var		0.053126
S.E. of regression	0.038330	Akaike info criterion		-3.623478
Sum squared resid	0.064644	Schwarz criterion		-3.505384
Log likelihood	88.15174	Hannan-Quinn criter.		-3.579039
F-statistic	22.18386	Durbin-Watson stat		1.816978
Prob(F-statistic)	0.000000			

Figure 11: The econometric results for Norway

We have eliminated the independent variables SSC and VAT and we proceed to logarithm the remaining independent variables. The final equation resulted is:

$$GDP\_grate = 0.77 + 0.03 \times \log(CIT) - 0.09 \times \log(PIT) \quad (4)$$

In terms of economic interpretation, the econometric model obtained tells us that an increase of 1% of CIT determines an increase of 0.03 p.p. of GDP_grate, while an increase of 1% of PIT determines a decrease of 0.09 p.p. of GDP_grate. For each variable, the interpretation is valid given that all other variables included remain constant.

7.4. Sweden

Dependent Variable: GDP_grate; Method: Least Squares; Sample: 1971 – 2017
Number of observations: 47

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Log(PIT)	0.094097	0.033097	2.843040	0.0068
Log(VAT)	-0.096804	0.023838	-4.060837	0.0002
C	0.023509	0.141385	0.166273	0.8687
R-squared	0.648831	Mean dependent var		0.065280
Adjusted R-squared	0.632869	S.D. dependent var		0.042670
S.E. of regression	0.025854	Akaike info criterion		-4.410976
Sum squared resid	0.029412	Schwarz criterion		-4.292882
Log likelihood	106.6579	Hannan-Quinn criter.		-4.366536
F-statistic	40.64792	Durbin-Watson stat		1.533790
Prob(F-statistic)	0.000000			

Figure 12: The econometric results for Sweden

We have eliminated the independent variables SSC and CIT and we proceed to logarithm the remaining independent variables. The final equation resulted is:

$$GDP\_grate = 0.02 + 0.09 \times \log(PIT) - 0.09 \times \log(VAT) \quad (5)$$

In terms of economic interpretation, the econometric model obtained tells us that an increase of 1% of PIT determines an increase of 0.09 p.p. of GDP_grate, while an increase of 1% of VAT determines a decrease of 0.09 p.p. of GDP_grate. For each variable, the interpretation is valid given that all other variables included remain constant.

The case of Sweden is an exceptional one, with analyzes showing different results from the other countries (and from the research provided by the specialized literature). However, from an extended economic point of view, we could perceive this result in the sense that PIT does not necessarily influence the economic growth, but that PIT is less harmful to economic growth. Going forward, we could say that the case of Sweden could generate a positive answer to the question: higher taxes, higher wealth? As regards the negative relationship between VAT and economic growth, this may indicate that Sweden has an economy that is not necessarily based on consumption. Subsequently, such fact can reveal the stability of the Swedish economy.

As far as the econometric testing is concerned, we have made a few points in the following.

We note that in all the cases, the output records R-squared and Adjusted R-squared values of above 0.5, meaning that the independent variables included in the models explain in proportion of over 50% the dependent variable GDP_grate.

In terms of parameter testing, we note that the variables included record values of Prob. lower than 0.05 (5%), so we can argue that all the variables included significantly influence the dependent variable. Furthermore, in order to test each model as a whole, since Prob. of F-statistic is 0 in all the cases, lower than 5%, we have the arguments to sustain that the regression models are valid.

8. CONCLUSIONS, DISCUSSIONS AND LIMITATIONS

The analyzes performed proved that in all cases the tax elements CIT and PIT have a significant influence on the economic growth/wealth of citizens.

Throughout the econometric analysis, we have concluded that:

- CIT has a positive influence, while PIT has a negative influence on GDP_grate in the case of Denmark, Finland and Norway;
- Unusual situation in the case of Sweden, where PIT has positive influence on GDP_grate and VAT a negative influence;
- In the case of Finland, the VAT has a positive influence on GDP_grate.

The models performed in this paper has strictly targeted the influence of taxation on economic growth (wealth of citizens) and additional econometric tests could be carried out to strengthen the results.

As another conclusion, during the analyzes, we observed that all the tax systems of Nordic countries are similar in terms of the evolution of the fiscal/economic variables included. Consequently, we can distinguish a cluster composed of Scandinavian countries in terms of the characteristics of the tax systems, but also of the economy as a whole.

Further, our contribution complements a series of similar analyses (for other countries) and the results allow a comparison with other tax systems. Our results generally confirm the results highlighted in the literature, with the exception of Sweden for which we obtained a unique result.

REFERENCES

[1] Bloom, C. C. (1955). State and Local Tax Differentials and the Location of Manufacturing. Bureau of Business and Economic Research;
[2] Thompson, W. R., Mattila, J. M. (1959). An Econometric Model of Postwar State Industrial Development. Wayne State University Press;
[3] Carlton, D. W. (1979). Why new firms locate where they do: An econometric model Interregional Movements and Regional Growth. The Urban Institute;
[4] Helms, L. J. (1985). The Effect of State and Local Taxes on Economic Growth: A Time Series Cross Section Approach, The Review of Economics and Statistics, 67, 574-82;
[5] Burgess, R., Stern, N. (1993). Taxation and Development, Journal of Economic Literature, 31(2), 762-830;
[6] Obreja, L., Brasoveanu, I. (2008). The Correlation between Fiscal Policy and Economic Growth, Theoretical and Applied Economics, 11(528), 51-59;
[7] Romer, C., Romer, D. (2010). The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks. American Economic Review, 100(3), 763-801;
[8] Nálepová, V., (2017). Affects corporate taxation economic growth? – Dynamic approach for OECD Countries. European Journal of Business Science and Technology, 3(2), 132-147;
[9] Widmalm (2001), Tax Structure and Growth: Are Some Taxes Better Than Others? Public Choice 107 (3/4), 199-219;
[10] Stoilova & Patonov (2012), An empirical evidence for the impact of taxation on economy growth in the European Union. Book of Proceedings – Tourism and Management Studies International Conference Algarve 2012(3), 1031-1039;
[11] Szarowská (2013), Effects of taxation by economic functions on economic growth in the European Union. Proceedings of the 6th International Scientific Conference: Finance and the performance of Firms in Science, Education and Practice. Zlin: Tomas Bata University, 746-758;
[12] Kosketa & Viren (1994). Taxation and Household Saving in Open Economies: Evidence from the Nordic Countries. The Scandinavian Journal of Economics 96(3), Tax Policy in Small Open Economies, 425-441;
[13] Livingston (2016). The Nordic model of taxation and its influence in North America: Image and Reality. Nordic Tax Journal 2016(2), 77-86;
[14] Stoilova (2017) Tax structure and economic growth: Evidence from the European Union. Contaduria y Administracion 62(2017), 1041-1057;
[15] http://www.ey.com/gl/en/services/tax/global-tax-guide-archive
[16] http://stats.oecd.org/

DROUGHT RISK AND ITS PERCEPTION BY FARMERS

Monika Kaczała[1]

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Abstract: *The purpose of this research is to investigate the cognitive perception of risk among Polish farmers and the factors which have an impact on this perception. Statistical analysis and logit models were applied for analysing the representative poll taken in February and March 2019 in Poland (N=200). Farmers' risk perception is dominated by the subjective factors (average loss caused by drought in the previous year, frequency of other types of impact of drought, catastrophic potential of drought risk, immediacy of effect, the degree to which the risk is known to science, number of farms susceptible to drought, trust in experts' assessment of drought, trust in the media informing about drought, age and level of education) to a much higher extent than by the objective ones (monthly income, specialising in plant output, high-cost crops, the share of income from farming in the whole income).*

Keywords: *Drought, risk perception, Poland, agriculture.*

1. INTRODUCTION

Water scarcity is one of the key issues in the area of food security [1] and it is caused, inter alia, by exacerbation of extreme phenomena such as drought [2]. In Europe between 1982-2012 the number and impact of droughts increased dramatically [3]. In the past two years alone there have been two severe droughts in this area – 2017 in the south on the Iberian Peninsula and in Italy [4,5], while in 2018 in most countries of the northern and central Europe [6].

Soil drought affects the financial situation of the farm, and in extreme cases may lead to its bankruptcy [7]. The farms concerned are the ones based either on plant or animal output. Dramatic situation of livestock farmers in Denmark can be a prime example of such problems, along with significant difficulties of Polish plant farms affected by drought, where in certain cases loss in some regions reached over 70% of the crop's value.

Soil drought is a systemic risk and therefore its management is essentially a task within the realm of the state [7]. The EU member states are obliged to implement action with regard to drought impact prevention, which is derived directly from (OJ L 327, 22.12,200, p. 1). Moreover, Common Agricultural Policy places particular emphasis on the issues related to risk management in agriculture. Regardless of embracing the concept of the so-called risk governance the most crucial issue which is decisive for the whole process is recognition and investigation into the system stakeholders. The key group of stakeholders consists of farmers. Identification of the structure of perceived risk and the formation of farmers' risk perceptions seems to be crucial both for designing a governmental risk management policy applicable in the agricultural sector and for suppliers of risk management tools [8–10].

Farmers' perception of risk has been extensively researched, especially in the United States, Australia and developing countries [11–13] and also in Europe [14–16]. However, almost no research has been conducted so far to determine farmer's risk perception in the Eastern and Cen-

[1] Department of Insurance, Poznań University of Economics and Business, Al. Niepodległości 10, 61-875 Poznań, Poland

tral Europe (especially in the post-communist countries) [17], despite the fact that the perception of risk among farmers could vary depending on the country they operate in [18].

Bearing the above in mind, the purpose of this research is to investigate the perception of risk with respect to drought among Polish farmers. Poland as an example of a Central European post-communist country has been selected for this study, because it is one of the main suppliers of area and people in the EU agriculture (it accounts for 8% of the EU arable land and 19% of the EU population economically active in agriculture) [19].

2. LITERATURE REVIEW

The literature points to a number of factors which affect the cognitive perception of risk. In accordance with the expected utility theory it is assumed that the subject possesses perfect information and established preferences, thus their risk perception is identical as the so-called objective risk. Objective risk, in turn, depends on factors affecting the level of likelihood of drought occurring in a particular area; these factors are identified in literature as affecting exposure to risk; in the other group of factors are the ones affecting the scope of damage – these factors are denoted as the ones which determine sensitivity or vulnerability to drought [20]. The level of exposure to risk depends primarily on the farm's location [21,22]. This variable however, in the analysed research is not very much diversified because the data refers to three voivodships located in vicinity of each other in central and north-western Poland. Nevertheless, the following hypothesis has been put forward:

H1_1: Perception of drought risk depends on the location of the farm.
The level of exposure to risk also depends on the value which is prone to reduction. It was assumed in the study that this is the average monthly income from farming reflecting the income from crops and animal production [16]. Therefore, another hypothesis was formed:

H1_2: The greater the average monthly income from farming is, the higher the perception of drought becomes.
Similarly, exposure to risk can be connected with the amount of arable land. Hence, the third hypothesis:

H1_3: The greater the amount of arable land in the farm, the higher the risk perception.
The level of vulnerability to drought in agriculture can be affected by several factors [23,24]. In Poland the monitoring system is based on the climatic water balance [25], in which value limits denoting drought depend on the type of soil and type of cultivated crops. Hence the following hypotheses have been put forward:

H1_4: The higher the average soil class in the farm, the lower the perception of drought risk.

H1_5: Perception of drought risk is contingent on the type of cultivated plants (detailed hypotheses from H1_5_1 to H1_5_2, cf. Table 1).
Vulnerability to drought risk may also depend on the farms specialisation which affects the level of loss in plant output [13,26]. Hence the following research hypothesis:

H1_6: The farmers who specialise in plant cultivation perceive the risk of drought as higher than those who manage farms with other specialisations.
Vulnerability, i.e. the degree to which the farm responds to drought, might also be linked with the percentage of income from farming operations within the whole of the income [26]. Hence:

H1_7: The greater the share of income from farming operations in the whole income of the farm, the higher the perception of risk.

Within the theory of risk perception a number of subjective factors is considered which determine risk perception [10]. D. Khanemann and A. Tversky within their prospect theory [27,28] point to numerous heuristics affecting the evaluation of probability by individuals, including availability heuristic [29]. Therefore it was assumed that experiences are indispensable in order to evaluate probability – when and how often the loss caused by drought occurred as well as its scope [26,30–33]. It was also assumed that if within the prospect theory respondents are allowed to select various reference points, different types of loss may affect drought risk perception differently [27]. Therefore, the following hypotheses were put forward:

H1_8: The higher the average loss in farm's yield caused by drought in the previous year the higher the risk perception.

H1_9: The higher the average loss in farm's income caused by drought in the previous year the higher the risk perception.

H1_10: Influence of experience on drought risk perception depends on the frequency of occurrences of particular impact (Hypotheses from H1_10_1 to H1_10_19 cf. Table 1).

Based on the psychometric paradigm [34–37] and its empirical verification [38–43] so far it was assumed that special influence on drought risk perception may be exerted by three elements. The first one, defined as „risk causing fear" consists of the level of fear caused by drought, risk controllability by the respondent and impact severity and catastrophic character. The second factor denoted in literature as „unknown risk" consists of the following features: risk known to persons who are not exposed to it, risk known to science, barely visible implications, immediacy of effect. The third factor encompasses aspects like risk newness (familiarity) or the range of the impact scope (common exposure). With regard to the factors resulting from the psychometric paradigm the following hypotheses were formed:

H1_11: Drought risk perception depends on perceptions of particular aspects of this risk by the respondent (detailed hypotheses H1_11_1 to H1_11_12 are presented in table 1).

Considering the sociological and cultural risk theory and the empirical research to date, it has to be said that risk perception can also be affected by vulnerability to group impact and the level of trust in external institutions which deal with drought risk management [33,44]. Assuming that group influence can be measured by degree, to which other farmers' opinions are taken into consideration when making decisions about controlling drought risk, the following hypotheses were formed:

H1_12: The more important the farm manager finds the other farmers' opinion about the choice of tools for preventing the impact of drought, the higher the drought risk perception.

H1_13: The higher the level of trust of the farmer in institutions engaged in drought risk management system and the system itself the weaker the risk perception (detailed hypotheses H1_13_1 to H1_13_7 are presented in table 1).

H1_14: The higher the level of trust in the media informing about drought the lower the risk perception.

Moreover, it was assumed that certain sociodemographic features - age, gender and education – may affect drought risk perception although it must be stated that research findings so far are not unambiguous. However, it was assumed that:

H1_15: The older the farmer, the lower the drought risk perception.

H1_16: Women present a higher drought risk perception than men.

H1_17_1: The higher the level of education, the lower the risk perception.
H1_17_2: Agricultural education lowers the level of drought risk perception.
Subsequently, a question was posed whether subjective factors explain risk perception to a greater extent than objective factors. In the course of seeking the answer to this query three regression models were estimated. The first one is based only on objective factors, the second one only on subjective factors, while the third on all the exogenous variables.

3. MATERIAL AND METHODS

The primary data was gathered on the basis of a survey conducted in February 2019 by means of direct interview, with the use of the structured questionnaire schedule, on a focus group of 200 farmers in three voivodships in Poland extremely exposed to drought. A representative sample was selected on the basis of the farm location and size.

Cognitive risk perceptions (RP) were measured by asking respondents about their perceived likelihood and perceived severity regarding drought. Measuring the perception of risk with the use of two variables, namely subjective probability of a damage-causing occurrence and the scope of the damage, is one of the more often quoted in studies [45–47]. The two variables are treated as essential when perception of risk is measured, and they can also be supplemented with other dimensions [zob. np. ,48]. The participants assess the subjective probability (SP) of drought in their farm using a percentage scale (with 0% = "impossible to happen," whereas 100% = "certain to happen"). The perceived severity was measured by asking about the severity of average consequences resulting from being exposed to drought with respect to crop (LC) and income (LI) using a percentage scale (with 0% = "no loss" whereas 100% = "total loss").

Therefore, it was assumed that:

$$RP=SP\times((LC+LI))/2\div100\% \quad (1)$$

RP – risk perception, in%
SP – subjective probability of drought, in%
LC – loss of crop due to drought, in%
LI – loss of income due to drought, in %

Distribution of RP variable is strongly asymmetric (on the right-hand side) and is characterised by a relatively high degree of concentration which makes it significantly different from the normal distribution.

In order to verify the hypotheses various statistical tests were conducted, the type of which was contingent upon the kinds of the studied variables. The choice was also made considering that the endogenous variable (RP) was a quantitative and constant one, but its distribution was characterised by high kurtosis, strong right-sided asymmetry and was significantly different from the normal distribution. Due to this, non-parametric test was favoured and the following were used: The Spearman's rank-order correlation coefficient, Kruskall-Wallis test and U-Mann-Whitney test.

To investigate the perception of drought three regression models were estimated. The goodness fit of the models has been measured by adjusted R2. The significance of the variables is

estimated using a two-sided t-Student test. In all the cases the change of R2 that is achieved through expanding the set of variables with subjective factors is assessed by applying F-test – corresponding p-values are presented (table 2).

4. RESULTS

The findings of the conducted analyses verifying hypotheses H1_1 to H1_17 are presented in Table 1, while table 2 presents research findings concerning evaluation of the degree to which risk perception is affected by subjective and objective factors.

Table 1. Factors affecting perception of drought risk – quantitative verification of hypotheses

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Objective factors					
Farm location	H1_1: Perception of drought risk depends on the farm's location.	2,34 (0,311)	NA	NA	The findings contradict the research hypothesis.
Average monthly income from farming operations	H1_2: The higher the monthly income from farming operations, the higher the risk perception	16,73 (0,005)	0,2 (0,021)	164 (0,006) for groups up to 2K. and 4001-6 K. 54 (0,05) for groups up to 2 K and 6001 – 8 K. 0 (0,008) for groups up to 2 K and 8001 – 12 K. 756,5 (0,024) for groups betw. 4001 – 6 K and 4001 – 6 K. 4,0 (0,007) for groups betw. 2001 – 4 K and 8001 to 12 K. 22,5 (0,034) for groups 4001 to 6 K and 8001-12 K. 7 (0,06) for groups 6001 – 8 K and 8001 – 12 K.	The findings contradict the research hypothesis. The highest risk perception is among farmers with income from 8001 PLN to 12 thousand PLN.
Farm size	H1_3: The greater the amount of arable land, the higher the risk perception.	8,80 (0,012)	0,74 (0,32)	916 (0,09) for groups from 1 ha - 5 ha and 20,1 ha – 50 ha 477 (0,08) for groups 5,1 ha – 20 ha and 20,1 ha – 50 ha	The findings are ambiguous. Although the highest level of risk perception was observed in farms of more than 20 ha, there were no differences between other categories of farm size.
Soil class	H1_4: The higher the average soil class in a given farm, the lower the risk perception	NA	0,044 (0,541)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Type of annual crops	H1_5_1: Drought risk perception is dependent on the type of cultivated annual crops.	NA	NA	3420,5 (0,001) for triticale 81,0 (0,033) for sugar beet	The findings corroborate the research hypothesis in the case of winter triticale cultivation (lower risk perception for farmers who grow triticale), sugar beet (higher risk perception for farmers who grow sugar beet)
Multi-annual plants	H1_5_2: Drought risk perception is dependent on the type of cultivated plants (annual or multi-annual).	NA	NA	261 (0,085)	The findings contradict the research hypothesis.
Farm specialisation	H1_6: farmers managing farms which specialise in plant output perceive drought risk as higher than those managing farms with other types of specialisations.	22,98 (0,000)	NA	1594,5 (0,000) in groups ref. Plant output and milk 285,0 (0,001) in groups ref. Plant output and no specialisation 710,5 (0,004) in groups ref. pork and milk 148,9 (0,015) in groups ref. pork and no specialisation.	The findings corroborate the research hypothesis. With „plant output" specialisation farmers perceive drought risk as the highest.
Share of income from farming operations	H1_7: The higher the share of income from farming in the whole income, the higher the risk perception.	NA	0,21 (0,003)		Findings point to existence and positive direction of the correlation.
Subjective factors					
Average loss in crops caused by drought	H1_8: The higher the average loss in farm's crops caused by drought in the previous year, the higher the drought risk perception	NA	0,258 (0,000)		The findings corroborate the research hypothesis.
Average loss in income caused by drought	H1_9: The higher the average loss in farm's income caused by drought in the previous year, the higher the drought risk perception	NA	0,42 (0,000)		The findings corroborate the research hypothesis.
Reduction in amount or quality of yield in annual crops (frequency)	H1_10_1: Impact of experience on drought risk perception depends on the frequency of reduction in amount or quality of yield.	NA	-0,14 (0,060)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Reduction in amount of yield in multi-annual crops (frequency)	H1_10_2: Impact of experience on drought risk perception depends on the frequency of reduction in amount of yield in multi-annual crops	NA	-0,13 (0,066)		The findings contradict the research hypothesis.
Reduction in yield of 30% or more of regular output (frequency)	H1_10_3: Impact of experience on drought risk perception depends on the frequency of reduction in yield of more than 30%	NA	-0,02 (0,814)		The findings contradict the research hypothesis.
Reduction in the amount of water available for irrigation (frequency)	H1_10_4: Impact of experience on drought risk perception depends on the frequency of reduction in the amount of water for irrigation	NA	0,07 (0,344)		The findings contradict the research hypothesis.
Reduction in the animal output (frequency)	H1_10_5: Impact of experience on drought risk perception depends on the frequency of reduction in animal output	NA	0,07 (0,332)		The findings contradict the research hypothesis.
Enforced herd reduction (frequency)	H1_10_6: Impact of experience on drought risk perception depends on the frequency of enforced herd reduction.	NA	-0,13 (0,068)		The findings contradict the research hypothesis.
Local shortage of animal feed or water (frequency)	H1_10_7: Impact of experience on drought risk perception depends on the frequency of local shortage of animal feed or water.	NA	0,02 (0,811)		The findings contradict the research hypothesis.
Increase in tension (rows) in the family (frequency)	H1_10_8: Impact of experience on drought risk perception depends on the frequency of increasing tensions in the family	NA	0,01 (0,924)		The findings contradict the research hypothesis.
Family members' health issues (frequency)	H1_10_9: Impact of experience on drought risk perception depends on the frequency of health issues in family members	NA	-0,09 (0,227)		The findings contradict the research hypothesis.
Shortage of drinking water for humans (frequency)	H1_10_10: Impact of experience on drought risk perception depends on the frequency of shortage of drinking water for humans.	NA	0,03 (0,725)		The findings contradict the research hypothesis.
Soil erosion (frequency)	H1_10_11: Impact of experience on drought risk perception depends on the frequency of soil erosion.	NA	0,07 (0,323)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Fires in the farm (frequency)	H1_10_12: Impact of experience on drought risk perception depends on the frequency of fires in the farm.	NA	-0,15 (0,038)		The findings corroborate the research hypothesis.
Reduction in the farm's income (frequency)	H1_10_13: Impact of experience on drought risk perception depends on the frequency of reduction in the farm's income	NA	-0,10 (0,172)		The findings contradict the research hypothesis.
Increase in costs of agricultural measures (frequency)	H1_10_14: Impact of experience on drought risk perception depends on the frequency of increase in costs of agricultural measures	NA	0,08 (0,263)		The findings contradict the research hypothesis.
Reduction in financial liquidity (frequency)	H1_10_15: Impact of experience on drought risk perception depends on the frequency of reduction in financial liquidity.	NA	0,034 (0,634)		The findings contradict the research hypothesis.
Decrease in investments (frequency)	H1_10_16: Impact of experience on drought risk perception depends on the frequency of decrease in investments.	NA	0,11 (0,146)		The findings contradict the research hypothesis.
Difficulty in obtaining loans (frequency)	H1_10_17: Impact of experience on drought risk perception depends on the frequency of difficulty in obtaining loans	NA	-0,17 (0,015)		The findings corroborate the research hypothesis.
Lowering of the family's standard of living (frequency)	H1_10_18: Impact of experience on drought risk perception depends on the frequency of lowering the family's standard of living.	NA	-0,23 (0,001)		The findings corroborate the research hypothesis.
Conflicts with recipients (frequency)	H1_10_19: Impact of experience on drought risk perception depends on the frequency of conflicts with recipients.	NA	-0,18 (0,011)		The findings corroborate the research hypothesis.
Level of fear caused by drought	H1_11_1: The higher the level of fear caused by drought the higher the drought risk perception	NA	-0,07 (0,363)		The findings contradict the research hypothesis.
Risk controllability _knowledge	H1_11_2: The stronger the respondent's feeling that they have sufficient knowledge to control drought risk the weaker the perception of this risk.	NA	-0,043 (0,555)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Risk controllability _resources	H1_11_3: The stronger the respondent's feeling that they possess sufficient material and financial means to control drought the lower the perception of this risk	NA	-0,10 (0,176)		The findings contradict the research hypothesis.
Catastrophic impact_scope	H1_11_4: The stronger the feeling that the impact of drought may be catastrophic, the higher the risk perception.	NA	-0,069 (0,341)		The findings contradict the research hypothesis.
Catastrophic impact_ probability	H1_11_5: The higher the assessment of probability of catastrophic impact of drought, the higher the risk perception	NA	-0,1 (0,159)		The findings contradict the research hypothesis.
Severity of the impact	H1_11_6: The stronger the conviction that drought may threaten the farm survival, the higher the risk perception.	NA	0,272 (0,000)		The findings corroborate the research hypothesis.
Risk familiar to the farmer	H1_11_7: The stronger the farmer's conviction that drought is a familiar phenomenon, the weaker the risk perception.	NA	-0,085 (0,22)		The findings contradict the research hypothesis.
Risk well-known to science	H1_11_8: The stronger the conviction that drought is a phenomenon known to science the weaker the risk perception.	NA	0,292 (0,004)		The findings corroborate the research hypothesis.
Visibility of impact	H11_9: The stronger the feeling that the impact of drought is not hidden (visible with „the naked eye"), the lower the risk perception.	NA	-0,09 (0,210)		The findings contradict the research hypothesis.
Immediacy effect	H1_11_10: The stronger the conviction that the impact of water shortage can be seen only after some time, the lower the risk perception.	NA	-0,210 (0,03)		The findings corroborate the research hypothesis.
Newness of risk	H1_11_11: The stronger the conviction that drought is an old and well-known phenomenon the weaker the risk perception.	NA	0,081 (0,243)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Common exposure to risk	H1_11_12: The larger the number of farms which in the respondent's opinion are exposed to drought, the higher the risk perception.	NA	-0,236 (0,029)		The findings contradict the research hypothesis. The larger the number of farms which in the respondent's opinion are exposed to drought, the lower the risk perception is.
Susceptibility to others' opinions	H1_12: The more important the farm manager finds the other farmers' opinion about the choice of tools for preventing the impact of drought, the higher the drought risk perception.	NA	-0,061 (0,398)		The findings contradict the research hypothesis.
Trust_existence of the system	H1_13_1: Conviction that there is a system of drought management in Poland lowers the drought risk perception.	NA	NA	1,53 (0,465)	The findings contradict the research hypothesis.
Trust _ understanding of CWB	H1_13_2: Understanding of CWB indicator lowers the drought risk perception.	NA	NA	1,50 (0,470)	The findings contradict the research hypothesis.
Trust _accuracy of CWB	H1_13_3: The stronger the conviction that CWB indicator properly reflects drought occurrences, the lower the risk perception.	NA	0,027 (0,756)		The findings contradict the research hypothesis.
Trust _CWB measurements	H1_13_4: The stronger the feeling that CWB measurements can be trusted the lower the risk perception.	NA	0,31 (0,721)		The findings contradict the research hypothesis.
Trust _farmers' interest	H1_13_5: The stronger the conviction that farmers have sufficient say in conducting operations minimising the impact of drought the lower the risk perception.	NA	-0,02 (0,780)		The findings contradict the research hypothesis.
Trust _experts	H1_13_6: The higher the level of trust in experts' opinion about the scope of drought, its causes and necessary actions, the lower the risk perception.	NA	-0,22 (0,02)		The findings corroborate the research hypothesis.
Trust _the state	H1_13_7: The stronger the conviction that the state guards the farmers' interests with respect to drought, the lower the risk perception.	NA	0,05 (0,498)		The findings contradict the research hypothesis.

Variable	Hypothesis	Kruskal-Wallis Test (p-value)	Spearman's rank-order correlation (p-value)	U-Mann-Whitney Test (p-value)	Conclusion
Trust _media	H1_14: The higher the level of trust in the media informing about drought, the lower the risk perception.	NA	-0,154 (0,029)		The findings corroborate the research hypothesis.
Age	H1_15: The older the person in charge of the farm, the lower the risk perception.	15,09 (0,02)	-0,77 (0,282)	473,5 (0,044) between groups aged 31-35 and 51-55 262,5 (0,053) between groups aged 36-40 and 41-45 65,0 (0,008) between groups aged 36-40 and 56-60 544 (0,002) between groups aged 41-45 and 51-55 177 (0,002) between groups aged 51-55 and over 56-60.	The findings contradict the research hypothesis. Although there is a correlation between age and risk perception, but it was impossible to determine its unambiguous direction.
Gender	H1_16: Women have a higher perception of risk than men.	0,549 (0,459)	NA		The findings contradict the research hypothesis.
Education_level	H1_17_1: The higher the education level, the higher the risk perception.	6,22 (0,045)	-0,088 (0,22)	2866 (0,040) between groups with vocational or lower, and secondary 127,0 (0,069) between groups with secondary and post-secondary	The findings contradict the research hypothesis. The lowest level is seen in farmers with vocational education or lower, the highest in farmers with post-secondary education.
Education _type	H1_17_2: Agricultural education lowers the drought risk perception.	NA	NA	4567 (0,674)	The findings contradict the research hypothesis.

Source: Author's own research

Table 2. Findings of the regression analysis of drought risk perception for three groups of exogenous variables

Variables	Model 1 – objective factors		Model 2 –subjective factors		Model 3 – both objective and subjective factors	
	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation
Constant	7,7***	0,62	9,79***	2,42	8,84***	2,37
Farm's specialisation – plant output	2,59***	0,82			0,95**	0,46
Farm's specialisation - livestock	2,51**	1,07			0,73	0,54
Average monthly income from farming operations - from 2001 to 4000	-1,90**	0,93			1,03	0,64
Average monthly income from farming operations - over 12 K	3,71**	1,60			-1,34	0,93
Age 31-35			2,62***	0,67	2,87***	0,68
Age 41-45			1,31**	0,59	1,47**	0,58
Age 46-50			2,56***	0,68	3.06***	0,70
Age 51-55			-2,37***	0,61	-2.07***	0,60
Education_level secondary			-1,33***	0,47	-1,11**	0,47
Average loss in yield caused by drought			0,07***	0,02	0,06***	0,02
Average loss in income caused by drought			0,085***	0,02	0,10***	0,02
Reduction in yield in multi-annual crops (frequency)			0,35**	0,16	0,24	0,17
Reduction in the farm's income (frequency)			-0,77***	0,16	-0,76***	0,15
Reduction in investments (frequency)			0,94***	0,17	0,94***	0,17
Difficulties with obtaining loans (frequency)			-0,98***	0,15	-0,96***	0,15
Risk controllability_resources			-0,72***	0,15	-0,53***	0,16
Impact severity (survival)			0,91***	0,16	0,81***	0,16
Immediacy of effect			-0,58***	0,20	-0,60***	0,20
Trust_system existence			-2,59***	0,85	-2,46***	0,83
Trust_understanding CWB			-1,23**	0,53	-1,72***	0,54
Trust_ CWB accuracy			-0,58***	0,19	-0,53***	0,12
R^2 **Corrected R^2** **F (p-value)**	0,084 0,065 F (4;191) = 4,39 (0,002)		0,71 0,67 F (17;117)=16,79 (0,000)		0,74 0,69 F (21;113)=15,199 (0,000) F-tests of linear restrictions for objective factors: F(4;113)=3,26 (0,014) For subjective factors: F(17;113)=16,77 (0,000)	

* significance of 10%, ** significance of 5%, *** significance of 1%

Source: author's own research

4. DISCUSSION AND CONCLUSIONS

On the basis of the hypotheses verification it is possible to conclude that risk perception depends on both objective and subjective factors. As for the former ones, one can assert that the higher the monthly income from farming operations, the higher the drought risk perception. It is also higher when the farm specialises in plant output, when beet roots are cultivated (high-cost cultivation) or triticale and when the income from farming is a larger share in farm's general income.

One may conclude then that the higher the exposure and vulnerability to risk, the higher the drought risk perception, which is in accordance with previous expectations.

As far as subjective factors are concerned, one can notice that the higher the average reduction in yield or income of the farm caused by previous year's drought the higher the risk perception. However, perception is not affected by the frequency of these occurrences. Therefore, it turns out that severe loss, even though less frequent, have a greater influence on drought risk perception than smaller loss even if it is more frequent, which may be due to the fact that farmers tend to accept fluctuations in yields of up to 10%. Nevertheless, one can state that farmers apply availability heuristic. Drought risk perception is also affected by frequency of certain other experiences resulting from drought, i.e. fires, difficulties in obtaining loans, lowering the family's standard of living or conflicts; surprisingly, greater frequency of these experiences lowers drought risk perception.

Among the factors analysed on the basis of psychometric paradigm, the degree of conviction that drought is a threat to the farm's survival became relevant – the higher it is, the higher the drought risk perception. Next, a strong conviction that the impact of drought is a postponed one and that it is well-known to science lowers the drought risk perception. This is caused by the fact that a larger temporal distance causes both positive and negative effects to be underestimated (hence the urge of entities to postpone negative effects and to possibly accelerate achievement of benefits) [49]. Moreover, a broader knowledge of risk contributes to its more accurate assessment and to taking more suitable action in the case of adverse effects [50]. It can be rather surprising that respondents tend to perceive drought risk as increasingly lower when the number of affected farms rises in their opinion. Most probably this is connected with the fact that in the years when drought was extensive in scope, a whole array of aid forms was provided from the state budget. Farmers perceive drought risk by reducing its attributes to four dimensions, namely catastrophic potential, immediacy of effect, the degree to which the risk is known to science and the number of farms exposed to drought.

Drought risk perception is also lowered by higher level of trust in experts' opinions about the scope, causes and necessary actions to be taken with regard to drought as well as by a higher level of trust in the media informing about drought. One can presume, therefore, that in the process of drought management, like in other cases of catastrophic risk, communication is key.

Considering sociodemographic factors, in the light of the conducted study, essential influence on risk perception comes from age and education level, in both cases acting as stimulant.

The model based on objective factors offers very little explanation as for risk perception volatility. On the other hand, the model taking into consideration only subjective factors explains the volatility of endogenous variable in 71%. The model regarding all the relevant objective and subjective variables in models 1 and 2 explains volatility in 74%. This corroborates the assumption that subjective factors explain risk perception to a much greater degree than objective factors. Considering standardised Beta coefficients in each model (not presented in the table) one can assert that in model the endogenous variable is largely affected by the farms plant specialisation. Other exogenous variables show convergent absolute values of Beta coefficients. In the group of subjective factors in model 2 risk perception is affected to the largest extent by the frequency of difficulties in obtaining loans, frequency of reduction in investments caused by drought, frequency of threat to the farms' survival, average level of loss in farm's income and its frequency of occurrence. These factors also affected to the largest extent the changes in the endogenous variable in model 3 along with age category of 31-35 and 46-50 years of age, In this

way, one may presume that perceptions depend mainly on experiences and sociodemographic traits (age), while trust in the state's ability to control risk is of slightly smaller importance.

Summing up the conducted analysis, it is possible to assert that although a correlation between objective variables and the level of risk perception has been identified, it is vital that exposure and vulnerability to drought risk provide very little explanation for drought risk perception variance. On the other hand, subjective factors offer explanation in over seventy percent. This means that heterogeneity of drought risk perception is not caused by differences in exposure or vulnerability to risk; on the contrary, it is mainly due to individual factors. At the same time, it becomes clear why the same objective risk may generate its versatile perceptions.

Because the correlation between risk perception and mitigation behavior is ambiguous [9,12,30,33,51–56] the above considerations should be extended towards analysis of linkages between cognitive perception of risk by farmers and their taking action aimed at risk control, such as purchasing insurance. It would enable, among other things, a realistic construction of plans aimed at preventing the impact of drought, at least in the part which requires farmers' activity.

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REFERENCES

[1] Elbehri, A., Challinor, A., Verchot, L., Angelsen, A., Hess, T., Ouled Belgacem, A., Clark, H., Badraoui, M., Cowie, A., Silva, S. De, Erickson, J. Joar Hegland, S., Iglesias, A., Inouye, D., Jarvis, A., Mansur, E., Mirzabaev, A., Montanarella, L., Murdiyarso, D., Notenbaert, A., Obersteiner, M., Paustian, K., Pennock, D., Reisinger, A., Soto, D., Soussana, J.-F., Thomas, R., Vargas, R., Wijk, M. Van and Walker, R. (2017) *FAO-IPCC Expert Meeting on Climate Change, Land Use and Food Security: Final Meeting Report; January 23-25, 2017 FAO HQ Rome*. http://www.ipcc.ch/pdf/supporting-material/EM_FAO_IPCC_report.pdf. Accessed November 2, 2017.

[2] Iglesias, A. and Garrote, L. (2015) Agricultural Water Management Adaptation strategies for agricultural water management under climate change in Europe. *Agricultural Water Management* **155**, 113–124. https://ac.els-cdn.com/S037837741500089X/1-s2.0-S037837741500089X-main.pdf?_tid=ece4c9f8-c2e7-11e7-a16c-00000aab0f6b&acdnat=1509968883_b75abfa935106666eef0d5fada08d723. Accessed November 6, 2017.

[3] European Commission (2012) *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Report on the Review of the European Water Scarcity and Droughts Policy.* http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0672&from=EN. Accessed November 2, 2017.

[4] JRC (2017) *Severe drought in Italy - July 2017.* http://edo.jrc.ec.europa.eu/documents/news/EDODroughtNews201707_Italy.pdf.

[5] Explaining the lack of rain in Spain (and Italy) (2017). *The Economist*. https://www.economist.com/europe/2017/08/10/explaining-the-lack-of-rain-in-spain-and-italy.

[6] JRC (2018) *Drought in Central-Northern Europe - July 2018*. http://edo.jrc.ec.europa.eu/documents/news/EDODroughtNews201807_Central_North_Europe.pdf.

[7] OECD (2016) *Mitigating Droughts and Floods in Agriculture. Policy Lessons and approaches.*, OECD Publishing, Paris.
[8] Ogurtsov, V. a., Asseldonk, M. a P.M. Van and Huirne, R.B.M. (2009) Purchase of catastrophe insurance by Dutch dairy and arable farmers. *Review of Agricultural Economics* **31**, 143–162.
[9] Sherrick, B.J., Barry, P.J., Ellinger, P.N. and Schnitkey, G.D. (2004) Factors Influencing Farmers' crop Insurance Decisions. *American Journal of Agricultural Economics* **86**, 103–114.
[10] Dobbie, M.F. and Brown, R.R. (2014) A framework for understanding risk perception, explored from the perspective of the water practitioner. *Risk Analysis* **34**, 294–308.
[11] Harwood, J., Heifner, R., Coble, K., Perry, J. and Somwaru, A. (1999) Managing Risk in Farming: Concepts, Research, and Analysis. *Agricultural Economic Report* **774**, 1–83.
[12] Tucker, C.M., Eakin, H. and Castellanos, E.J. (2010) Perceptions of risk and adaptation: Coffee producers, market shocks, and extreme weather in Central America and Mexico. *Global Environmental Change* **20**, 23–32.
[13] Duinen, R. van, Filatova, T., Geurts, P. and Veen, A. van der (2015) Empirical Analysis of Farmers' Drought Risk Perception: Objective Factors, Personal Circumstances, and Social Influence. *Risk Analysis* **35**, 741–755.
[14] Urquijo, J. and Stefano, L. De (2016) Perception of drought and local responses by farmers: A perspective from the Jucar river Basin, Spain. *Water Resources Management* **30**, 577–591.
[15] Bryan, K., Ward, S., Barr, S. and Butler, D. (2019) Coping with Drought: Perceptions, Intentions and Decision-Stages of South West England Households. *Water Resources Management* **33**, 1185–1202.
[16] Giordano, R. and Vurro, M. (2010) Fuzzy Cognitive Map to Support Conflict Analysis in Drought Management. In: *Fuzzy Cognitive Maps. Studies in Fuzziness and Soft Computing*, Ed: M. Glykas, Springer, Berlin, Heidelberg. pp 403–425.
[17] Blanka, V., Ladányi, Z., Szilassi, P., Sipos, G., Rácz, A. and Szatmári, J. (2017) Public Perception on Hydro-Climatic Extremes and Water Management Related to Environmental Exposure, SE Hungary. *Water Resources Management* **31**, 1619–1634.
[18] Boholm, Å. (2003) The cultural nature of risk: Can there be an anthropology of uncertainty? *Ethnos* **68**, 159–178.
[19] Central Statistical Office (2018) *Statistical Yearbook of Agriculture*, Warsaw.
[20] Aven, T. and Renn, O. (2010) *Risk Management and Governance. Concept, Guidelines and Applications*, Springer-Verlag, Berlin, Heidelberg.
[21] Collins, R., Kristensen, P. and Thyssen, N. (2009) *Water Resources Across Europe — Confronting Water Scarcity and Drought.*
[22] Lanen, H. a J. Van, Alderlieste, M. a, Acacio, V., Garnier, E., Gudmundsson, L., Monteagudo, D.H., Lekkas, D., Paredes, J., Solera, A., Assimacopoulos, D., Rego, F., Seneviratne, S., Stahl, K. and Tallaksen, L.M. (2013) Quantitative analysis of historic droughts in selected European case study areas.
[23] Łabędzki, L. (2017) Parameterization of Drought Vulnerability in Agriculture. *Infrastructure and Ecology of Rural Areas* **II**, 535–544.
[24] Rocha, M.S. and Lanen, H.A.J. Van (2015) Links Between Meteorological Drought Indices and Yields (1979 – 2009) of the Main European Crops.
[25] Łabędzki, L. and Bąk, B. (2015) Indicator-based monitoring and forecasting water deficit and surplus in agriculture in Poland. *Annals of Warsaw University of Life Sciences – SGGW. Land Reclamation* **47**, 355–369. https://content.sciendo.com/view/journals/sggw/47/4/article-p355.xml.

[26] Kaczała, M. (2017) Perception of risk by farmers and crop insurance decisions –Polish case. In: *21st APRIA 2017 Annual Conference; 30th July to 2nd August 2017.* http://apria2017.syskonf.pl/conf-data/APRIA2017/files/Paper Kaczala_APRIA_2017.pdf.

[27] Kahneman, D. and Tversky, A. (1979) Prospect Theory: An Analysis of Decision under Risk. *Econometrica* **47**, 263–292. http://links.jstor.org/sici?sici=0012-9682%28197903%2947%3A2%3C263%3APTAAOD%3E2.0.CO%3B2-3. Accessed July 30, 2017.

[28] Tversky, A. and Kahneman, D. (1986) Rational Choice and the Framing of Decisions. *The Journal of Business* **59**, 251–278.

[29] Kahneman, D. and Tversky, A. (1973) On the Psychology of Prediction. *Psychological Review* **80**, 237–251.

[30] Kaczała, M. and Wiśniewska, D. (2015) Polish farmers' perception of spring frost and the use of crop insurance against this phenomenon in Poland. *Economic and Business Review* **15**, 90–111.

[31] Astfj, D. V, Peters, E. and Slovic, P. (2014) Cognition and Neurosciences The affect heuristic, mortality salience, and risk: Domain-specific effects of a natural disaster on risk-benefit perception. 527–532.

[32] Keller, C., Siegrist, M. and Gutscher, H. (2006) The role of the affect and availability heuristics in risk communication. *Risk Analysis* **26**, 631–639.

[33] Wachinger, G., Renn, O., Begg, C. and Kuhlicke, C. (2013) The risk perception paradox-implications for governance and communication of natural hazards. *Risk Analysis* **33**, 1049–1065.

[34] Paul Slovic (1987) Perception of Risk. *Science* **236**, 280–285. http://socsci2.ucsd.edu/~aronatas/project/academic/risk slovic.pdf.

[35] Slovic, P., Fischhoff, B. and Lichtenstein, S. (1985) Characterizing perceived risk. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2185557. Accessed July 7, 2017.

[36] Slovic, P., Fischhoff, B. and Lichtenstein, S. (1985) Characterizing perceived risk. In: *Perilous progress: Managing the Hazards of Technology*, Eds: R.W. Kates, C. Hohenemser and J.X. Kasperson, Westview. pp 91–123.

[37] Slovic, P., Fischhoff, B. and Lichtenstein, S. (1984) Behavioral decision theory perspectives on risk and safety. *Acta Psychologica* **56**, 183–203. https://www.researchgate.net/profile/Baruch_Fischhoff/publication/256105116_Behavioral_Decision_Theory_Perspectives_on_Risk_and_Safety/links/5619390a08ae78721f9cfed1/Behavioral-Decision-Theory-Perspectives-on-Risk-and-Safety.pdf. Accessed July 30, 2017.

[38] Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S. and Combs, B. (1978) How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences* **9**, 127–152.

[39] Englander, T., Farago, K., Slovic, P. and Fischhoff, B. (1986) A comparative analysis of risk perception in Hungary and the United States. *Social Behaviour* **1**, 55–66.

[40] Teigen, K.H., Brun, W. and Slovic, P. (1988) Societal risks as seen by a Norwegian public. *Journal of Behavioral Decision Making* **1**, 111–130.

[41] Kleinhesselink, R.R. and Rosa, E.A. (1991) Cognitive Representation of Risk Perceptions: A Comparison of Japan and the United States. *Journal of Cross-Cultural Psychology* **22**, 11–28.

[42] Karpowicz-Lazreg, C. and Mullet, E. (1993) Societal Risk as Seen by the French Public. *Risk Analysis* **13**, 253–258.

[43] Goszczyńska, M., Tyszka, T. and Slovic, P. (1991) Risk perception in Poland: A comparison with three other countries. *Journal of Behavioral Decision Making* **4**, 179–193.

[44] Kasperson, R.E., Renn, O., Slovic, P., Brown, H.S., Emel, J., Goble, R., Kasperson, J.X. and Ratick, S. (1988) The social amplification of risk: A conceptual framework. *Risk Analysis* **8**, 177–187.

[45] Kellens, W., Terpstra, T., Schelfaut, K. and Maeyer, P. De (2013) Perception and Communication of Flood Risks: a systematic review of empirical research. *Risk Analysis* **33**, 24–49. https://biblio.ugent.be/publication/3163311/file/6787664.pdf. Accessed July 28, 2017.

[46] Ullah, R., Shivakoti, G.P. and Ali, G. (2015) Factors effecting farmers' risk attitude and risk perceptions: The case of Khyber Pakhtunkhwa, Pakistan. *International Journal of Disaster Risk Reduction* **13**, 151–157. http://ac.els-cdn.com/S2212420915300121/1-s2.0-S2212420915300121-main.pdf?_tid=1dec0962-45e8-11e7-a894-00000aacb35d&acdnat=1496225069_a4bdb1f6c4366f71611b0cb57e30ad37. Accessed May 31, 2017.

[47] Ullah, R., Shivakoti, G.P., Zulfiqar, F., Iqbal, M.N. and Shah, A.A. (2017) Disaster risk management in agriculture: tragedies of the smallholders. *Natural Hazards* **87**, 1361–1375.

[48] Botzen, W.J.W., Aerts, J.C.J.H. and Bergh, J.C.J.M. Van Den (2009) Dependence of flood risk perceptions on socioeconomic and objective risk factors. *Water Resources Research* **45**, 1–15.

[49] Kozielecki, J. (1977) *Psychologiczna teoria decyzji*, drugie por., Państwowe Wydawnictwo Naukowe, Warszawa.

[50] Goszczyńska, M. (1997) *Człowiek wobec zagrożeń*, Wydawnictwo 'Zak', Warszawa.

[51] Ullah, R., Shivakoti, G.P., Kamran, A. and Zulfiqar, F. (2016) Farmers versus nature: managing disaster risks at farm level. *Natural Hazards* **82**, 1931–1945.

[52] Liu, F., Corcoran, C.P., Tao, J. and Cheng, J. (2016) Risk perception, insurance recognition and agricultural insurance behavior–An empirical based on dynamic panel data in 31 provinces of China. *International Journal of Disaster Risk Reduction* **20**, 19–25. http://www.sciencedirect.com.000042cv025a.han3.ue.poznan.pl/science/article/pii/S2212420916301352. Accessed April 5, 2017.

[53] Birkholz, S., Muro, M., Jeffrey, P. and Smith, H.M. (2014) Rethinking the relationship between flood risk perception and flood management. *Science of The Total Environment* **478**, 12–20. http://www.sciencedirect.com.00004272012c.han3.ue.poznan.pl/science/article/pii/S0048969714000709. Accessed May 10, 2017.

[54] Woods, B.A., Nielsen, H.Ø., Pedersen, A.B. and Kristofersson, D. (2017) Farmers' perceptions of climate change and their likely responses in Danish agriculture. *Land Use Policy* **65**, 109–120. http://ac.els-cdn.com.00004272014f.han3.ue.poznan.pl/S0264837717303812/1-s2.0-S0264837717303812-main.pdf?_tid=70b6ca42-3576-11e7-aecf-00000aacb35d&acdnat=1494417027_f5c92824ef98b14a266ea294c11f8347. Accessed May 10, 2017.

[55] Grothmann, T. and Patt, A. (2005) Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change* **15**, 199–213. https://www.pik-potsdam.de/news/public-events/archiv/alter-net/former-ss/2009/14.09.2009/schroeter/literature/grothmann_patt.pdf. Accessed July 28, 2017.

[56] Wheeler, S., Zuo, A. and Bjornlund, H. (2013) Farmers' climate change beliefs and adaptation strategies for a water scarce future in Australia. *Global Environmental Change* **23**, 537–547. http://www.elsevier.com/authorsrights. Accessed July 30, 2017.

FACTORS INFLUENCING PROJECT MANAGEMENT SUCCESS: THE RELEVANCE OF DIGITAL COMPETENCES

Marko Slavković[1]
Marijana Simić[2]

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Abstract: *Digital era changes the assumption for business success forces of production firms and transform their technological base. Success of this type of project depends on different factors related to internal organization, stakeholders and digital competencies. The purpose of this article is to compare the relevance of these factors for project management success. The goal is to identify the importance of employees' digital competences in technological changes. The results obtained in the original research can be a useful guide for managers to focus their efforts on factors that can ensure superior performance of a particular project.*

Keywords: *project management, digital competences, digitalization, technology change.*

1. INTRODUCTION

Globalization and digitization as contemporary trends play an important role in the way businesses operate. Challenges and issues facing enterprises are the basic characteristics of today's Fourth Industrial Revolution that integrates the digital and physical world in one way [1] into a consistent whole [2]. Moreover, the intensification of the use of digital technology in the last two decades has contributed to the transformation of numerous processes in the company and the value chain, which has affected all activities, from procurement to sales and marketing. Special requirements are in front of production companies, which, by replacing traditional methods of work with modern digital tools [3], tend to maximize potential benefits generated by the use of technologies such as automation, robotics, 3D-printing, Internet of Things (IoT) and others [4], [5].

The identified trends have led to changes, not only in the structure of production and productivity, but also in the domain of quality and quantity of work. There is a need for transforming business models, but also redefining job descriptions [3]. Advanced technologies associated with the Fourth Industrial Revolution, on the one hand, guarantee significant improvements in efficiency and effectiveness of production, but on the other hand, they also require new key competences and capabilities of employees [6], [2]. Consequently, there is a need to innovate formal education programs and their content, taking into account the existing needs of individuals. This is further enhanced by the fact that in companies that are seeking a sustainable competitive advantage, the focus is increasingly on enhancing professional skills and business models through continuous education and lifelong learning programs for newly employed and existing employees [3].

In addition, project management is classified as the fundamental activity of manufacturing enterprises [7], [8], especially if they want to secure their position in today's digitalization era. An important task for managers is the identification of factors that determine the success of projects,

[1] Faculty of Economics, University of Kragujevac, Djure Pucara Starog 3, 34000 Kragujevac, Serbia
[2] Faculty of Economics, University of Kragujevac, Djure Pucara Starog 3, 34000 Kragujevac, Serbia

which imply the implementation of advanced technology. Since the future of production rests on the exploitation of intangible assets and the ability to innovate and differentiate [9], as a key precondition for successfully overcoming the barriers to digital transformation, and thus maximizing the potential benefits of advanced technologies, it represents human capital [3]. A review of previous studies identified a wide range of factors that determine the success of the projects. Among them are allocated financially [9], [7], [8], organizational [10], [11], [12], stakeholders [13], technological [14]. As the development of advanced production technologies develops the need for changing employee behavior patterns and their competencies [15], project managers must undoubtedly pay special attention to the development of competencies of their employees, in order to ensure the path to successful implementation of the project. In this context, the phenomenon of digital competences is highlighted [16]. Although their significance in the field of project management cannot be disputed [17], empirical evidence is limited that points to the importance of digital competencies for the successful implementation of the project.

2. LITERATURE REVIEW

In today's era, project management is defined not only as a mode of production, which results in the creation of a finished product [13], but it is also assumed to be an organizational form and management technique [18]. One of the important issues in the field of project management refers to the method of measuring project performance. For the past two decades, the focus has been on financial criteria, based on the estimation of efficiency and the design of the budget required for the implementation of the project [19]. In addition, the success of the project can also be viewed through the prism of stakeholder satisfaction, while recognizing the success of products on the market, business and organizational benefits, and the development of project team members [20].

Although a significant part of the professional public places focusses on financial factors of success [9], [7], [8], other factors need not be omitted. Among the important internal factors, which can improve the efficiency and effectiveness of project implementation, is the organizational culture [12]. Presented as the development of a unique set of values, attitudes and ideas, it is clear that it plays an important role in many aspects of the organization [21]. An organization whose culture rests on flexibility and spontaneity will most likely contribute to more effectively overcoming obstacles caused by uncertainty. Therefore, the organizational culture, which fosters active participation of employees and their empowerment during the implementation of advanced technology, certainly contributes positively to the successful realization of the projects [22], [10]. In addition to organizational culture, previous research emphasizes the importance of organizational structure, which primarily affects the ease of resource allocation and agility in decision making. According to [23], the organizational structure is an important factor, as there are greater prospects for the success of the project, if the organizational structure is fully adapted to the requirements for the realization of the project.

Although the wide range of internal factors, which determine the success of the project, the following conditions should not be omitted [24]: (1) the criteria for success should be consistent with the interests of stakeholders before and during the project; (2) the relationship between project owner / project sponsor and manager should be characterized by co-operation and continuous exchange of information and ideas; (3) the project manager should be prepared to handle flexibly in unforeseen circumstances; (4) The project promoter / sponsor should really be interested in the results of the project. Based on the above, it is concluded that „the value is in the eyes of the observers", i.e. that the actions and interests of the stakeholders significantly deter-

mine the chances of realization and success of the projects. Bearing in mind the numerous, but often, contradictory perspectives of stakeholders, the success of the projects can be considered in different ways, and therefore special attention should be paid to the consideration and harmonization of the interests of internal and external stakeholders [10].

Among external stakeholders, an important group is represented by suppliers, since the level of integration with these stakeholders contributes to positive results in terms of the flexibility and reliability of the delivered supplies [25]. In accordance, Horn et al., [26] emphasize that enterprises with a high level of integration with suppliers are particularly successful in the execution of projects. Therefore, the relationship with suppliers and their choice should be classified as another critical factor. The selection process should be carried out carefully, taking into account various aspects such as quality, price, delivery, service level, warranty, technical capacity, production capacity, historical performance, and even location [27]. It is also important to note that the definition of contractual items related to the establishment of different incentive mechanisms (bonuses and penalties) for suppliers [28] plays an important role in the realization of projects, since it can achieve reduction of time and cost of delivery and improvement of the quality of the delivered articles [29]. In addition to relationships with suppliers, the success of the project is also correlated with the level of client engagement. The greater the degree of participation of clients in the project, it is easier to identify the requirements, to establish the quality criteria and to reduce the need for change, and thus to improve the performance. Therefore, the active participation of clients in projects has to be stimulated from the beginning of the life cycle of the project [30].

The implementation of advanced technology, which features the Fourth Industrial Revolution, on the one hand, provides significant improvements in the efficiency and effectiveness of production, but on the other hand, it also requires new key competences and skills to be developed by employees [6], [2]. Since advanced production technology is a novelty, while competence management is one of the most important levers on which successful transformation processes lie [31], [2], it is necessary to create appropriate behavioral patterns, which will primarily be based on the improvement of existing experience and abilities of employees [15]. Chryssolouris et al. [32]. state that engineers in manufacturing companies should attend various training programs in order to continuously work on the improvement of knowledge and skills and thus meet the growing needs of the modern production industry. Sousa and Rocha [33] have found that the set of necessary competences of employees is changing under the influence of the effects of the Internet of things, cloud technologies, large data, mobile technologies, artificial intelligence and robotics. Sousa and Wilks [34] concluded in their study that the skills of critical thinking, adaptation, network collaboration and creativity skills will be essential in today's business environment.

Moreover, the influence of advanced technology has significantly contributed to the development of the phenomenon of digital competences, that is, technology-related skills [16], which can also be classified as one of the primary requirements in the field of project management in the production sector [35]. Their relevance rests on the fact that they significantly contribute to acquiring other key competences (e.g. language, mathematics, learning to learn, cultural awareness) [36]. However, empirical evidence of the specific competencies of employees for successful implementation of projects in manufacturing enterprises is limited [37], while a small number of studies are also concerned with establishing the relevance of digital competencies necessary to overcome obstacles in transformation processes [38], [2].

3. RESEARCH METHODOLOGY

The given theoretical framework and the gap in the existing literature is the starting point for carrying out the research, the results of which are presented in this paper. The subject of the research is to determine the relevance of different groups of factors, with particular emphasis on establishing and comparing the importance of digital competencies for the successful implementation of projects. Participation in the survey was taken by employees in managerial positions in manufacturing enterprises, which actively operate in the territory of the Republic of Serbia. The primary goal of the research is to determine the perception of employees about the relevance of identified groups of factors for the realization of projects. The software package SPSS was used for data processing. In accordance with the subject and objective of the research, descriptive statistics analysis and reliability analysis were conducted.

A questionnaire was used as a research instrument, which was specifically designed for this research. The first part of the questionnaire was intended to provide basic information about the company (i.e. ownership structure, number of employees etc.) and information on the way of organizing the production process and the existing form of automation. Within the second section of the questionnaire, statements were presented, which presented critical factors for the implementation of projects, whereby respondents were asked to express their views on the relevance of these factors in the five-point Likert scale. The method of distributing the questionnaire was conducted with the help of a transparent database of businessmen and companies, published by the Business Registers Agency. This was randomly selected 189 active production companies, and 54 valid questionnaires were collected (response rate 28.6%).

4. RESEARCH RESULTS

Table 1 gives an overview of the evidence, which reflects various factors relevant to the success of the projects, as well as the average values that reflect the attitude of the respondents. Based on the results of descriptive statistical analysis, the conclusion is drawn that managers attach the greatest importance to the factors concerning the stakeholders and their relations with them. Particular emphasis is placed on the importance of customers, as the most important external stakeholders, which clearly indicates the basic vision of the company to strive to fully meet the needs of its customers. No suppliers should be omitted, which have an impact on the efficiency of the execution of the production process, but also in the timely satisfaction of the needs of customers. Regarding organizational factors, which are also highly evaluated (3.8185), it is essential to note that it is important to build an organization and cultivate a culture that facilitates the acquisition of the necessary resources (material and immaterial).

Regarding digital competencies, the mean value shown (3,8796) indicates the central relevance of these factors from the perspective of the manager. This result also points to the potential shortage of Serbian manufacturing companies in which digital awareness is still not developed, that is, employees continue to use traditional methods, tools and equipment. Insufficient knowledge about new technologies, a constant break with modern trends and/or resistance to change are just some of the possible reasons why digital competencies are not on the highest level of significance. Also, Table 1 gives the results of reliability analysis. The values of Cronbach's alpha coefficient can be accepted [39] and range from 0,700 to 0,734.

Table 1: Descriptive statistics and reliability analysis

Factors	*Mean*	*Standard deviation*
Stakeholders: Cronbach's alpha =0,734		
Finding and selecting suppliers	4,2593	0,67810
Improving product quality from customer perspective	4,2963	0,79217
Offering value to customers	4,1481	0,81048
Return rate of invested money into the new production system	3,9444	0,83365
Strengthening the image of the organization in public	3,9259	0,90807
Sum	4,1148	0,56248
Organisational structure and culture: Cronbach's alpha =0,733		
Willingness of the employees to accept and participate in the implementation of the new production system	3,6852	1,07850
Provision of necessary resources (material and immaterial) for the implementation of a new production system	4,2407	0,72516
Improving communication among employees	3,5000	1,02331
Time needed to implement a new production system	3,9444	0,89899
Simplicity of implementation a new production system	3,7222	0,97935
Sum	3,8185	0,65964
Digital competences: Cronbach's alpha =0,700		
Readiness of employees to follow the demands of their superiors	3,9815	0,92125
Availability of relevant information on the new production system	3,7963	0,89821
Employee competence to introduce a new production system	3,8519	0,81048
Monitoring the achieved performance of the new production system	3,8889	0,92485
Sum	3,8796	0,64563

5. CONCLUSION

Based on the results of the survey, it is concluded that digital competences have a significant impact on the success of projects in manufacturing enterprises. However, it cannot be said that managers point out the above factors as the most important. In the first place are stakeholders' factors, that is, relationship with suppliers and buyers, as the most important external stakeholders. The compensation for the obtained results rests with the fact that the companies included in the sample still do not have modern technological equipment and tools, and underestimates the importance of digital competencies. In addition, managers and contractors are mostly used to traditional methods, which makes companies in Serbia on a lower scale than in the region.

In addition to the insufficiently developed awareness of the need for the application of modern technological solutions (internet of things, cloud technologies, large data, mobile technologies, artificial intelligence and robotics), the findings incorporated in the questionnaire primarily relate to the possibilities of using modern technological equipment in order to more effectively communicate and exchange information and knowledge among employees. In this way, gap has been created to expand and conduct future research, which will include other digital competences (e.g. digital literacy, digital divide, digital citizenship). In addition, it would be possible to carry out a comparison with other groups of critical project success factors, such as financial, organizational and stakeholder-related factors, which would lead to the ranking of the analyzed

factors by the degree of importance for achieving success in the domain of project management. Such a method of research would provide significant implications for the managers of production companies, which would indicate to all critical areas during project implementation and provide guidelines for the implementation of AMT (advanced manufacturing technology).

REFERENCES

[1] Schallmo, D., Williams, C. A., & Boardman, L. (2017). Digital transformation of business models—Best practice, enablers, and roadmap. *International Journal of Innovation Management, 21*(08), 1740014.

[2] Butschan, J., Heidenreich, S., Weber, B., & Kraemer, T. (2019). Tackling hurdles to digital transformation—The role of competencies for successful industrial internet of things (IIoT) implementation. *International Journal of Innovation Management*, *23*(04), 1950036

[3] Demir, O. (2019). Digital Skills, Organizational Behavior and Transformation of Human Resources: A Review. *Ecoforum Journal*, *8*(1).

[4] Laudien, S. M., & Daxböck, B. (2016). The influence of the industrial internet of things on business model design: A qualitative-empirical analysis. *International Journal of Innovation Management*, *20*(08), 1640014.

[5] Turovets, Y., Vishnevskiy, K., Tokareva, M., & Kukushkin, K. (2019). Technology foresight for digital manufacturing: Russian case. In *IOP Conference Series: Materials Science and Engineering* (Vol. 497, No. 1, p. 012062). IOP Publishing.

[6] Delery, J. E., & Doty, D. H. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. *Academy of management Journal*, *39*(4), 802-835.

[7] Belout, A., & Gauvreau, C. (2004). Factors influencing project success: the impact of human resource management. International journal of project management, 22(1), 1-11

[8] McCollum, J. K., & Sherman, J. D. (1991). The effects of matrix organization size and number of project assignments on performance. *IEEE Transactions on Engineering Management, 38*(1), 75-78.

[9] Achanga, P., Shehab, E., Roy, R., & Nelder, G. (2006). Critical success factors for lean implementation within SMEs. *Journal of manufacturing technology management*, *17*(4), 460-471.

[10] McDermott, C. M., & Stock, G. N. (1999). Organizational culture and advanced manufacturing technology implementation. *Journal of Operations Management, 17*(5), 521-533.

[11]Parthasarthy, R., & Sethi, S. P. (1992). The impact of flexible automation on business strategy and organizational structure. *Academy of Management review, 17*(1), 86-111.

[12] Zammuto, R. F., & O'Connor, E. J. (1992). Gaining advanced manufacturing technologies' benefits: The roles of organization design and culture. *Academy of Management Review, 17*(4), 701-728.

[13] Pacagnella Jr, A. C., da Silva, S. L., Pacífico, O., de Arruda Ignacio, P. S., & da Silva, A. L. (2019). Critical Success Factors for Project Manufacturing Environments. *Project Management Journal*, *50*(2), 243-258.

[14] Whyte, J., Stasis, A., & Lindkvist, C. (2016). Managing change in the delivery of complex projects: Configuration management, asset information and 'big data'. *International Journal of Project Management, 34*(2), 339-351.

[15] Zhong, R. Y., Xu, X., Klotz, E., & Newman, S. T. (2017). Intelligent manufacturing in the context of industry 4.0: a review. *Engineering*, *3*(5), 616-630.

[16] Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in human behavior*, *72*, 577-588.
[17] Westkämper, E. (2007). Digital Manufacturing in the global Era. In *Digital Enterprise Technology* (pp. 3-14). Springer, Boston, MA.
[18] Satoglu, S., Ustundag, A., Cevikcan, E., & Durmusoglu, M. B. (2018). Lean Transformation Integrated with Industry 4.0 Implementation Methodology. In *Industrial Engineering in the Industry 4.0 Era* (pp. 97-107). Springer, Cham.
[19] Gemünden, H. G. (2015). Success factors of global new product development programs, the definition of project success, knowledge sharing, and special issues of project management journal®. *Project management journal*, *46*(1), 2-11.
[20] Geoghegan, L., & Dulewicz, V. (2008). Do project managers' leadership competencies contribute to project success?. *Project Management Journal*, *39*(4), 58-67.
[21] Denison, D. R., & Mishra, A. K. (1995). Toward a theory of organizational culture and effectiveness. *Organization science, 6*(2), 204-223.
[22] Leonard-Barton, D., & Sinha, D. K. (1993). Developer-user interaction and user satisfaction in internal technology transfer. *Academy of Management Journal*, 36(5), 1125–1139.
[23] Creasy, T., & Anantatmula, V. S. (2013). From every direction—how personality traits and dimensions of project managers can conceptually affect project success. *Project Management Journal*, *44*(6), 36-51.
[24] Jugdev, K., & Müller, R. (2005). A retrospective look at our evolving understanding of project success. *Project management journal, 36*(4), 19-31.
[25] Schoenherr, T., & Swink, M. (2012). Revisiting the arcs of integration: Cross-validations and extensions. *Journal of Operations Management*, *30*(1-2), 99-115.
[26] Horn, P., Scheffler, P., & Schiele, H. (2014). Internal integration as a pre-condition for external integration in global sourcing: A social capital perspective. *International Journal of Production Economics*, *153*, 54-65.
[27] Luzon, B., & El-Sayegh, S. M. (2016). Evaluating supplier selection criteria for oil and gas projects in the UAE using AHP and Delphi. *International Journal of Construction Management*, *16*(2), 175-183.
[28] Bubshait, A. A. (2003). Incentive/disincentive contracts and its effects on industrial projects. *International Journal of Project Management*, *21*(1), 63-70.
[29] Meng, X., & Gallagher, B. (2012). The impact of incentive mechanisms on project performance. *International Journal of Project Management*, *30*(3), 352-362.
[30] Ribeiro, P., Paiva, A., Varajão, J., & Dominguez, C. (2013). Success evaluation factors in construction project management—some evidence from medium and large Portuguese companies. *KSCE Journal of Civil Engineering*, *17*(4), 603-609.
[31] Abstein, A., Heidenreich, S., & Spieth, P. (2014). Innovative work behaviour: The impact of comprehensive HR system perceptions and the role of work–life conflict. *Industry and Innovation*, *21*(2), 91-116.
[32] Chryssolouris, G., Mavrikios, D., & Mourtzis, D. (2013). Manufacturing systems: skills & competencies for the future. *Procedia CIRp, 7,* 17-24.
[33] Sousa, M. J., & Rocha, Á. (2019). Skills for disruptive digital business. *Journal of Business Research*, *94*, 257-263.
[34] Sousa, M. J., & Wilks, D. (2018). Sustainable skills for the world of work in the digital age. *Systems Research and Behavioral Science*, *35*(4), 399-405.
[35] Ilomäki, L., Kantosalo, A., & Lakkala, M. (2011). What is digital competence?. *Linked portal*.
[36] Ferrari, A. (2012). *Digital competence in practice: An analysis of frameworks*.

[37] Schwuchow, K & J Gutmann (2015). Personalentwicklung 2016 Themen, Trends, Best Practices. (1). Freiburg im Breisgau: Haufe-Lexware.
[38] Falk, M., & Biagi, F. (2017). Relative demand for highly skilled workers and use of different ICT technologies. *Applied Economics*, *49*(9), 903-914.
[39] Mallery, P., & George, D. (2003). SPSS for Windows step by step: a simple guide and reference. *Allyn, Bacon, Boston*.

THE IMPACT OF INTERNET USAGE ON HEALTH-CARE EXPENDITURES AND SUSTAINABILITY

Marco Benvenuto[1]
Francesco Vincenzo Sambati[2]
Carmine Viola[3]

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Abstract: *Introduction: The increasing age, the presence of different diseases that affect the health of individuals and the new opportunities of access to information are changing the process of acquisition of data on health status. Very often, the process of autonomous research of information leads to wrong self-diagnosis with consequent repercussions on health expenditures (e.g.: unnecessary hospitalization) and, generally, on sustainability of health systems.*

Scope: This work aims to examine the influence of Digital Divide and Internet Usage (DD/IU) on autonomous Health Information Seeking (HIC) process, in order to get useful information about its impact on Healthcare Expenditures per Individual (HEPI). Similarly, this work aims to recognize and understand, from an economical, organizational and technological perspective, the correlation between DD/IU-HIS and HEPI.

Methods: To discover the link between DD/IU, HIS and HEPI, we conducted a systematic literature review in order to understand the network of behind these concepts and we applied the Panel Linear Model (PLM) approach in a case study to prove the correlation.

Findings: By analysing the literature on between DD/IU and HIS ties have emerged between the research topics. These findings have been also revealed by a significative impact. This suggests that, since people live longer, the more individuals access the Internet to get information on health status, the more effective the health expenditure is. All of this has repercussions on the long-term sustainability of the health system, requiring a re-modulation of the services provided, the professionalism and the technologies adopted.

Keywords: *Digital Divide, Health Information Seeking, Health-care Expenditures, Internet Usage, Internet Access.*

1. INTRODUCTION

Worldwide health and health conditions are changing. According to WHO's statistics, indicators such as *Life expectancy at birth* or *Healthy life expectancy at birth* are showing significant increase (respectively from 66,5 years in 2000 to 72,0 in 2016 and from 58,5 in 2000 to 63,3 in 2016). According WHO's report[1], that analyzed health statistics for its 194 Member States, focusing on the health and health-related Sustainable Development Goals (SDGs), these improvements can be ascribed to: a global enhancement of reproductive, maternal, newborn and child health; a reduction of incidence of infectious diseases, such as HIV ("from 0.40 per 1000 uninfected population in 2005 to 0.26 per 1000 uninfected population in 2016") or TB (with a 19% decrease of new and relapse cases from 2000 to 2016); a collective reduction of mortality

[1] UNISALENTO, Centro Ecotekne Pal. C - S.P. 6, Lecce - Monteroni, CAP 72023 - ITALY
[2] UNISALENTO, Centro Ecotekne Pal. C - S.P. 6, Lecce - Monteroni, CAP 72023 - ITALY
[3] UNISALENTO, Centro Ecotekne Pal. C - S.P. 6, Lecce - Monteroni, CAP 72023 - ITALY

due to the four main Non-Communicable- Diseases (NCDs)[4] in people from 30 to 70 years; universal health coverage (there is an enormous heterogeneity between countries); a gradual growth of essential services provided by national health services; and a constant increase in financial resources spent on research and development to develop or create new health products and processes.

Nowadays digital transformation is changing our life and our well-being, in a relatively short time it has changed unprecedented the way people work, interact, and learn [2]. In fact, past global revolutions (e.g. Industrial Revolution) produced their effect slowly and with great heterogeneity in countries.

Recently, OECD[3] analyzed how digital technologies are changing and will change our life. In its report, OECD starts its considerations from some empirical evidences: people are making a constant use of personal digital devices to access the Internet; broadband connections increased by 26% in OECD countries; applications, such as Big data [4], Internet of Things, and Artificial Intelligence, connected to the widespread technologies are continuously developed.

Extreme use of digital technologies and connection, to date, is deeply connected to information and exchange of communications. On one hand, in health-care delivery most common application are: electronic health records, online accessibility of health-care providers, remote sensors, eHealth technologies [5], and medical appointments online. On the other hand, digitalization is leading to better outcomes of health technologies (such as, reduction of costs and effectiveness in management of pathologies) [6],[7] and to improve patient experiences (for example, with online platform upon which individuals can find more information about diseases, treatments or support) [8] .

In other studies [4], [9] it emerges that digital devices and the Internet connection caused disparities in Internet usage and Internet access, between countries and within countries: these phenomena are known as Digital Divide (DD). The DD is related to three key elements: technology (infrastructure[10] and hardware[11]), Socio-economic impact (social inequalities: class, ethnicity, gender, age, and geographical location [12], [13]), and Ability to use the devices (First Level DD [9], [14] and Second Level DD[15], [16]).

For the reasons exposed above, this paper aims to investigate the impact of DD and Health Information Seeking Online (HIS) among individuals on individual health-care expenditures. Due to the complexity of the subject matter, we followed a tiered approach, dividing the research work into two steps. First, we identified through a literature review the hidden relationship among the determinants of DD and HIS and the variables needed. Then we applied a Panel Linear Model (PLM) on an empirical research on European individual health expenditures.

This paper is organized as follows: the introduction presents the information needed to introduce the research questions; a brief literature review to identify the concept and the variables; the PLM methodology adopted to analyse the data; the results and the conclusion.

[4] The four main NCDs are: cardiovascular disease (with 44% of all NCD deaths); cancer (22%); chronic respiratory disease (9%); and diabetes (4%).

2. BRIEF LITERARATURE REVIEW

2.1. Literarature review metodology

We analysed scientific production using the "Digital Divide", "Internet Usage" and "Health Information Seeking" descriptors. The research was performed using the ISI Web of Knowledge database, focusing on material published between 2012 and 2019. We chose to limit our research with articles from 2012 because in that year in the World Economic Forum was presented officially presented the "digital divide" as "inequalities between the advanced economies and the rest of the world in terms of access and use of information and communication technologies (ICT), and thus its economic and social impacts" [17]. We downloaded the .cvs file containing all the information provided by the Isi Web of Knowledge database.

The study also established some exclusion criteria:

1. From 129 documents found on ISI, we removed 14 of them because of lack of digital Object Identifier;
2. The second criterion of exclusion is the keywords used to characterize the abstract, using a Rstudio and text analysis packages we select articles containing the following keywords: digitality, digitalization, divide, Internet, technologies, technology, technology based, mobile, access, devices, inequality, accessibility, health, health-care, health seeking, information, information seeking, seeking, care, search, research, medical, needs, disease, chronic, illness, patient, and inequalities. We removed 9 articles.
3. In the third phase, based on screening on abstract we selected 65 documents (59 available documents).
4. In the fourth and last phase, we read 59 documents and we admitted 11 articles in the study, in order to extract definitions, determinants and variables useful to decline DD and HIS.

2.2. Definition and determinants of digital divide

After 2012, first authors that recognized the impact of DD are Broadbent and Papadopoulos[18], they affirmed that two elements characterized it. The first is "infrastructure", the "access to ICT infrastructure in the digital age is fundamental to reducing economic and social disparity", but it is not sufficient. The second element is "Capacity for ICT access", they referred to the availability of devices to use "infrastructure". These phenomena appeared in different social situations (e.g.: low income, unemployed, elderly, disabled, low language proficiency, and those in rural or remote areas), both in developed and in developing countries. Neumark [19], citing other authors, listed different barriers about Internet use for health: limited Internet access and connectivity (what has come to be termed first-level DD[9]); insufficient web-navigation skills (second-level DD[11]), lack of privacy, time constraints, financial costs of going online, language challenges, lack of trust in the Internet as a reliable source of health information, etc.

Choudrie et al[20] confirmed that the two elements of DD (i.e. technology usage and infrastructure) are the main barriers when we talk about the modern way of interaction within people and between people and government agencies (or health-care providers)[21], [22],[23].

2.3. Definition and determinants of health information seeking online

Health Information Seeking is one of the most relevant activity online, especially among adult and older people.

Feng [24], citing other authors, defined Health information as" any information which is related to the practice of medicine and health-care" and ''information which can aid in the prevention, detection, and treatment of disease''. He noticed that Internet has changed the way to find information, providing the widest, up-to-date and easy-to-access information to clinicians and patients. He also highlighted that the Internet penetration, among American homes, has revealed a problem with the skills needed to find, evaluate and understand information (especially health information). Contextually, the increasing age (older people) and the incidence of chronic diseases increased the likelihood to seek out health related news and information.

Sato[25] highlighted that social network, and the related exchange and search of information on the Internet, increased the use of devices and mobile devices. The author specified, "[…] 31% of cell phone owners, and 52% of smartphone owners, have used their phone to look up health or medical information".

Hallows[26] stated that the Internet has become the most popular destination about health information, also in elderly users because they are interested in maintain their health conditions and/or in management of their chronic diseases. The author, reporting a research of 2009, underlined that online health information is the third most popular online activity among seniors.

Shah and Marchionini[27] report that "members of medically underserved groups are less likely to use the Internet for health information", that Internet access is preparatory to online health information search and that Internet use (time, frequency, or activities) is related to the frequency of online health information search.

The problem of misinformation and information overload due to a wrong interpretation of information could be possible but, in general, it is less common because to the cross checking information [28], in fact consulting different online sources can lead to identify the correct evidences and to isolate the wrong ones.

3. CASE STUDY

In order to investigate the influence Because of interdependencies between our variables and mutual impact between, we have decided to use a Panel linear model regression (PLM). Therefore, we taken 23 cross-sections to the European member states in a period across 10 years, from 2007 to 2016. We excluded five states because of the complete lack of data in OECD datasets. We treated missing value (complete lack of HIS in 2012 and 2014, and of CatH in 2014 and 2016) with *interpolation* function (*imputeTS* package) in R in order guarantee the completeness of data.

3.1. Data and variables description

Using both OECD and EUROSTAT datasets, we identified six main variables. They are:

- Current expenditure on health (HEPI), this variable consider the expenditures per capita at current prices [OECD, **Dataset: Health expenditure and financing]**;
- Households with Internet access at home (IA), as the percentage of individuals with an Internet connection at home. This variable does not consider technological difference between, for example, classical DSL and xDSL [OECD, **Dataset: ICT Access and Usage by Households and Individuals]**;

- Individuals frequently using Internet (IU), it refers to individual from 16 to 74 years connection to the Internet every day or almost every day on average within the last 3 months before the survey. Use includes all locations and methods of access and any purpose (private or work/business related). the value is expressed in percentage [EUROSTAT, **Dataset: Individuals frequently using the Internet**].
- Households with computer access at home (CatH), it expresses the percentage of individuals with a computer at home [OECD, **Dataset: ICT Access and Usage by Households and Individuals]** ;
- Individuals using the Internet for seeking health information - last 3 m (HIS), this include all the searches on Internet in the last 3 months before the survey. These researches include all the topics related to health and health-care (injury, disease, nutrition, improving health, etc.). The value is expressed in percentage [OECD, **Dataset: ICT Access and Usage by Households and Individuals]**;
- Life expectancy at birth (LEX), it measures how many years an individual is expected to live at birth [OEDC, **Dataset: Health Status**].

The data presents a great heterogeneity both between country and within time. In fact, observing the descriptive statistics (Table 1 - Descriptive statistics), you can see a constant increasing mean value about IU, IA and Hi, on the other side the Heterogeneity across years about HEPI increased less rapidly than the other variables while the distance between the minimum and the maximum value increases (Figures 1-4).

Table 1: Descriptive statistics

Variable	N	Mean	Std. dev.	Min.	25 %	Median	75 %	Max.
HEPI	230	1,961.832	1,228.220	320.850	771.615	1,831.720	2,929.540	5,014.740
IU	230	58.587	15.876	19.000	47.000	59.000	70.000	93.000
CatH	230	76.517	12.598	40.170	67.483	78.910	87.387	96.200
IA	230	72.730	14.821	25.400	62.763	74.655	82.945	97.040
HIS	230	40.172	12.738	7.660	31.620	40.780	48.915	70.720
LEX	230	79.365	2.858	70.800	77.450	80.500	81.300	83.400

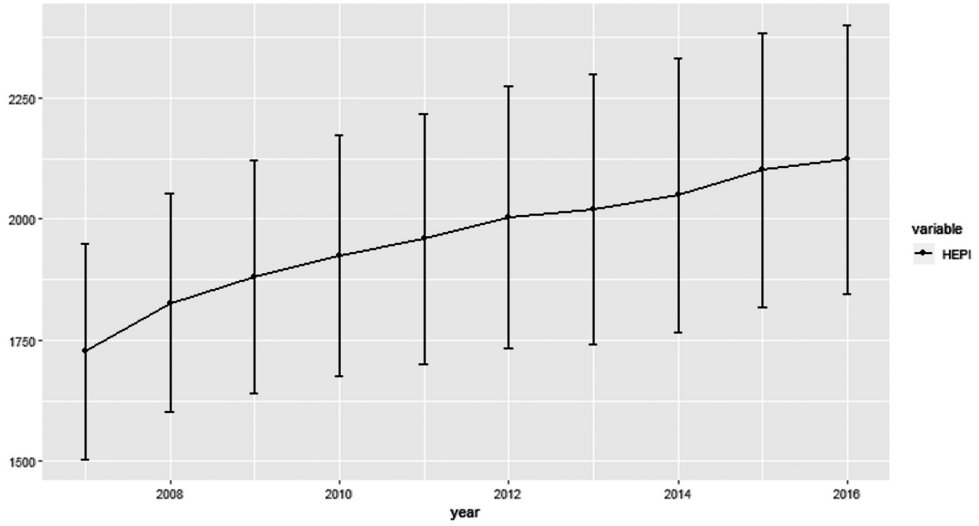

Figure 1: Health Expenditures per Individual over years

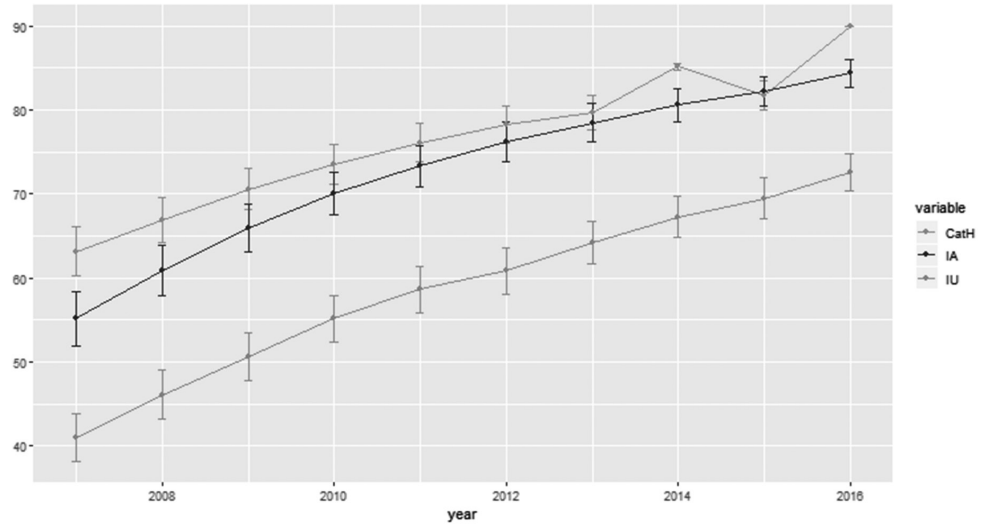

Figure 2: Computer at Home (CatH), Internet Access (IA) and Internet Usage (IU) over Years

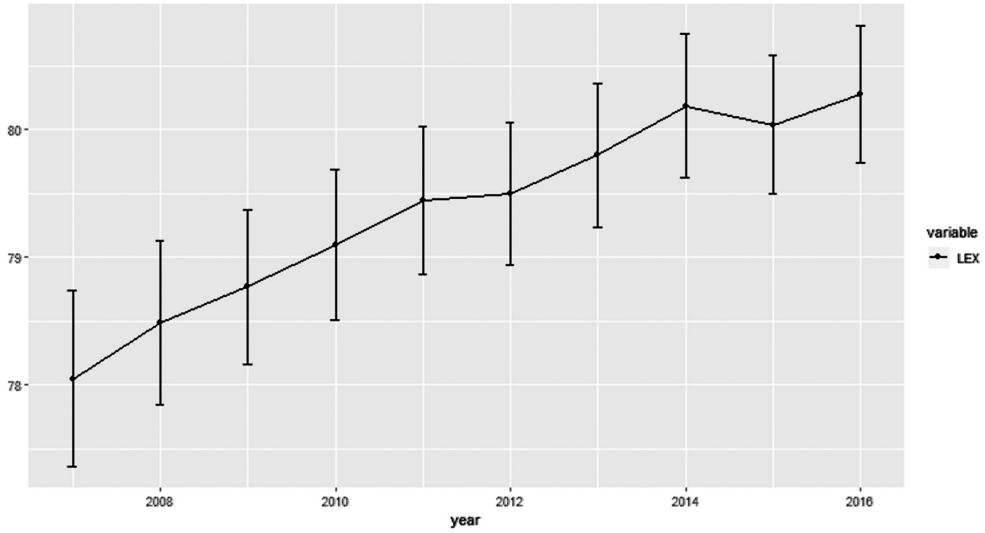

Figure 3: Life Expectancy over years

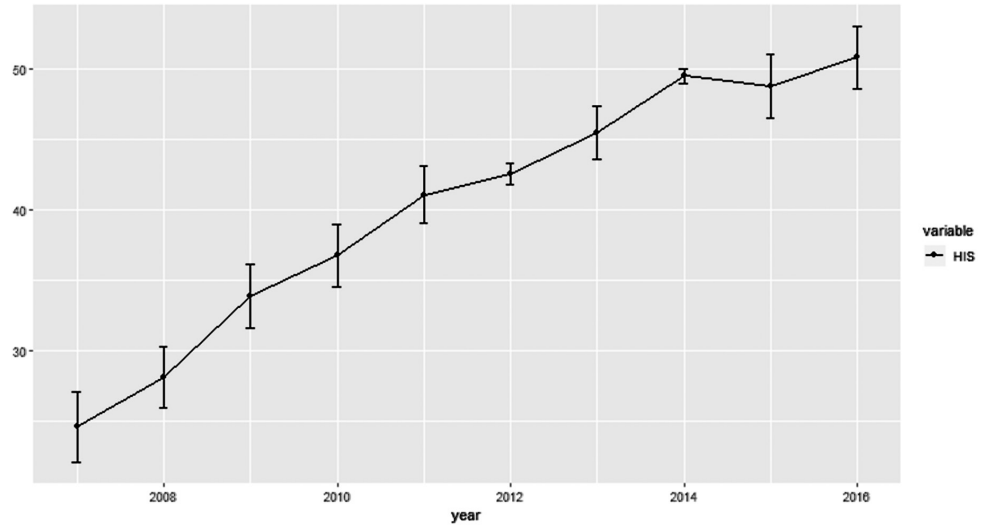

Figure 4: Health Information Seeking over years

The differences are much more evident when you look about the heterogeneity across country (Figures 5-10). In this perspective, it arises a great disparity in IA, IU and HI on the two European poles (the Mediterranean and the North Europe). Countries, with lowest levels of Internet access, highlight low levels of Internet usage and are less confident finding autonomously health information on the Internet. In the last figure, the distinction between the Mediterranean and the North Europe is sharpest. Low level of HEPH could be caused by low opportunity to access to the Internet, consequently to use it and to find and to consult online health information.

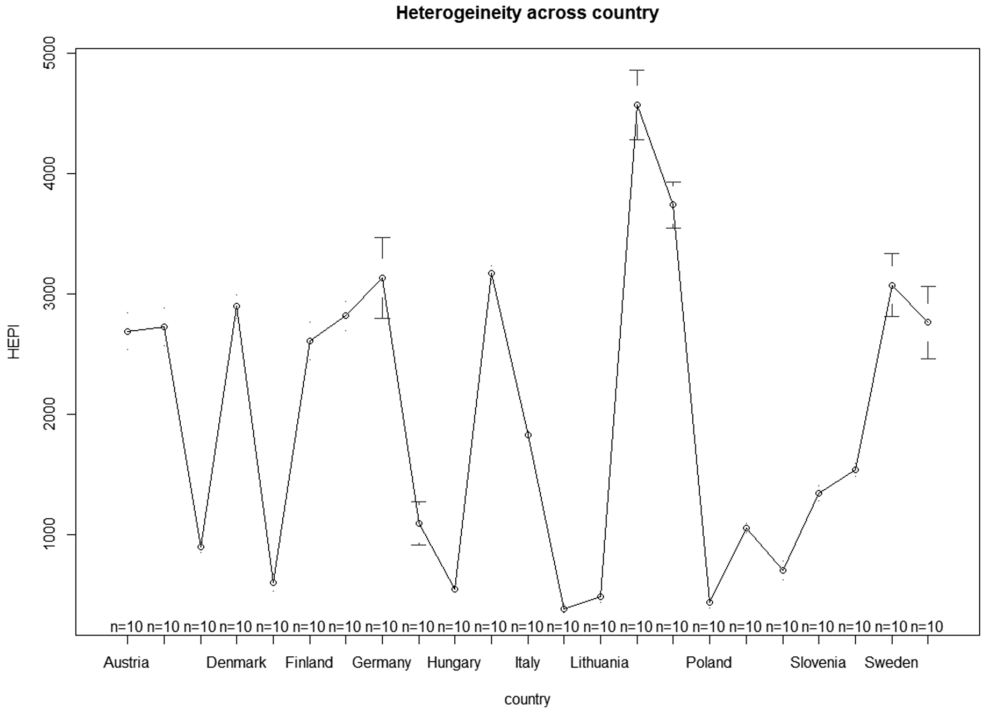

Figure 5: Health Expenditures per Individual across countries

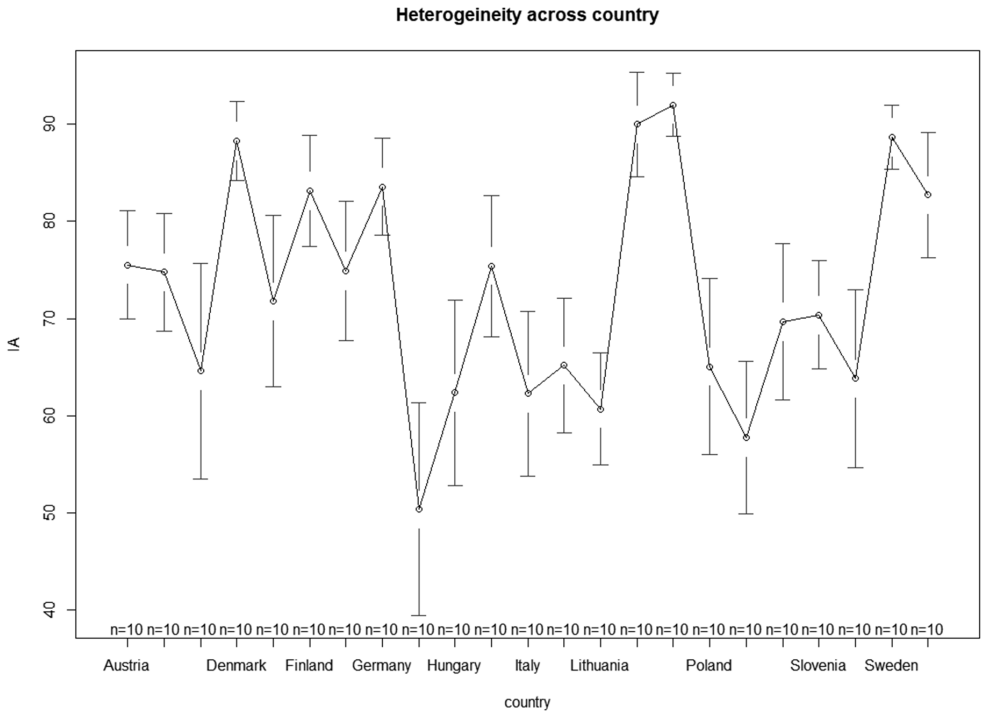

Figure 6: Internet Access across countries

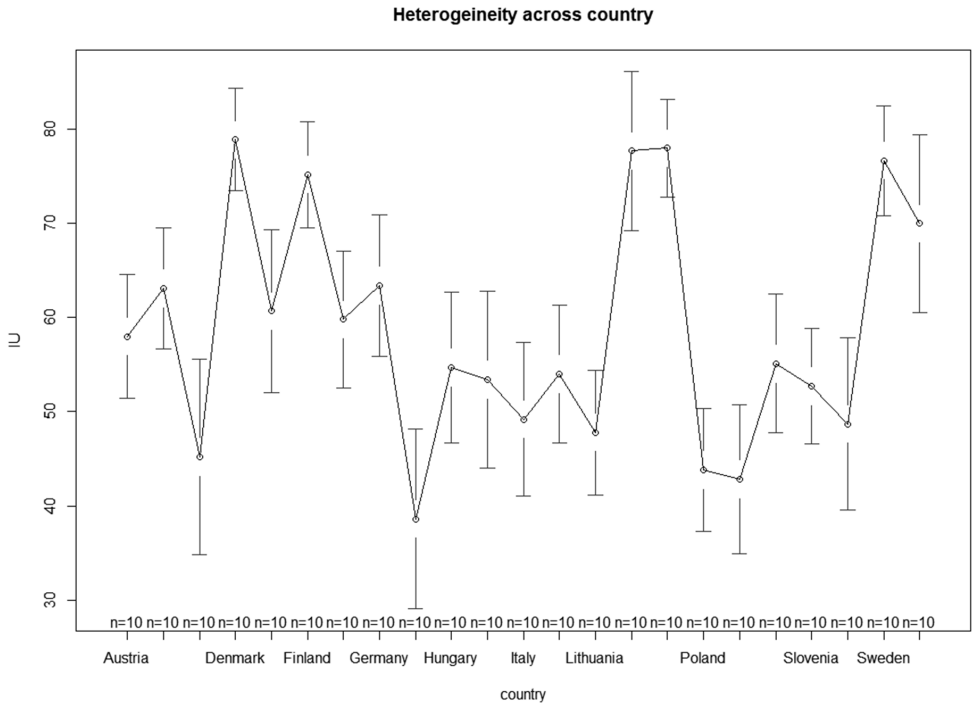

Figure 7: Internet Usage across countries

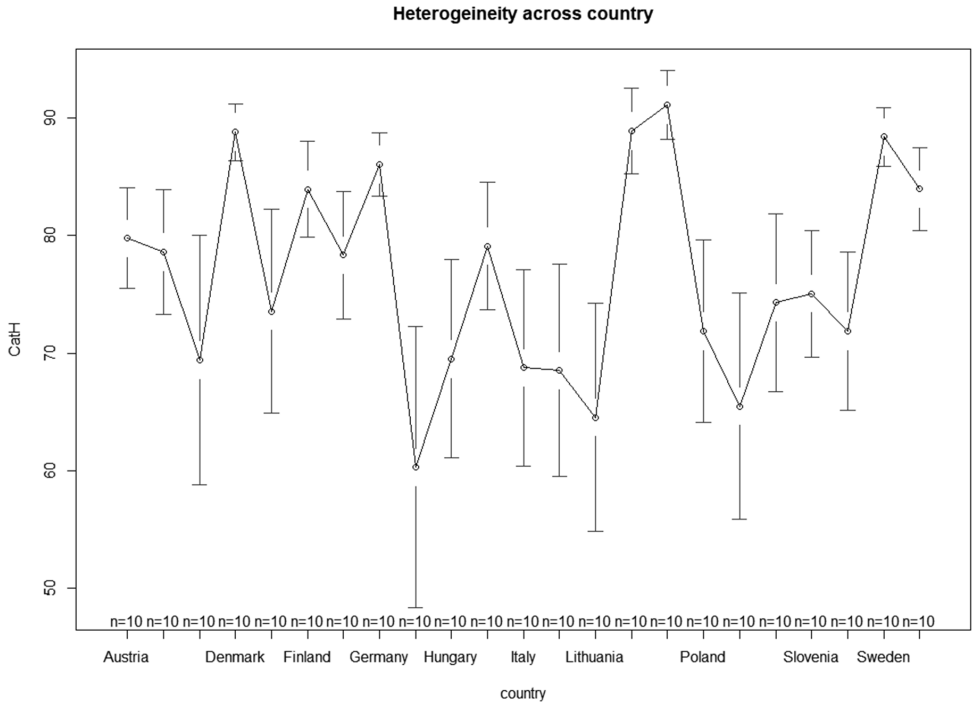

Figure 8: Computer at Home across countries

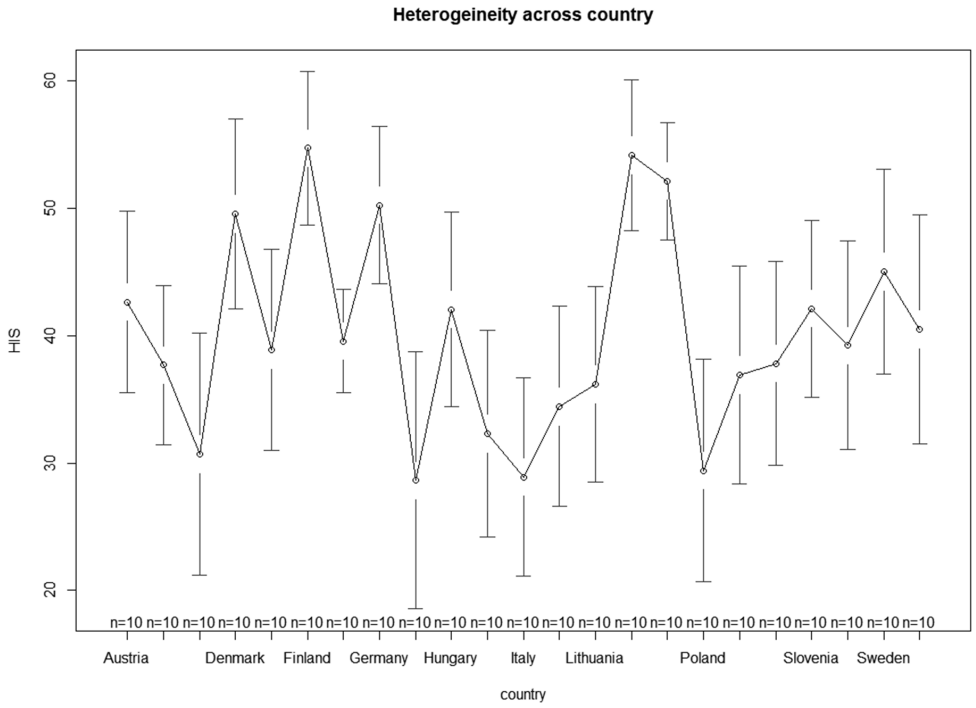

Figure 9: Health Information Seeking across countries

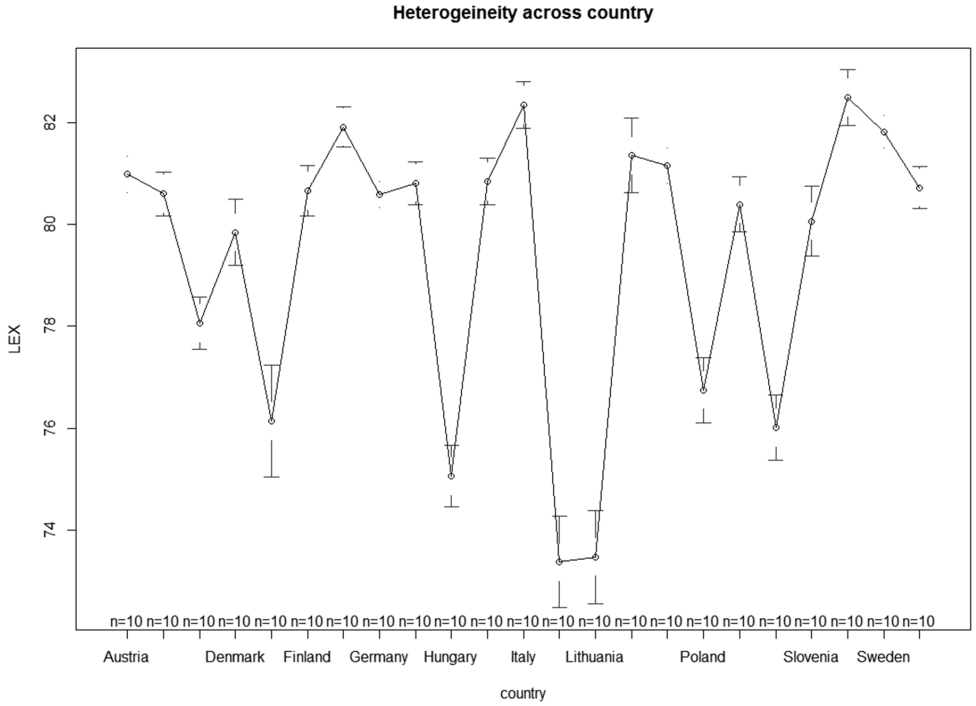

Figure 10: Life Expectancy across countries

3.2 MODEL DESCRIPTION

PLM are the most used models in panel data analysis and with specific test will allow us to identify which model fit better the data and if there are country effects[29].

Starting from the classical linear model

$$y_{it}=\alpha_{it}+\beta_{it}^{T}x_{it}+u_{it} \quad (1)$$

where i=1,…,N is the is the individual (group, country...) index, t=1,…,T is the time index and a random disturbance term of mean 0, we hypothesized the following model to describe the relationship between the variables listed above:

$$HEPI_{it}=\alpha_{it}+\beta_{it}^{T}IA_{it}+\gamma_{it}^{T}IU_{it}+\delta_{it}^{T}\ CatH_{it}+\zeta_{it}^{T}HIS+\iota_{it}^{T}LEX+\ u_{it} \quad (2)$$

The model was studied according the three classical approach:

- Pooling model (OLS);
- Fixed effect model (either “individual effect” and “time effect”;
- Random effect.

The hypotheses on parameters and error terms (and hence the choice of the most appropriate estimator) was tested by means of:

1. F-test (let you choose between OLS and Fixed effect model),
2. Hausman test (let you choose between Random effect and Fixed effect model),
3. Lagrange Multiplier Test (let you choose between OLS and Random effect model).

We developed the following hypotheses:

Hp1: IA, IU, CatH, HIS, and LEX affect the HEPI, according to literature review we expect to find a positive influence (reduction) of IA, IU, CatH, HIS, and LEX on HEPI. This is plausible because the more increase the life expectancy, the more people want to maintain their health finding information on the Internet. HIS is strictly connected to the availability of infrastructures (IA) and technology (CatH) and to the frequency of Internet usage (IU).

Hp2: there is a different pattern in individual behaviours across country.

4. RESULTS

According to the test conducted above, the null hypotheses was rejected in the F-test and in Hausman Test. This confirm that fixed effect model is preferable respect to OLS and Random Effect. In addition, we can state that, according to the F-test and Hausman Test, conducted on Individual fixed effect model and on Time fixed effect model, that the second model is preferable.

In the Time fixed effect model, HEPI raise constantly, while an increment of IA, HIS and LEX have the opposite effect. When individuals increase the possibility to access to the Internet and acquire more information about health, they are causing a reduction of health-care cost per capita, the same impact seems to have also life expectancy. In this case our first hypothesis is confirmed.

Our second hypothesis cannot be confirmed, the test conducted suggests that there is no difference between country, this is also confirmed by the absence of significance in the Fixed effect (Individual) model.

```
## Oneway (individual) effect Within Model
##
## Call:
## plm(formula = HEPI ~ IU + CatH + IA + LEX + HIS + factor(year),
##     data = Ppayr, model = "within", index = c("country", "year"))
##
## Balanced Panel: n = 23, T = 10, N = 230
##
## Residuals:
##       Min.    1st Qu.     Median    3rd Qu.       Max.
## -401.73423  -69.58673    0.80717   70.70122  635.50240
##
## Coefficients:
##                    Estimate Std. Error t-value  Pr(>|t|)
## IU                  10.2144     4.7084  2.1694  0.031274 *
## CatH                -4.6565     2.9478 -1.5797  0.115819
## IA                 -25.5641     4.9411 -5.1738 5.723e-07 ***
## LEX                -89.5087    30.4143 -2.9430  0.003649 **
## HIS                 -4.5511     1.9274 -2.3613  0.019208 *
## factor(year)2008   268.2852    49.3689  5.4343 1.647e-07 ***
## factor(year)2009   472.0892    62.4943  7.5541 1.646e-12 ***
## factor(year)2010   631.2852    78.1509  8.0778 7.003e-14 ***
## factor(year)2011   777.8740    92.9831  8.3658 1.183e-14 ***
## factor(year)2012   895.5271   101.0733  8.8602 5.246e-16 ***
## factor(year)2013   982.5560   115.0022  8.5438 3.885e-15 ***
## factor(year)2014  1111.8737   126.6154  8.7815 8.655e-16 ***
## factor(year)2015  1150.4883   134.4661  8.5560 3.599e-15 ***
## factor(year)2016  1264.4600   142.1073  8.8979 4.123e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    9681400
## Residual Sum of Squares: 4005700
## R-Squared:      0.58625
## Adj. R-Squared: 0.50907
## F-statistic: 19.5333 on 14 and 193 DF, p-value: < 2.22e-16
```

5. CONCLUSION

Health-care expenditures are constantly increasing, just as life expectancy in Europe, and individuals want to live longer and healthier. For these reasons they try to get much more information on different resources, the Internet is the most accessible and easy-to-use. In this paper we analysed the influence of some barriers of Digital Divide and Health Information Seeking Online on Health-care Expenditures. The results highlighted significative impact of Internet Access, Life Expectancy, Internet Usage and Health Information Seeking. This can be considered a starting point for further researches in this field.

REFERENCES

[1] W. H. Organization, 'World health statistics 2018: monitoring health for the SDGs, sustainable development goals', Geneva, 2018.
[2] Y. N. Harari, *21 Lessons for the 21st Century*. London: Vintage, 2019.
[3] OECD, *How's Life in the Digital Age?* OECD, 2019.
[4] G. Gravili, M. Benvenuto, A. Avram, and C. Viola, 'The influence of the Digital Divide on Big Data generation within supply chain management', *Int. J. Logist. Manag.*, vol. 29, no. 2, pp. 592–628, 2018.
[5] Marco Benvenuto, Carmine Viola, and Francesco Sambati, 'A New Social and Technological Paradigm to Assess Chronic Patient Management Process: Preliminary Results', *Manag. Stud.*, vol. 5, no. 6, 2017.
[6] M. R. Giovagnoli *et al.*, 'Diagnostic and therapeutic path of breast cancer: Effectiveness, appropriateness, and costs – Results from the DOCMa study', *Clin. Interv. Aging*, vol. 10, 2015.
[7] L. Gastaldi and M. Corso, 'International Journal of Engineering Business Management Smart Healthcare Digitalization: Using ICT to Effectively Balance Exploration and Exploitation Within Hospitals Regular Paper', pp. 1–13, 2012.
[8] V. N. Slev, P. Mistiaen, H. R. W. Pasman, I. M. V. Leeuw, C. F. van Uden-Kraan, and A. L. Francke, 'Effects of eHealth for patients and informal caregivers confronted with cancer: A meta-review', *Int. J. Med. Inform.*, vol. 87, pp. 54–67, Mar. 2016.
[9] P. Norris, *Digital Divide*. Cambridge: Cambridge University Press, 2001.
[10] W. Ryder, M. and Brent, 'Affordances and Constraints of the Internet for Learning and Instruction', *Present. to Assoc. Educ. Commun. Technol. Indianapolis, IN.*, 1996.
[11] S., DiMaggio, P., Hargittai, E., Celeste, C., and Shafer, 'Digital Inequality: From Unequal Access to Differentiated Use.', in *Social Inequality*, K. N. Ed., Ed. New York: Russell Sage Foundation., 2004, p. '355–400.
[12] P. DiMaggio, E. Hargittai, W. R. Neuman, and J. P. Robinson, 'Social Implications of the Internet', *Annu. Rev. Sociol.*, vol. 27, no. 1, pp. 307–336, Aug. 2001.
[13] R. Whitaker, *The End of Privacy: How Total Surveillance is Becoming a Reality*. New York: The New Press, 2000.
[14] E. J. Wilson, 'Closing the digital divide: an initial review. Briefing the President', Washington DC Internet Policy Inst., 2000.
[15] J. Cooper, 'The digital divide: the special case of gender', *J. Comput. Assist. Learn.*, vol. 22, no. 5, pp. 320–334, Sep. 2006.
[16] H. Ono and M. Zavodny, 'Gender and the Internet *', *Soc. Sci. Q.*, vol. 84, no. 1, pp. 111–121, Mar. 2003.
[17] S. Dutta and B. Bilbao-Osorio, *The Global Information Technology Report 2012 Living in a Hyperconnected World*. 2012.
[18] R. Broadbent and T. Papadopoulos, 'Impact and benefits of digital inclusion for social housing residents', *Community Dev.*, vol. 44, no. 1, pp. 55–67, 2013.
[19] Y. Neumark, C. Lopez-Quintero, B. S. Feldman, A. J. Hirsch Allen, and R. Shtarkshall, 'Online health information seeking among Jewish and Arab adolescents in Israel: Results from a national school survey', *J. Health Commun.*, vol. 18, no. 9, pp. 1097–1115, 2013.
[20] J. Choudrie, G. Ghinea, and V. N. Songonuga, 'Silver surfers, e-government and the digital divide: An exploratory study of UK local authority websites and older citizens', *Interact. Comput.*, vol. 25, no. 6, pp. 417–442, 2013.

[21] S. Jiang and R. L. Street, 'Factors Influencing Communication with Doctors via the Internet: A Cross-Sectional Analysis of 2014 HINTS Survey', *Health Commun.*, vol. 32, no. 2, pp. 180–188, 2017.
[22] Y. Zhang, Z. Lin, X. Li, T. Xiaoming, Y. Zhou, and X. Zhang, 'Factors Affecting ICT Use in Health Communication among the Older Population in Jiangsu, China', *Libri*, vol. 69, no. 1, pp. 41–53, 2019.
[23] D. Haluza, M. Naszay, A. Stockinger, and D. Jungwirth, 'Digital Natives Versus Digital Immigrants: Influence of Online Health Information Seeking on the Doctor–Patient Relationship', *Health Commun.*, vol. 32, no. 11, pp. 1342–1349, 2017.
[24] Y. Feng and W. Xie, 'Digital divide 2.0: The role of social networking sites in seeking health information online from a longitudinal perspective', *J. Health Commun.*, vol. 20, no. 1, pp. 60–68, 2015.
[25] A. Sato and J. Costa-i-Font, 'Social networking for medical information: A digital divide or a trust inquiry?', *Heal. Policy Technol.*, vol. 2, no. 3, pp. 139–150, 2013.
[26] K. M. Hallows, 'Health information literacy and the elderly: Has the Internet had an impact?', *Ser. Libr.*, vol. 65, no. 1, pp. 39–55, 2013.
[27] C. Shah and G. Marchionini, 'Awareness in CIS', *Int. Rev. Res. Open Distance Learn.*, vol. 14, no. 4, pp. 90–103, 2013.
[28] M. Manierre, 'Examining the Relationship Between Flexible Resources and Health Information Channel Selection', *Health Commun.*, vol. 31, no. 1, pp. 22–34, 2016.
[29] Y. Croissant and G. Millo, *Panel Data Econometrics with R*. John Wiley & Sons Ltd, 2018.

COMPARATIVE ANALYSIS OF EMPLOYMENT BY ECONOMIC ACTIVITIES IN BULGARIA AND EU-28

Konstantin Kolev[1]

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Abstract: *The paper's goal is to analyze the employment in Bulgaria and EU-28 by economic activities of NACE Rev. 2 Statistical Classification of Economic Activities in the European Community, and on this basis to reveal opportunities for increasing the employment in Bulgaria. The analysis of employment by economic activities is based on shift-share analysis and the concept of the economic base. The first one decomposes the changes in the number of employees on three parts: national, industrial and regional. From the three components of the change the 'regional share' is the most important. It reveals the economic activities, which have opportunities for growth in the respective region (in current study in Bulgaria) due to its favourable conditions. According to the concept of the economic basis the local economy (in current study the economy of Bulgaria) is divided on two sectors – basic and non-basic. The economic sectors defined as basic form the economic base of the region and all other economic sectors thrive by serving the basic ones. To determine the basic economic sectors of the respective regional economy (in current study the economy of Bulgaria) location quotients are calculated. The results of the two methods are summarized on the four-quadrant table, which allows the economic sectors to be systematized into four groups – growing, transforming, declining and emerging. The most significant sectors, which contribute to high extent for increasing of employment in the region (Bulgaria) are those ones classified as growing.*

Keywords: *employment, shift-share analysis, conception of economic base, location quotients, economic sectors.*

1. INTRODUCTION

The average annual employment rate in Bulgaria in 2017 for the age group 20 to 64 years is 71% and is below the target level of 75%, that is pointed out in Europe 2020 strategy. The last one is difficult for achievement due to the fact that in 2017 the number of employed aged 15-64 is with 419.46 thousand persons smaller than their number in pre-crisis 2007 year [1]. In order to overcome these negative findings, the purpose of the present study is to analyze the employment in Bulgaria and EU-28 by economic activities of NACE Rev. 2 Statistical Classification of Economic Activities in the European Community, and on this basis to reveal opportunities for increasing the employment in Bulgaria.

2. SHIFT-SHARE ANALYSIS AND THE CONCEPT OF THE ECONOMIC BASIS

Different methods of quantitative analysis of regional employment are known. Among them, according to some authors, the most popular methods are shift-share analysis and the concept of the economic basis, which uses location quotients. They are reliable tools for making adequate decisions by national and regional development planning agencies and departments because of the following reasons: firstly, their implementation is provided with quantitative data unlike the subjective approaches that rely mainly on expert opinions; secondly, the obtained results are

[1] University of Forestry, 10 Kliment Ohridsky Blvd., Sofia 1797, Bulgaria

logical and clear to understand; thirdly, they permit comparison in time between region located in different parts of the world [2, 3]. Because of these reasons the methods mentioned above are perceived as leading for the research. Their essence is presented in the lines below.

1.1. Shift-share analysis

Shift-share analysis is a popular method used to analyze the changes in the number of employees in some region for a definite period of time. Usually the changes in the number of employees in the region are compared with the changes in the number of employees at national level.[2] Shift-share analysis decomposes the changes in the number of employees on three parts: national share, industrial share and regional share [4, 5, 6, 7, 8, 9].

The component national share (NS_r) measures the change in the number of employed persons on regional level if employment in the region alters with the same rate of growth (g_n) as the national economy [2].

$$NS_r = \sum_{i=1}^{N} E_{ir}^{t} g_n \tag{1}$$

- NS_r – the national share for the region r, number of employed;
- E_{ir}^{t} – the employed persons in economic activity i of region r at the begging of the analyzed period;
- N – the number of economic activities;
- g_n – the growth rate of employed persons on national level for the analyzed period (index of national share.

The component industrial share (IS_r) characterizes the sectoral structure of regional economy. It reflects the change in the number of employed on regional level if each sector of regional economy grows with the difference between the national growth rate for this sector (g_{in}) and the growth rate of national economy (g_n) for the studied period.

$$IS_r = \sum_{i=1}^{N} E_{ir}^{t} (g_{in} - g_n) \tag{2}$$

- IS_r – the industrial share for region r, number of employed;
- g_{in} – the growth rate in employment for economic activities i at national level.

The component regional share (RS_r) is also known as the differential share, the competitive effect and the local factor effect. It measures the change in the number of employed persons in a given economic activity at regional level, which is caused by the differences in the growth rates of the employed in the respective sector at regional level (g_{ir}) and national level (g_{in}). The regional share index (g_{ir}-g_{in}) makes it possible to reveal the economic activities that have potential for development and growth in the respective region [2, 7, 10]. When the value of regional share (RS_r) is positive the conclusion which is drawn up is that due to better opportunities in the region some of its economic activities have a higher rate of growth in the number of employed (g_{ir}) than the rate of growth in employment of the same economic activities at national level (g_{in}).

[2] In current study under region/regional level or local level is understood the territory of Bulgaria, and under national level is understood the territory of EU-28.

The last one means tnat the regional share index (g_{ir}-g_{in}) is positive. At the same if RS_r is negative, the conclusion which is drawn up is that due to worse conditions in the region some of its economic activities have a lower rate of growth in the number of employed (g_{ir}) than the rate of growth in employment of the same economic activities at national level (g_{in}). The regional share is considered as the most important component of the three presented above. It draws attention to the economic activities that are able to take advantages of the appropriate opportunities, which the region offers, and develop successfully in it by helping to increase employment [2, 4, 7, 8, 11, 12]. The regional share is calculated by means of formula (3) [2, 4]:

$$RS_r = \sum_{i=1}^{N} E_{ir}^{t}(g_{ir} - g_{in}) \tag{3}$$

- RS_r – the regional share for region r, number of employed;
- (g_{ir} – g_{in}) – the index of regional share;
- g_{ir} – the growth rate of employment in economic activity i on regional level for the analysed period.

The sum of the three shares examined above represents the growth in the number of employed persons (TS_r) for the analyzed period in the respective district. It is calculated through formula (4) [2, 4]:

$$TS_r = \sum_{i=1}^{N} E_{ir}^{t} g_n + \sum_{i=1}^{N} E_{ir}^{t}(g_{in} - g_n) + \sum_{i=1}^{N} E_{ir}^{t}(g_{ir} - g_{in}) \tag{4}$$

The period of the research should be carefully defined. The first year may be two, five or ten years back in time in comparison with the last one, and they have to be in the same phase of the business cycle. In this way the changes will be reflected more precisely [2]. In relation with the mentioned above and taking into account the available data provided by the EUROSTAT, the shift-share analysis is realized for the period 2007-2017.

1.2. The concept of the economic basis

According to the concept of the economic basis, the local economy is divided on two main sectors – basic and not basic. The first one includes companies that realize their production outside the borders of the region, while the second is compounded by companies that sell their production on the local/regional market. The concept of the economic basis is grounded on the assumption that the basic industries form the economic base of the region, and all other economic activities thrive by serving the basic ones. The local economy is stable when it stimulates the development of those economic activities that are export-oriented and provide financial revenues from outside the territory in which they operate. To determine the basic economic activities for the respective regional economy, a specialization (localization) coefficient (CS_{ir}) is used. It presents a ratio between the relative share of employed person in a particular economic activity at the local level and the relative share of employed person in the same economic activity at national level. The specialization index is a reliable tool for identifying correctly the basic economic activities [2, 3, 9, 13, 14, 15, 16]:

$$CS_{ir} = \left(\frac{E_{ir}}{E_r}\right) : \left(\frac{E_{ni}}{E_n}\right) \quad (5)$$

- CS_{ir} is the index of specialization for economic activity i in district r;
- E_{ir} – the number of employed persons in economic activity i in district r;
- E_r – the number of employed persons in district r;
- E_n – the number of employed persons in economic activity i on national level;
- E_n – the number of employed persons on national level.

It should be mentioned that the obtained results are reliable under the assumption that the technological level of the enterprises in the respective industry is approximately equal [15]. The minimum value of the coefficient of specialization is zero and the maximum one is not limited [14]. If the value of the coefficient is bigger than 1, it can be assumed that the respective economic activity is basic for the local economy. Basic economic activities are defined as specialized. Due to the specialization it is considered that in them the local economy has competitive advantages over the same in other administrative-territorial units.

The results from shift-share analysis and economic basis analysis can be summarized on a two-dimensional cartesian coordinate system. In this respect on the abscissa are set up the regional share indexes (g_{ir}-g_{in}), and on the ordinate are set up the values of the coefficients of specialization (CS_{ir}). Since the specialization index is normalized from zero to infinity from its value is subtracted 1. In this way the economic activities that are basic for the local economy will be located in the first and second quadrants of the coordinate system and those with coefficient of specialization less than one will accept negative values and will be placed in the third and fourth quadrants (see Table 1) [4, 12, 17, 18, 19].

Table 1: Visualization of the indexes of regional share and specialization [4, 12]

Indexes	g_{ir}-g_{in}<0	g_{ir}-g_{in}>0
CS_{ir}> 1	**II quadrant** – basic economic activities with deteriorated conditions for development on the respected territory (Transforming Industries).	**I quadrant** – basic economic activities with opportunities for development on the respected territory (Growing Base Industries).
CS_{ir}< 1	**III quadrant** – not specialized economic activities without opportunities for development on the respected territories (Declining Industries).	**IV quadrant –** not specialized economic activities with opportunities for development on the respected territory (Emerging Industries).

2. COMPARATIVE ANALYSIS OF EMPLOYMENT BY ECONOMIC ACTIVITIES IN BULGARIA AND EU-28

The analysis of regional employment by economic activities is based on the methodology presented in paragraph (2) and information from EUROSTAT about the number of employed persons in Bulgaria and EU-28 in 2007 and 2017, grouped by sectors of ISIC Rev.4/NACE Rev.2. (see table 2)

Table 2: Systematization of ISIC Rev.4/NACE Rev.2. Sectors

ISIC Rev.4/NACE Rev.2 sections	**Descriptions**
A	Agriculture, forestry and fishing
B, D and E	Industry (except construction)
C	Manufacturing
F	Construction
G, H and I	Wholesale and retail trade, transport, accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M and N	Professional, scientific and technical activities; administrative and support service activities
O, P and Q	Public administration, defense, education, human health and social work activities
R, S, T and U	Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies

Table 3: Index of National, Industrial and Regional Share and Specialization Index of Bulgaria

ISIC Rev.4/ NACE Rev.2 sections	**Employed persons in 2007, thousands**		**Employed persons in 2017, thousands**		g_n	$(g_{in}-g_n)$	$(g_{ir}-g_{in})$	CS_{ir}	**NSr, thousands employed**	**ISr, thousands employed**	**RSr, thousands employed**	**Quadrant**
	Bulgaria	**EU-28**	**Bulgaria**	**EU-28**								
A	723.86	12676.75	664.91	10433.83	0.017	-0.194	0.095	3.762	12.06	-140.13	69.12	I
B, D and E	835.58	38903.02	708.13	36183.45	0.017	-0.087	-0.083	1.272	13.92	-72.33	-69.04	II
C	723.20	35,322.7	615.19	32629.68	0.017	-0.093	-0.073	1.219	12.05	-67.19	-52.87	II
F	251.10	17583.71	175.44	14997.16	0.017	-0.164	-0.154	0.803	4.18	-41.12	-38.72	III
G, H and I	866.07	55739.49	889.38	58436.37	0.017	0.032	-0.021	0.955	14.43	27.48	-18.59	III
J	68.37	6082.68	94.24	7086.03	0.017	0.148	0.213	0.765	1.14	10.14	14.59	IV
K	51.56	6204.34	64.91	5917.34	0.017	-0.063	0.305	0.602	0.86	-3.24	15.74	IV
L	20.81	2445.69	27.02	2585.01	0.017	0.040	0.241	0.592	0.35	0.84	5.02	IV
M and N	200.07	24982.50	245.56	30329.07	0.017	0.197	0.013	0.500	3.33	39.48	2.67	IV
O, P and Q	612.47	50964.14	544.13	55588.63	0.017	0.074	-0.202	0.674	10.20	45.37	-123.92	III
R, S, T and U	96.86	13260.95	111.65	14379.90	0.017	0.068	0.068	0.469	1.61	6.56	6.62	IV
Total	**4449.9**	**264166.0**	**4140.5**	**268566.4**	-	-	-	-	**74.13**	**-194.14**	**-189.38**	-

Sector A is the only basic sector for which there are suitable development conditions on the territory of Bulgaria (see table 3). Due to this it is positioned in first quadrant of the coordinate system. The number of persons employed in sector A in 2017 is 664 910. Under the influence of the regional share, the number of employed in the sector for the surveyed period increased with 69 120 persons (see table 3).

Sectors (B, D and E) and C are distributed in quadrant II, which means that they are basic for the economy of Bulgaria. By the way during the investigated period on the territory of Bulgaria the conditions for development of these economic activities are not suitable. The effect of re-

gional share on employment is negative and under its influence in sectors (B, D and E) and C are lost respectively 69 040 and 52 870 working places (see table 3).
Poorly developed on the territory of Bulgaria are the economic activities F, (G, H and I), (O, P and Q) which are distributed in the third quadrant of the coordinate system (see table 3). All of them have negative regional shares respectively 38 720, 18 590, 123 920 working places. The latter reflects the unfavourable conditions for these sectors development on the territory of Bulgaria. Regarding sector (G+H+I), it should be noted that there is a potential for its development on the territory of Bulgaria and its transformation into a basic one. The prerequisites for this are the favorable location of the state and its strategic place in the regional transport system as well as the rich cultural and historical heritage.

During the period 2007-2017 in Bulgaria there are good opportunities for development of sectors J, K, L, (R, S, T and U) which are set up in fourth quadrant of the coordinate system. Their regional share is positive and amount respectively to 14 590, 15 740, 5020 and 6620 new working places (see table 3).

4. CONCLUSION

On the grounds of the employment's analysis in Bulgaria the following conclusions can be done: Firstly, through the existing regulatory framework and strategic documents should be encouraged the development of these economic activities of NACE Rev. 2, which are basic for the economy and on the territory of Bulgaria there are suitable conditions for their development. These are the economic activities distributed in the first quadrant of the coordinate system (the so called 'Growing Base Industries'). For Bulgaria in first quadrant is positioned only economic activity 'Agriculture, Forestry and Fishery' (A). Secondly, through existing regulatory framework and strategic documents should be encouraged the development of these economic activities of NACE Rev. 2, which are not basic for the economy, but on the territory of Bulgaria there are suitable conditions for their development. These are the economic activities distributed in the fourth quadrant of the coordinate system (the so called 'Emerging Industries'). For Bulgaria these activities are: Information and communication (J), Financial and insurance activities (K), Real estate activities (L) and Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies (R, S, T and U).

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REFERENCES

[1] www.nsi.bg
[2] Dinc, M. (2002). Regional and Local Economic Analysis Tools. The World Bank, Washington DC, 44 p.
[3] Rupasingha, A., M. Patrick. Tools for Understanding Economic Change in Communities: Economic Base Analysis and Shift-Share Analysis, New Mexico State University Library, http://aces.nmsu.edu/pubs/_circulars/cr643A.pdf

[4] Blakely, E., N. Leigh. (2013). Planning Local Economic Development. Theory and Practice, Fifth Edition, SAGE Publication, 461.
[5] Dogru, T., E. Sirakaya-Turk. (2017). Engines of Tourism's Growth: An Examination of Efficacy of Shift-Share Regression Analysis in South Carolina, Elsevier, Tourism Management, 58, 205-214.
[6] Elburz, Z., F. Gezici. (2012). Regional Development Policies and Industrial Employment Change in Turkey: A Shift Share Analysis (1992-2008), 52nd Congress of the European Regional Science Association: "Regions in Motion – Breaking the Path", 21-25 August, Bratislava, http://hdl.handle.net/10419/120750
[7] Goschin, Z. (2014). Regional Growth in Romania after its Accession to EU: A Shift-Share Analysis Approach, Elsevier, Procedia Economics and Finance, 15, 169-175.
[8] Herath, J., T. Gebremedhin, B. Maumbe. (2011). A Dynamic Shift-Share Analysis of Economic Growth in West Virginia, Journal of Rural and Community Development, 155-169.
[9] Islam, F., F. Sidding, F. Mubassirah. (2016). Economic Growth Analysis of Six Divisions of Bangladesh Using Location Quotient and Shift-Share Method, Bangladesh Res. Pub. J. 12 (2), 144-154.
[10] Evans, G. (2008). Spatial Shift-Share Analysis of the Leisure and Hospitality Sector on the Gulf Coast Following Hurricane Katrina, Southern Agricultural Economic Association, Dallas, 2008, 1-15.
[11] M. Khusaini. (2015). A Shift-Share Analysis on Regional Competitiveness – a Case of Banyuwangi District, East Java, Indonesia, Elesevier, Procedia – Social and Behavioral Sciences, 738-744.
[12] Mason, S., P. Zhu, J. Dyke. (2017). Regional Industry Analysis: An Approach for Economies Large and Smaller, Economic Development Quarterly, 31 (2), 128-138.
[13] Morrissey, K. (2016). A Location Quotient Approach to Producing Regional Production Multipliers for the Irish Economy, Papers in Regional Science, 95 (3), 491-506.
[14] Stoenchev, N. (2016). Kachestvoto na zhivot i spetsializatsiya na teritoriyata po ikonomicheski deynosti v Balgariya (statisticheski aspekti). Izdatelstvo „Intel Entrans", S., 122 s.
[15] Stoencheva, TS. (2010). Regionalna ikonomika. Universitetsko izdatelstvo „Stopanstvo", S., 160 s.
[16] Svetikas, K. (2014). Strategic Planning For Regional Development: An Introductory Textbook, Mykolas Romeris University, Vilnius, 131.
[17] Papazov, E. (2006). Tehniki za obektivizirane na SWOT-analiza na regionalnoto razvitie. Ikonomicheski zhivot, br. 2.
[18] Stoychev, K. (2007). Opredelyane na znachenieto na toplivno energiyniya kompleks Maritsa-iztok v regionalnata ikonomika na oblast Stara Zagora chrez obektiviziran SWOT-analiz. Geografiya i regionalno razvitie. Nauchni konferentsii s mezhdunarodno uchastie. Sozopol, 2-12 s.
[19] Stoychev, K. (2008). Regionalen balans na promishlenoto proizvodstvo: struktura i optimizatsiya. Avtoreferat na disertatsiya, predstavena za prisazhdane na nauchna stepen „doktor" po nauchna spetsialnost 01. 08. 02. „Ikonomicheska i sotsialna geografiya". SU „Sv. Kl. Ohridski", Geologo-geografski fakultet, S., 60 s.
[20] https://ec.europa.eu/eurostat/data/database

AUDITING OF PROJECTS FINANCED FROM EUROPEAN FUNDS FOR THE PROGRAMMING PERIODS 2007-2013 AND 2014-2020 AND FINANCIAL IMPACT OF IRREGULARITIES IN ROMANIA

Grosu Maria[1]
Mihalciuc Camelia Cătălina[2]

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Abstract: *In Romania, but also in other EU countries, the projects funded by European funds have a special regime for auditing. This study aims at a comparative approach to identifying the most frequent irregularities with financial impact of beneficiaries of European projects found during the 2007-2013 and 2014-2020 programming periods (until 2017). The analysis is based on the Reports published by the Romanian Court of Accounts for a period of eight years from 2010 to 2017, aiming at auditing the projects funded by seven Operational Programs (OP).*

Keywords: *Financial audit, external public audit, audit of operations, European funds.*

1. INTRODUCTION

In Romania, since January 2014, it was considered that they can participate in the auditing of projects financed from European funds only auditors, active members of the Chamber of Financial Auditors of Romania (CFAR), according to the protocol signed between the Ministry of European Funds (MEF) and the body governing the audit profession at the national level, respectively CFAR [1]. In the context of the current regulations on the implementation of the Operational Programs (OP) 2014-2020, the independent financial audit of projects funded by European funds is no longer a compulsory activity, as is indicated in the Specific Guidelines for the Programs launched. As a result, the Collaboration Protocol concluded in 2014 has become obsolete and has therefore been terminated in May 2017 [2] by a number of specialists disputed. Given the conditions, auditing European projects remains the responsibility of the Audit Authority (AA) of the Court of Accounts of Romania (CAR).

The start of this research was given by the fact that the CAR report in 2014 [3] indicated that AA found irregularities of over 50 million Euro in the expenditure declared for settlement by the European Commission (EC) in 2013 by the entities in Romania which have benefited from non-reimbursable funding from the Structural and Cohesion Funds (SF and CF). In previous research [4], aimed at identifying significant systems considered most risky encountered the beneficiaries of funds in Romania by the AA in 2007-2013, and the identification of improvements on the line of legality and regularity of expenditure declared EC projects that were to be launched in 2014-2020, following the recommendations made by representatives of CAR.

This study continues research with a comparative approach on identifying the most frequent irregularities affecting the financial beneficiaries of European projects in Romania, recorded

[1] Faculty of Economics and Business Administration, „Alexandru Ioan Cuza“ University of Iasi, Romania, Carol I Blvd., No. 22

[2] Faculty of Economics and Public Administration, “Stefan cel Mare“ University of Suceava, Romania, St. Universitatii, No. 13

in both periods: 2007-2013 and 2014-2020 to highlight features seven OP. Fund allocations are divided into seven OPs for the 2007-2013 programming period, namely: the Regional Operational Program (ROP), financed by the European Regional Development Fund (ERDF); Sectoral Operational Program Increase of Economic Competitiveness (SOP IEC), financed by the ERDF; the Operational Program Technical Assistance (OPTA), financed by the ERDF; The Sectoral Operational Program Environment (SOP E), financed by the ERDF and the Cohesion Fund (CF); Sectoral Operational Program Transport (SOP T), financed by ERDF and CF; The Sectoral Operational Program Human Resources Development (SOP HRD), financed by the European Social Fund (ESF); Operational Program Administrative Capacity Development (OP ACD), funded by the ESF. For the 2014-2020 programming period, some OPs have different names.

According to European regulations for the 2007-2013 programming period, the deadline for eligibility of expenditure for projects financed through Structural and Cohesion in this period was 31.12.2015, which means that in terms of audit cannot do clear distinction of irregularities on the two programming periods, but their track changes over a period of eight years. In addition, for the 2014-2020 programming period, the study stops at 2017, the year for which data has been reported so far.

A further review of both the legal framework [5], [6] for auditing European funded projects, as well as national and international studies and research have been carried out on this issue topic in the last period.

2. LITERATURE REVIEW

About a legal, national, relative to compulsory auditing of projects financed by grants, can speak only in 2006 with the advent of the Practical Guide (February 2006) for contractual procedures related to Phare, Ispa and Sapard [7]. ISRS 4400 „Settlement of agreed procedures for financial information" is the audit standard that does not involve the expression of an assurance, but only provides a report on the actual findings, on the basis of which the lender formulates its own conclusions [8], [9]. For the auditing of projects funded by European funds, both in the period 2007-2013 and as of 2014, CFAR members have followed and continue to observe the provisions contained in the concluded financing contracts. In the context of the current regulations on the implementation of the 2014-2020 OP, the independent financial audit of projects funded by European funds is no longer a compulsory activity, as is clear from the Specific Guidelines, which remains the responsibility of the AA within the CAR.

Concerning the studies and research carried out in connection with the auditing of projects funded by European funds, various points of view can be found in several papers, even covering the period 2014-2020 [10] - [13]. Other authors [14] are focusing on conducting studies on the involvement of active financial auditors in the area of related services to verify the expenses of European projects [15], namely the market concentration of these services in Romania, compared to the other auditor activities. There are authors [16] - [18] who have proposed Guidelines for documenting a mission to verify the amounts spent on Structural Fund projects. In the literature we also find concerns about the synthesis of the difficulties identified in the audit practice of projects funded by European funds [19], [20]. European non-reimbursable funds have also been a recovery measure for the countries of the European Union after the economic crisis of 2009, especially on the labor market. [21]. Other authors have studied the absorption of structural funds in Romania over the period 2007-2013 [22], [23].

Based on literature review, this study is focused on analysis of published reports CAR section covering audit of EU funded projects in the period 2010-2017 [24]. The aim is to identify, analyze and compare the most frequent irregularities found in the eligibility of project expenditure during this period in Romania. It is important to note that some expenditure declared and audited during 2014-2017 does not belong to the 2014-2020 programming period, which is an extension of the previous programming period.

3. RESEARCH METHODOLOGY: POPULATION, SAMPLE, VARIABLES, DATA SOURCE, DATA ANALYSIS METHODS

For comparative study on the financial impact of irregularities resulting from the audit of EU funded projects during the 2007-2013 and 2014-2020, the total population programs funded by grants, were selected seven projects included in OP financed of the Structural Funds (FS) and the Cohesion Fund (CF), which were mentioned above. For the programming period 2014-2020, some OP have changed names, but to ensure comparability, were using the same statistical unit.

The sample analyzed consists of over 7000 projects implemented in the two programming periods: 2007-2013 and 2014-2020, included in the seven OP, which represent about 30% of the entire population. But analysis was performed on the PO rather than individual projects.

The variables analyzed after collecting the basic data are shown in the table below.

Table 1: Variables

Symbol	Explanation
DE_2007_2013	*Declared Expenses EC 2007-2013 (Euro)*
DE_2014_2017	*Declared Expenses EC 2014-2017 (Euro)*
AE_2007_2013	*Audited Expenses 2007-2013 (Euro)*
AE_2014_2017	*Audited Expenses 2014-2017 (Euro)*
AE/DE_2007_2013	*Share of Audited Expenses in Declared Expenses 2007-2013 (%)*
AE/DE_2014_2017	*Share of Audited Expenses in Declared Expenses 2014-2017 (%)*
FIIAE_2007_2013	*Total Financial Impact of Irregularities in the Audited Expenses 2007-2013 (Euro)*
FIIAE_2014_2017	*Total Financial Impact of Irregularities in the Audited Expenses 2014-2017 (Euro)*
IF/TI_2007_2013	*Share of Irregularities Found in Total Irregularities 2007-2013(%)*
IF/TI_2014_2017	*Share of Irregularities Found in Total Irregularities 2014-2017(%)*
IPP/TI_2007_2013	*Share of Irregularities in Public Procurement in Total Irregularities 2007-2013 (%)*
IPP/TI_2014_2017	*Share of Irregularities in Public Procurement in Total Irregularities 2014-2017 (%)*
IOIE/TI_2007_2013	*Share of Irregularities in Other Ineligible Expenses in Total Irregularities 2007-2013(%)*
IOIE/TI_2014_2017	*Share of Irregularities in Other Ineligible Expenses in Total Irregularities 2007-2013 2014-2017(%)*
IF/AE_2007_2013	*Share of Irregularities Found in Audited Expenses 2007-2013 (%)*
IF/AE_2014_2017	*Share of Irregularities Found in Audited Expenses 2014-2017 (%)*
IF/DE_2007_2013	*Share of Irregularities Found in Declared Expenses 2007-2013 (%)*
IF/DE_2014_2017	*Share of Irregularities Found in Declared Expenses 2014-2017 (%)*

Source: own projection

For the 2007-2013 period, the variables have been analyzed since 2010, the year in which the data were available, but also because the projects were launched, approved and audited after the opening year of the programming period. For the 2014-2020 programming period, the last year surveyed is 2017, for the following periods not yet reported.
Data collection was based on bibliographic documentation using CAR reports published for each of the eight years examined related programming periods 2007-2013 and 2014-2020. It is

important to note that in this study the data that represented the results of AA were collected as a result of the audit of each OP for the 2007-2013 and 2014-2020 programming periods but with the analysis of the year 2017. According to the Council Regulation (EC) no. 1083/2006, AA must ensure that audit missions are carried out in order to ensure that the management and control systems of the OP function effectively (system audit) and audit missions of operations on the basis of an appropriate sample in order to obtain an assurance that all declared costs are fair and legal. In this study, we analyzed ten CAR reports published between 2008-2017 (2007 paired with 2008), following the results obtained from the audit operations, not audit system, but analysis was performed in final eight datasets (on the grounds that some years were engaged and were found only descriptive information).

For *data analysis*, it has recourse to quantitative methods, such as: systematization (grouping, tabulation, graph) and the comparison using the primary indicators, and relative derivatives, as can be observed from the presentation of the variables in the Table 1. Also, for a synoptic presentation of variables and statistical units, we Analyzed the Main Components (AMC) as a descriptive method of multidimensional analysis of data [25], [26] which is applied in the study of correlations between numerical variables. Specifically, it was considered highlighting statistical links between variables taken into account, on the one hand, and the similarities and differences between statistical units, i.e. seven OP envisaged by variables recorded. Below we present the final results and their interpretation using systematization using graphical tools.

4. RESULTS AND DISCUSSIONS

In Romania, AA is the one that informs the European Commission, the Parliament of Romania, but also the public opinion on how to use the non-reimbursable funds, as well as on the main deficiencies found. The auditor's opinion is based on all audit work and an assessment of the generality of the error by comparing it with the materiality threshold established in the audit planning. In all CAR reports, we find an acceptable level of materiality of 2% of the declared expenditure. Beyond this threshold, the error rate is considered to be significant.

The results of processing are summarized in the charts below. Thus, starting from the variables included in the Table 1, the first examines the share of expenditure audited by AA in total expenditure declared EC. For the two periods analyzed, on the total OP, the percentage of expenditure audited in the total expenditure declared exceeds by at least 30% for the two periods considered. We present in Figure 1 the weight of Audited Expenses (AE) in Declared Expenses (DE). On the OP and periods, it can be seen from Figure 1 that the largest share of the audited expenditures in the total expenditures declared in the projects is owned by SOP T, over 70%, followed by the OPTA for the period 2007-2013 and the OPTA over 70%, followed by ACD, for the period 2014-2017. The lowest weights of the expenditure audited in the declared expenditure are held by the SOP HRD, even less than 10% for the period 2010-2013, and 15% for the period 2014-2017.

Regarding irregularity in periods analyzed by auditing the projects included in the sample, it appears that the level of expenditure declared to the EC during the period 2007-2013 over 7 billion Euro, over 2 billion Euro are audited expenditure and total financial corrections proposed from the audit are about 63 million Euro, of which over 22 million Euro for 2013. For the period 2014-2017, at the level of EC declared expenditures of over 11 billion Euro, over 3 billion Euro are the audited expenditures, and the total financial corrections proposed by the audit exceed 150 million Euro, out of which over 86 million Euro belong to the year 2014. In other words, the irregularities

found as a result of the auditing of the projects financed by the SF and the CF during the analyzed periods refer to the irregularities found in the eligibility of public procurement expenditure, as well as to irregularities related to other ineligible expenditure. The percentage of Irregularities Found (IF) in Total Irregularities (TI) over the two analyzed periods can be plotted as in Figure 2.

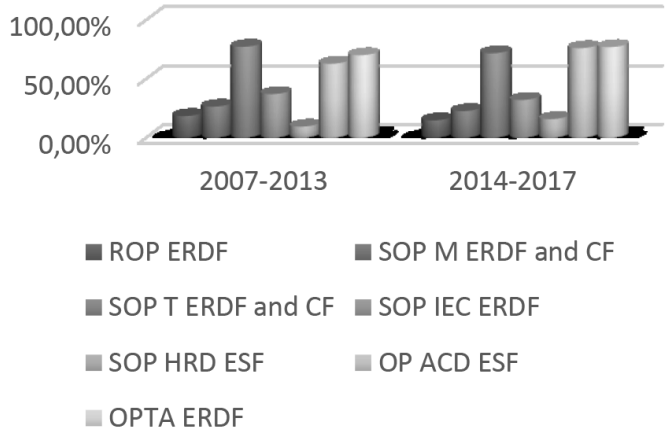

Figure 1: Share of Audited Expenses in Declared Expenses (AE/DE)

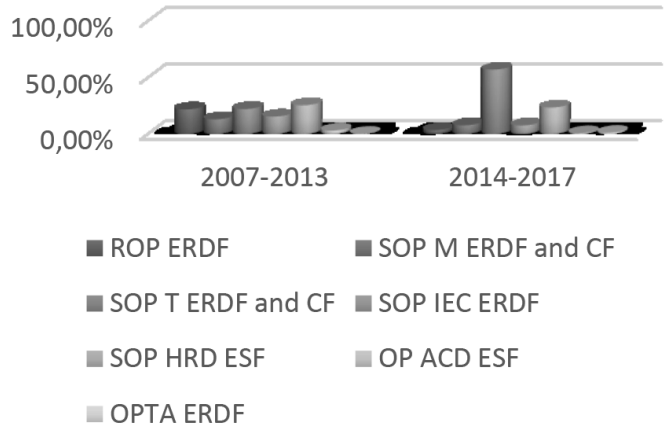

Figure 2: Share of Irregularities Found in Total Irregularities (IF/TI)

Following the audit of projects under the seven OP in the periods under review, the total financial impact of irregularities in the expenditure audited has increased considerably for projects financed from SOP T, from about 20% in 2007-2013 to 55% in 2014-2017. A positive aspect is noted in the case of projects financed from the ROP, where there is a decrease in the share of total irregularities found from approximately 20% in the first analyzed period to 3% in the last period, while the percentage of the expenditures audited decreased by only 4 %. Decreasing weightings of the observed irregularities were registered also by the projects financed from SOP M and SOP IEC. On a constant line, regarding irregularities, instead, the projects financed from SOP HRD are maintained, with 25% to 23% (decreasing), while the share of audited expenditures increased by about 6% during the period 2014-2017 as compared to 2007-2013. The financial impact of irregularities concerning ineligible expenditure categories of irregularities (procurement and other irregularities) may be observed when considering Figures 3 and 4.

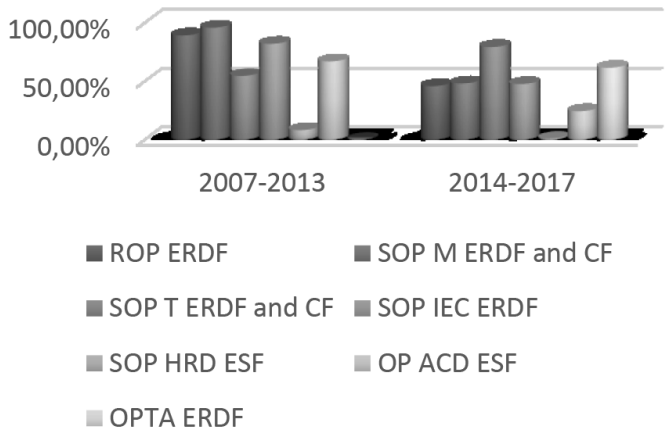

Figure 3: Share of Irregularities in Public Procurement in Total Irregularities (IPP/TI)

The financial corrections for the eligibility of public procurement expenditure for the period 2010-2013 amount to 37 million Euro, out of which over 10 million Euro are corrections for 2013; and all at the level of audited expenditure. For the period 2014-2017, the total financial corrections for the eligibility of public procurement expenditure exceeds 86 million Euro, out of which over 43 million Euro are in 2014. Important is that 2017 is a decrease in their reaching around 300 thousand Euro in 2017. Following the analysis of Figure 3, it is observed that for the analyzed periods there were significant increases of the public procurement irregularities for the projects financed under SOP T and OPTA, and decreases in the percentages related to the public procurement irregularities were registered as a result of the audit of the finalized projects ROP, SOP M and SOP IEC. The most frequent examples of audits of projects in the analyzed periods of irregularities related to public procurement relate to [3]: failure to comply with award procedures in the case of contracts with suppliers in the sense of non-compliance with the principle of equal treatment in the bidding process, use of the negotiated procedure without prior publication of a contract notice, modification of the information included in the contract notice without publication of a notice, etc.

Different weights than those related to public procurement have irregularities in other ineligible expenditure, as can be seen from Figure 4.

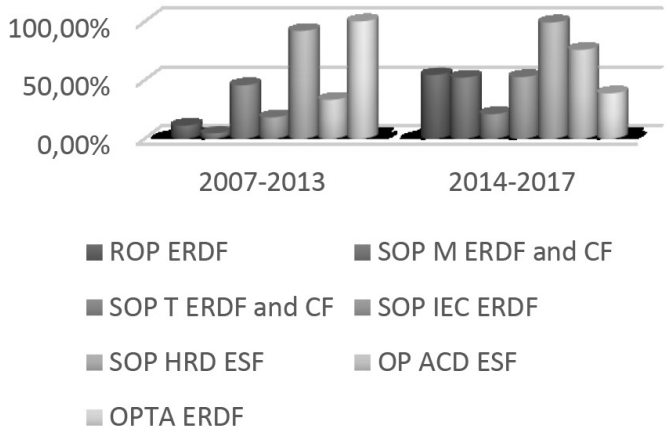

Figure 4: Share of Irregularities in Other Ineligible Expenses in Total Irregularities (IOIE/TI)

Significant weightings in the two analyzed and growing periods of these types of irregularities are found at the level of ESF-funded SOP HRD projects, followed by ACD projects funded from

the ESF. However, there are also decreases in these types of irregularities in the case of OPTA projects, financed by the ERDF. Irregularities involving other than those ineligible for public procurement have been encountered due to the fact that various expenditures were made without complying with the financing contracts and list of eligible expenses under the legislation.

The Figure below shows that the largest share of the irregularities found in the audits of projects funded by the European funds for the two analyzed periods in the total of the audited expenditures is owned by 11% of SOP HRD projects financed by the ESF.

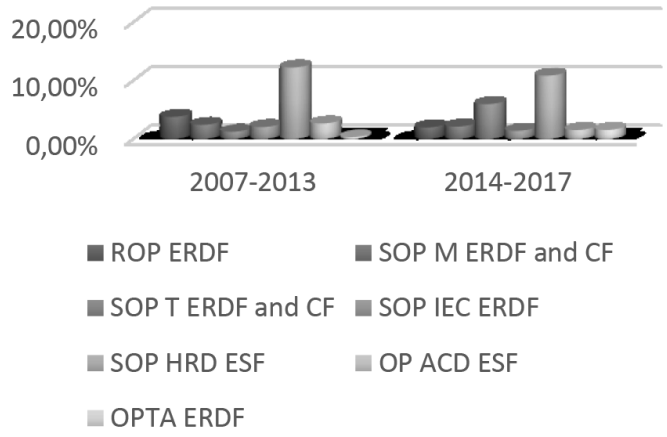

Figure 5: Share of Irregularities Found in Audited Expenses (IF/AE)

In Figure 6, it analyzes the declared expenses irregularities weight, based on the assumption that the accepted level of significance threshold is 2% of the declared expenses.

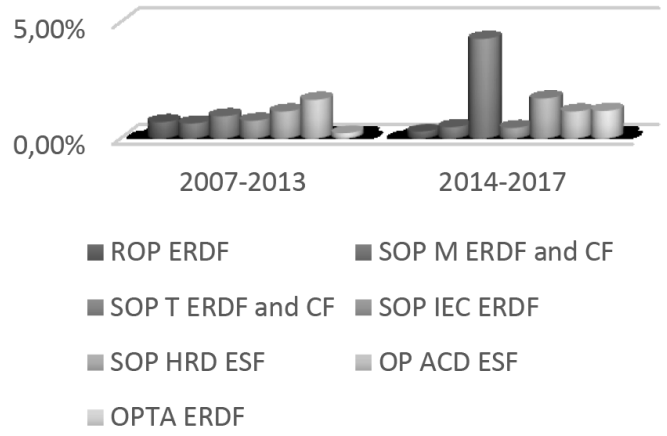

Figure 6: Share of irregularities found in declared expenses

Data analysis attached chart above, it appears that 2% is exceeded for projects related to SOP T qualifier you find in public CAR reports in this regard is "Operating system, but improvements are needed" [3].

To summarize the situation of the variables analyzed, following the Analysis of the Main Components (AMC), it can be seen from the Figure below that for the two analyzed periods, the situation of the correlations is roughly the same in the sense that a negative correlation between the observed irregularities related public procurement and detected irregularities related to other types of ineligible expenditure.

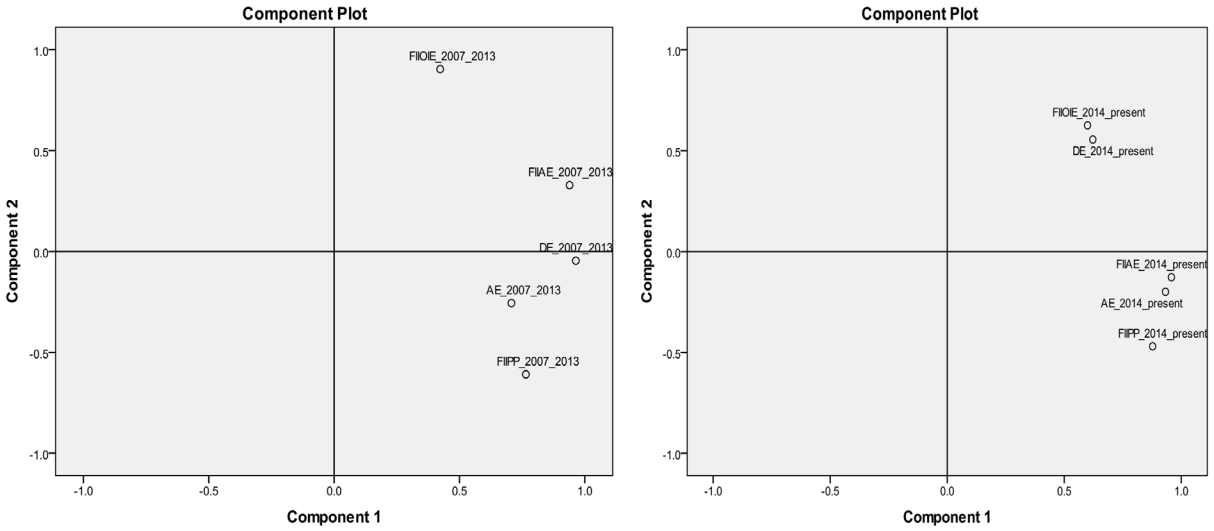

Figure 7: Correlations between variables after AMC

Instead, if we correlate the garbage in Figure 7 with Figure 8, the following findings can be made: SOP HRD, OP ACD and OPTA are characterized by the fact that on average they have the highest weights in respect of the irregularities found in other ineligible expenditure and the smallest weights, on average, related to the irregularities found in public procurement; SOP T, SOP IEC, SOP E and ROP record weights that do not differ significantly from one period to the next, except SOP T, which on average has significant weightings with respect to the total deficiencies found.

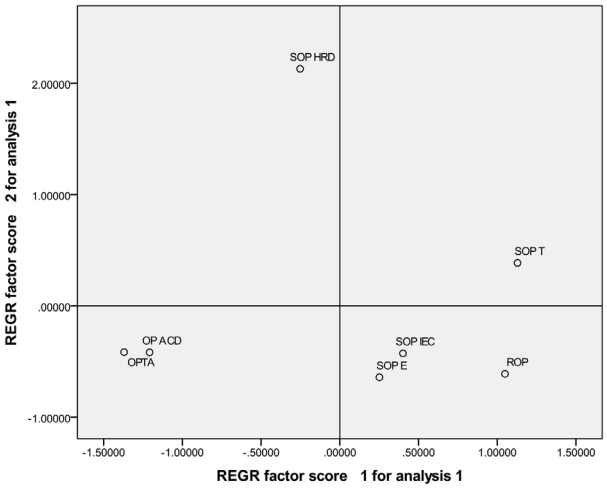

Figure 8: Similarities and differences between the OP after the AMC

This study focused on the comparative analysis of the audit results of the European projects implemented during the period 2007-2013 and from 2014 to the present, namely by the end of 2017, precisely to highlight the most important irregularities found by the auditors. The following are the most important conclusions drawn from the research.

5. CONCLUSION

In the present research it was desired to collect the data for project audits for the entire period 2007-2013, but the data were collected only for the 2010-2013 period since 2007 was the launch year when EC expenditure was not yet declared and in 2008 and 2009, the information was presented in the CAR reports more in a descriptive manner, without any errors. Therefore, the

relevance of the data for the comparisons was only for the period 2010-2013. For the second 2014-2020 programming period, projects approved and funded by 2017 were considered, including the CAR Report (2018) not yet published at the time of data collection for this article. In addition, expenditure declared and audited during this period was a continuation of projects started in the period 2007-2013.

Following the processing of the data collected, it was found that the public procurement irregularities identified during the audit for the periods considered are the most frequent and, at the same time, imputed significant value corrections. As a result of the analysis of these issues on OP and periods, there was a greater share of the irregularities found in the OP in the last years of the first analyzed period (2007-2013) and in the first years of the second analyzed period (2014-2017). If you are considering seven OP, the highest percentage of irregularities is found for POS T in significant increase in the period 2014-2017 to 2010-2013. With reference to the public procurement irregularities found in the audit of European projects, it can be seen from the previous figures that on average there is a decrease in them, and those related to other non-eligible expenditures are kept on average about the same level. Instead, the share of total irregularities found in audited expenditures is maintained at a significant, very low, downward trend for SOP HRD for the two periods under review. The materiality threshold accepted for auditing European projects of 2% is exceeded, as could be seen, only for SOP T in the second programming period. Based on these findings, auditors' future projects must focus primarily on significant public procurement system when performing an audit for a project financed by grants.

The research adds to knowledge, because it can have a greater impact on applicative, but it has limitations. These are caused primarily by lack of data or presenting them in a more than satisfactory for study.

REFERENCES

[1] Chamber of Financial Auditors in Romania - CFAR, (2014a). *Collaboration protocol on the organization and conduct of financial audit activity for European funds and other non-reimbursable funds from other donors (Protocol de colaborare privind organizarea și desfășurarea activității de audit financiar pentru fonduri europene și alte fonduri nerambursabile de la alți donatori).* [online] Available at: http://www.cafr.ro/uploads/Protocol%20MFE-3454.pdf (currently abrogated) [Accessed 10.05.2019].

[2] Ministry of Regional Development, Public Administration and European Funds, (2017). *Request for termination of collaboration protocol on the organization and conduct of the financial audit activity for European funds and other non-reimbursable funds from other donors.* [online] Available at: https://www.cafr.ro/uploads/Rezilierea%20Protocolului%20de%20colaborare%20CAFR%20%E2%80%93%20MFE-8ed3.pdf [Accessed 12.05.2019].

[3] Court of Accounts of Romania, (2014). *Public Report for 2013.* Bucharest: The Romanian Court of Accounts.

[4] Grosu, M., Robu, I., B., Maha, L., G. (2018), *Study on the Impact of Projects from European Funds in 2007-2013 and Impact on Present and Future of Grants,* International Conference on European Union Financial Regulation, "Alexandru Ioan Cuza" University Publishing House, Iasi, pp. 285-299.

[5] Kameniczki, C. (2009). *Auditor's responsibility in auditing projects with domestic and international funding in Romania* (Răspunderea auditorului în auditarea proiectelor cu finanțare internă și internațională în România). In: *National and international financial audit activity. Auditors and the global economic crisis (Național și internațional în ac-*

tivitatea de audit financiar. Auditorii și criza economică globală), Second Congress of Financial Auditors of Romania. Bucharest: ELFI Publishing House, pp. 638-647.

[6] Chamber of Financial Auditors in Romania - CFAR, (2014b). *Some clarifications on standards applicable to auditing projects funded by European funds (Unele clarificări cu privire la standardele aplicabile în auditarea proiectelor finanțate din fonduri europene).* [online] Available at: http://www.cafr.ro/pagina.php?id=141 [Accessed 02.06.2019].

[7] Council Regulation (EC) no. 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund. online] Available at: http://www.fsesudest.ro/legislatie/070307r1083RO.pdf [Accessed 03.06.2019].

[8] IAASB, (2013). *International Quality Control, Audit, Review, Other Insurance and Related Services (Manual de Reglementări Internaționale de Control al Calității, Audit, revizuire, Alte Servicii de Asigurare și Servicii Conexe)*, vol. I and II, Bucharest: CFAR.

[9] Șuteu, A. (2013). *Audit of European structural funds - agreed procedures* (Auditul fondurilor europene structurale – proceduri convenite). Practici de audit (Audit Practices)*,* 2(6), pp. 19-28.

[10] Staicu, E. (2014). *Auditors on European funds and other non-reimbursable funds: How to obtain certification (Auditori pe fonduri europene și alte fonduri nerambursabile: Cum se obține certificarea).* [online] Available at: http://legestart.ro/auditori-pe-fonduri-europene-si-alte-fonduri-nerambursabile-cum-se-obtine-certificarea/ [Accessed 20.05.2019].

[11] Șerban, M. (2014). *Auditing European Funds - Comparisons between ISRS 4400 and ISA 805* (Auditarea fondurilor europene – comparații între ISRS 4400 și ISA 805). Practici de audit (Audit Practices)*,* 3(11), pp. 13-17.

[12] Șuteu, A. (2015). *Reflections on ISA 805 from the Audit of European Funds 2014-2020* (Reflecţii privind ISA 805 din perspectiva auditului fondurilor europene 2014-2020). Practici de audit (Audit Practices)*,* 3(15), pp. 43-52.

[13] Anghelache, G., V., Anghelache, C., Anghel, M., G., Stoica, R. (2017), *Elements for EU Cohesion Policy 2014-2020*, Revista de Statistică, Supliment, vol 65, issue 5, pp. 77-86

[14] Hațegan, C.D. (2013). Study on the financial audit activity for the verification of European projects in Romania (Studiu privind activitatea de audit financiar pentru verificarea proiectelor europene în România). Audit Financiar *(Financial Audit)*, Year XI, 102(6), pp. 3-10.

[15] Săvoiu, G., Bănuță, M., Gâdoiu, M. (2013), *Some Accounting Issues and Statistics about Romania and EU Funds – Absorption through Projects and Eligible Expenses*, revista de Statistică, INS, Bucharest, no. 1, pp. 126-136.

[16] Botez, D., (2012a). Auditor's intervention on non-reimbursable structural funds (Intervenția auditorului privind fondurile structurale nerambursabile). *Studia Universitatis Petru Maior Series Oeconomica*, [online] 6(1), pp. 24-38. Available at: http://oeconomica.upm.ro/OVI/24-38DanielBotez.pdf [Accessed 01.06.2019].

[17] Botez, D. (2012b). Experiences and suggestions on documenting structural fund audits (I and II), (Experiențe și sugestii privind documentarea auditării fondurilor structurale - I și II). *Audit Practices,* no. 3 and no. 4, pp. 21-24.

[18] Mataragiu, C., Oșanu, O., Grapini, A., C., Chereji, A., Untariu, A. (2013). *Audit of Structural Funds - step by step (Auditul fondurilor structurale – pas cu pas).* Bucharest: Datagroup Publishing House.

[19] Șerban, M. (2012). Audit of European projects - from theory to practice (Auditarea proiectelor europene – de la teorie la practică). Practici de audit (Audit Practices)*,* 4 (issue), pp. 13-19.

[20] Burja, V., Jeler (Popa), I., (2018). The Control of the Implementation and Management of European Funds. *Academic Journal of Economic Studies*, Faculty of Finance, Banking

and Accountancy Bucharest, „Dimitrie Cantemir" Christian University Bucharest, 4(1), pp. 89-93.

[21] Bostan, I., Grosu, V. (2010), *The social effects of the current economic crisis on the European Union labour market*, Revista de Cercetare și Intervenție Socială, vol. 31, pp. 7-21.

[22] Gelămancă, B., Zai, P. (2013), *Abordări privind absorbția Fondurilor Structurale în România în perioada 2007-2013,* Revista Transilvană de Științe Administrative 2(33), pp. 76-88.

[23] Cocoșatu, C., C. (2015), *Abordare sistemică privind implementarea fondurilor externe nerambursabile în România (Systemic approach on the implementation of European grants in Romania)*, Academia Română, Institutul de economie Mondială, Impactul transfprmărilor socio-economice și tehnologice la nivel național, european și mondial, No. 1, vol. 1.

[24] Court of Accounts of Romania, (2010-2018). *Public Report for 2008-2017.* Bucharest: The Romanian Court of Accounts.

[25] Pintilescu, C. (2007), *Multivariate Statistical Analysis (Analiză statistică multivariată),* "Alexandru Ioan Cuza" University Publishing House, Iasi

[26] Jaba, E., Robu, I., B. (2011), *Obținerea probelor de audit pentru testarea "Going Concern", folosind metode statistice avansate în analiza influenței factorilor asupra ratei îndatorării globale*, Audit Financiar (Financial Audit), vol. 9, no. 81

UNCONDITIONAL INCOME FOR LONG-TERM UNEMPLOYED PEOPLE AS SOLUTION IN GERMANY

Thomas Kronberger[1]

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Abstract: *The classical Game Theory reflects the payoff of decision-makers. The conventional model has been expanded to a 3D Expanded Game Theory (EGT), including the consequences for the stakeholders. This model has the holistic benefits similar to the stakeholder model, but also allows forecasts like the classical Game Theory. This paper will discuss EGT.*

This model is to be applied in the German labour market, where we have two decision-makers, an "unemployed person" and an "employee at job centre", as well as the stakeholder, "the state", who can influence both decision-makers in different ways. Germany has almost full employment on one hand and a hard core of long-term unemployed people on the other. Including these people in the labour market is very expensive and inefficient. This study will show how an unconditional income can be a possible solution for this specific group under the current German circumstances.

Keywords: *Expanded Game Theory, Labour Market, Stakeholder, Decision Making.*

1. INTRODUCTION

In Germany, we have the following framework:

- There is currently almost a full employment scenario,
- The long-term unemployed people are building relative constant groups,
- The cost of administrating long-term unemployed people and finding them jobs is high,
- The levels of stress and frustration of the employees at the job-centers are high,
- The levels of stress and frustration of the unemployed people are high.

The above are the reasons why the marginal benefit of job-searching efforts for long-term unemployed people is rather low. It will be shown, that under such conditions, an unconditional income can be a possible solution for all involved parties, as it reduces costs and increases the satisfaction of unemployed people as well as the employees at job centres.

For analysing the situation, it is necessary to take into account the theoretical background of Expanded Game Theory (EGT) and the economic condition in Germany. Having these two, EGT can be applied to find whether unconditional income is a possible solution for long-time unemployed people in Germany.

This paper does not consider the cases of short-term unemployed people and is based on a society with (almost) full-employment. In a society with a higher unemployment rate, the situation can be completely different.

[1] Faculty of Management, Comenius University, Odbojárov 10, 820 05 Bratislava, Slovakia

2. CURRENT SITUATION ON GERMAN LABOUR MARKET

In the beginning of 2010s, several authors claimed Germany is on its way to full employment. [1] [2]According to Eurostat, in February 2019, the unemployment rate in Germany dipped to 3.1%, which is the second lowest rate in the EU. [3]

Germany has significant economic differences amongst its regions. The Bundesagentur für Arbeit (BA) used a different approach to define unemployment rates compared to Eurostat and exhibited an unemployment rate of 5.3% for Germany and a range from 3.2% in the two southern states Bayern and Baden-Württemberg up to 9.8% in Bremen. [4, p. 16] An interpolation of the methods, employed by Eurostat probably leads to an unemployment rate that is significantly lesser than 2% in the two southern states.

A current rigid source [5] considers an unemployment rate of 2% as full employment for Germany. Before this, other authors have considered quite higher values as full employment (for example, Bert Rürup in 2008 considered 4% [6] while Robert E. Hall et al. considered 4–5% [7]). Based on all these definitions, the German labour market can be considered to have fully employed workers, at least in some regions.

Nevertheless, in February 2019, 756,000 persons (31.9% of all unemployed people) were unemployed for more than 12 months. These people are considered as long-term unemployed. This rate has been seen to reduce within the last 12 months (by 101,000 persons, from 33.7%), mostly because of reduction in conversion from short-time unemployment to long-time unemployment ("Der Rückgang der Langzeitarbeitslosigkeit ist vor allem das Resultat von weniger Übertritten aus Kurzzeitarbeitslosigkeit"). [4, p. 13] Interestingly, this reduction does not result of long-term unemployed people entering the regular labour market. Thus, proves that the efforts for pushing and pulling long-term unemployed people to the regular labour-market has no significant effect on long-term unemployment, even though the BA considers the reduction of long-term unemployment as one of their main tasks. ("Die Reduzierung von Langzeitarbeitslosigkeit ist eines der Schwerpunktthemen der Bundesagentur für Arbeit (BA)") [8] In the last ten years, long-term unemployment-rate has been seen to be much more stable than the general unemployment-rate. [9, p. 622] One reason for the constant high rate of long-term unemployment is the digitalisation and the lack of qualification of the member of this group. [10]

In 2014, the efforts of BA with its about 95,000 employees only led to 154,000 long-term jobs (for all unemployed people, not only the long-term unemployed ones). This represents a ratio of only 1.6 jobs found per employee of the BA. [11]

Even if extra effort is invested, the possible extra benefit will be marginal compared to the costs incurred.

3. CURRENT GERMAN LABOUR POLITICS AND ITS CONSEQUENCES

After working for at least 2 years, in the case of unemployment, a moderate economic compensation will be granted for a maximum period of 12 months (independent of assets). [12] Afterwards a basic compensation ("Hatz IV") will be given for needy people. The rate is 424 € plus housing costs for a single person (families get more). [13] Unemployed people need to collaborate to enjoy the full aid.

3.1. Consequences for long-term unemployed people

There is a minimal chance for long-term unemployed people to go back to the regular labour market. [14]

The current system of forcing unemployed people is based on "carrot and whip". For example, the local office of the BA can grant 5€ for every job application (up to 260€ per year) [15]. On the other hand, if the unemployed person does not show enough effort in job hunting, he may be penalised with punishments such as reduction in social aid or, in the worst case, obligation to pay back the money to the local agency of the BA.

The economic loss of the punishments can impair the families – especially innocent children – of the unemployed people. Economic restriction has often hampered the health and social life of unemployed people. The health status of long-term unemployed people is significantly worse than that of the median population. [16] [17] [18] Long term unemployment can lead to the stigmatisation of the unemployed people and their families. [19]

Some families cannot even afford any excursion; illness is an important topic for them. [20]

If there are sanctions, they can harm the people and strengthen the mentioned negative effects. Sanctions have a positive influence on activating employment; however, they are in conflict with the guarantee of subsistence [21], for which the state is responsible. But: The positive effect of sanctions for long-term unemployed people is marginal.

3.2. Consequences for employees of BA

Employees of the BA agencies face negative effects of the German labour politics as well. They are under stress, for example, when asked to hold sanction discussions. For such discussions, a special training is elaborated. [22]

Currently, the German system is pushing the employee of the BA and the unemployed person to find a job until the unemployed person finds a job or reaches the age of retirement. This leads to stress, even more if the employee of the BA sees that his customer is unable/unwilling to search for a job.

In 2017 a query revealed that the working atmosphere at the BA is "disastrous". Unfortunately, detailed results were only published in the intranet of the BA. [23]

Also, this study found no scientific texts on the consequences for the employees of the BA; however, many journalistic contributions are available in print media [24] and TV [25]. There are also numberless comments on sites where employees can review their companies, such as Glassdoor and Kununu [26] among other internet forums. [27]
One comment on Glassdoor by a former recruitment agent summarises the consequences of the current labour politics: "Zero motivation because of lack success, utopic targets and unattainable workload" ("Null Motivation wegen mangelnden erfolgserlebnissen, utopische Zielvorgaben und unerreichbares arbeitspensum" [sic]). [28]

3.3. Consequences for the society/government

The mentioned reclaim of the BA from the unemployed people led to an absurd situation in 2018 where local agencies of the BA had to spend 60,000,000€ to retrieve 18,000,000€ (sum of small amounts of less than 50€ each). [29]

The government pays a lot of money for job recruitments with a very small benefit of only 1.6 long-term jobs per employee of the BA per year. These costs lead to an unsatisfied population that criticises the inefficient and expensive administration. Before drawing a solution to the problem, the model of Expanded Game Theory will be explained.

4. EXPANDED GAME THEORY AS THE THEORETICAL BASIS FOR ANALYSIS

The classical dyadic Game Theory model of von Neumann and Morgenstern [30] shows in a table the payoffs of two decision-makers depending on the decisions of their own as well as the other:

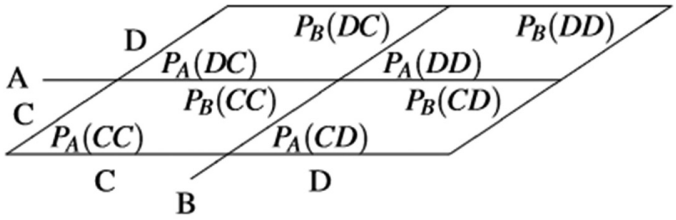

Figure 1: Classical Game Theory model (own visualisation)

This visualisation can be expanded to a 3D model [31] with the following three levels (in the case of one stakeholder, if there are more stakeholders, extra levels have to be added):

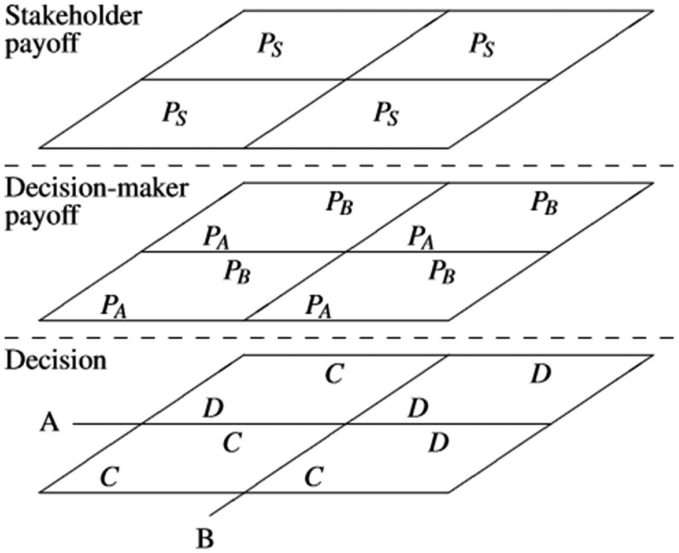

Figure 2: Expanded Game Theory with stakeholder (own elaboration)

Each level can be used by the decision-makers and the stakeholder for different purposes. The decision-makers will of course use the two lower levels of the model to find which output is the highest and how can they achieve it. The upper level shows the benefit of the stakeholder and can be used for getting a holistic view of the case.

The stakeholder can consider each level corresponds to a different method that he can use to influence the decision-makers:

1. Stakeholder payoff level – Educating the decision makers: For the decision-maker to consider the stakeholder's suggestion, it is important that the stakeholder ensures the decision-makers acknowledge their existence as well as the consequences of ignorance.
2. Decision-maker payoff level – Adapting the framework so that the payoff for the involved parties change: If the payoff is adapted in a clever way, the decision-makers will have a lesser interest in taking decisions at the disadvantage of the stakeholders.
3. Decision level – Controlling the decision makers: If the decision-makers are controlled, the motivation for breaking rules is minimised.

5. POSSIBLE SOLUTION: UNCONDTIONAL INCOME FOR LONG-TERM UNEMPLOYED PEOPLE

Applying this model on the current case delivers the following:

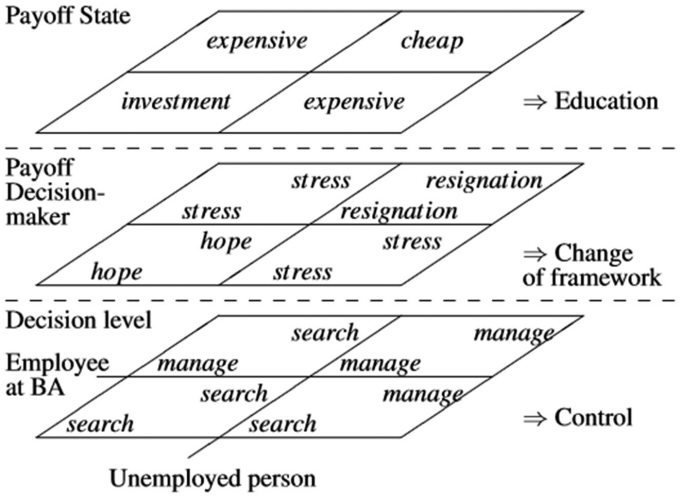

Figure 3: EGT applied on labour market (self-elaboration and see [11])

There are 4 possibilities:

1. search/search: The employee at the BA and the unemployed person are motivated in searching for a job. Both have hope, (can have) success and at least some satisfaction. The government is investing, i.e. paying the employee at the BA and providing income for the unemployed people. The possible profit for the government is mostly in the form of taxes levied, which the currently unemployed will pay once he gets a job.
2. search/manage: The employee at the BA is pushing and pulling the unemployed person to manage his situation. It is not important if the unemployed is unwilling or unable to search a job. Both the cases will result in stress for the two decision-makers and as expensive for the government; the latter because the government has to fund the work of the employee at the BA irrespective of whether the work is successful or not.
3. manage/search: The unemployed person is motivated to search for a job, and the employee at the BA is passive and only wants to administrate his customer. In this case, the employee at the BA gets his share for doing nothing, and the unemployed person stops believing in the BA. Thus, both are stressed, and again the government pays a lot of money for nothing.
4. manage/manage: Both, the employee at the BA and the unemployed person come to terms with the fact that they will not have success in finding a job and try to manage the

situation. The unemployed person is not under pressure to deliver motivation letters and other proofs of job searching. The employee at the BA can use his time for cases that promise more success; this way, the government can save money.

This shows, that there are two possible solutions (Nash-equilibriums):

search/search: Forcing job searching
manage/manage: Unconditional income without obligation for job searching

The best solution is to avoid long-term unemployment. Of course, an early education is the best solution. [32] Another method (among others) involves increasing the mobility of unemployed people. [9, pp. 627-628] But, statistical data [9, p. 622] show for a large population of the long-term unemployed people, their situation is a way of no return.

The statistics of the BA (Table 1) reveals, that in the years 2013–2016, even with a decreasing unemployment rate (2.95 million → 2.69 million), the group with an unemployment time for more than 5 years increased in number (139,000 → 156,000). The influence of the long-term unemployed people on the statistics has led to an increase in the average unemployment time (464 days → 495 days) despite the number of unemployed people dipping. Interestingly, the time for finding a job is almost constant in these years (green highlighted values).

Table 1: Unemployment statistics from the BA (March 2019) [33]

Time	unemployed	of these								average time of unemployment	average time for finding a job
		not long-term	of these	long-term	of these						
			10 - 12 months		1-2 years	2-3 years	3-4 years	4-5 years	5 or more years		
	1	2	3	4	5	6	7	8	9	10	11
Jahresdurchschnitt											
2008	3.258.954	1.932.414	143.033	1.326.540	506.976	303.074	245.372	91.779	176.140	525	295
2009	3.414.992	2.276.860	159.718	1.138.132	486.801	217.256	150.308	134.699	147.147	452	258
2010	3.238.965	2.098.596	167.672	1.140.368	566.522	206.892	114.546	84.894	166.953	451	265
2011	2.976.488	1.908.358	149.868	1.068.130	512.228	224.986	108.173	65.520	153.263	459	260
2012	2.897.126	1.850.491	141.138	1.046.635	499.733	210.164	117.655	62.638	138.215	458	260
2013	2.950.338	1.880.616	143.246	1.069.721	505.445	228.689	120.401	73.716	139.367	464	262
2014	2.898.388	1.821.637	139.594	1.076.752	490.405	229.540	132.864	76.174	146.918	481	267
2015	2.794.664	1.755.383	133.485	1.039.281	458.704	214.973	130.146	82.513	151.657	492	266
2016	2.690.975	1.697.902	122.957	993.073	436.908	198.929	119.853	79.919	156.282	495	268
2017	2.532.837	1.632.093	114.879	900.745	388.424	181.618	105.849	70.301	153.950	490	262
2018	2.340.082	1.526.674	104.076	813.409	352.459	155.061	96.184	61.540	145.773	488	259

For the long-term unemployed people, there needs to be a solution. For them, the question is not "How can long-term unemployment be reduced?" [34] but rather "How is a decent life possible with long-term unemployment?" The affected persons need to participate in their social life and exclusion needs to be avoided. On the other hand, a shift from the working part to the non-working part of the population needs to be avoided, and the working part of the society should not feel overburdened.

Stopping job-searching can mean one of the following four basic things:

5.1. Stop supporting the unemployed people

This solution is against the German constitution [35]. Greece is the only country in the EU where economic support is not perceived after a certain period of time [36]. Belarus went even a step further than Greece. Belarus does not only stop supporting the unemployed people, it even asked

money from them. Belarus' leader Alexander Lukashenko installed a "parasite tax" for the unemployed. Who has no job, has to pay, because most likely he works illegal? Due to the protests from the unsatisfied population, he cancelled the "parasite tax" after a short period of time in 2018. [37]

5.2. Providing unconditional income only in regions with (high) unemployment

In the first instance, this appears as a good idea: give money to the people of those places that have no jobs. However, in Germany regions with a high unemployment rate are poorer than the rest of the country. [38] Therefore, an unconditional income will only burden cities with a poor economic status and, as its negative side effect, influence the unemployed people from richer regions to move to these places to gain easy money. Apart from economic consequences with wrong incentives, the segmentation of the country leads to political consequences, which are explained in the next sub-chapter:

5.3. Providing unconditional income only in regions with full employment.

A fragmentation of the country in two sections, areas with and without unconditional income, can be compared to the regional differentiated minimum wage. Such has been seen to be practiced in some countries such as Brazil (between 998 R$ (about 226€) and 1335.20 R$ (about 303€)) [39]. Economic differences perceived here are much bigger than in Germany. The Brazilian South East can be considered a first world country with an equivalent life cost level. Poorer regions comprise more than 8000 schools without electricity. In some schools, pupils even have to bring their own water in buckets. [40] In Germany, the differences are not that big. Nevertheless, a regional basic salary was calculated [41] but is not realised due methodical difficulties. [42] The same difficulties exist in dividing the country in two sections: one with unconditional income and the other one without it.

Germany was divided for more than 28 years, the effects of which have not been overcome up to now. Many people are still of the belief that Germany is divided. This may be another reason why the government is trying to avoid regional differentiations of minimum wages and social welfare.

Nevertheless, as thought-experiment, it will be interesting because unemployed people living in a region with a high unemployment rate will have two reasons to move to a region with a low unemployment rate: more jobs and unconditional income.

5.4. Providing unconditional income throughout Germany

Therefore, the only feasible option left is to provide unconditional income throughout Germany. This will result in the following benefits for all involved parties:

Benefit for the long-term unemployed person (and his family):

- As there are no sanctions, the unemployed will have planning reliability about their money. This may also improve their health and reduce their probability to commit a crime, especially robbery (because they are less needy) and vandalism (less frustration).
- This may also result in greater satisfaction, as there will be no need to prove for job-searching activities. Nevertheless, this way, the unemployed can decide whether they want to search for a job or not. The possibility of job-searching and the support of the BA is still in existence.

Benefit for employee of the BA:

- Employees are only in contact with long-term unemployed people willing/able to search for a job and short-term unemployed people (who have a high chance for finding a job). Therefore, these two groups of unemployed have a higher motivation and/or a higher success rate compared to the hopeless cases.

Benefit for the society:

- Since the motivation of the employee of the BA will be higher than before, they will reflect their happiness in their family, which is a part of the society.
- As mentioned before, this may also reduce health costs and crime rates.
- Less unmotivated people will write motivation letters for jobs they are not well-suited for; this will in turn decrease the costs incurred by the companies. All these aspects will have a positive effect on the society. There will be lesser stress and the society in general will be happier. This happiness has no monetary in western countries; In Bhutan, the "Gross National Happiness" even has a constitutional status. [43]

6. CONCLUSION & OUTLOOK

When the author first learnt about unconditional income, he was against the policy of supporting unemployed people without demanding anything from them. After researching on this topic and understanding the situation of the involved parties, his opinion changed at least for the long-term unemployed people in Germany.

He now believes that it is the best for all three involved parties (unemployed people, employees of the BA and society) to stop forcing on job searching after a certain time. Finding the correct moment for "resigning searching" is very hard and can be compared with chess computers. Douglas R. Hofstadter in 1979 wrote the following in his famous book "Gödel, Escher, Bach" about a chess program, "In a computer chess tournament not long ago in Canada, one program – the weakest of all the competing ones – had the unusual feature of quitting long before the game was over. It was not a very good chess player, but it at least had the redeeming quality of being able to spot a hopeless position, and to resign then and there, instead of waiting for the other program to go through boring ritual of checkmating. Although it lost every game it played, it did it in style." [44] As forum contributions show, still today chess programs have the "problem" that they do not know when to resign. [45]

Seeing that computers cannot find the right moment to resign in a chess game, one can realise that it is even harder for them to find the right moment to resign in job searching, where many aspects have to be regarded. One of these aspects is considering the possibility that the probability of finding a job decreases over time. The first indicator of this can be seen from the statistics of the BA (see Table 1). Acceptance of population, economic situation and change in unemployment rates are a few of the many other aspects that need to be regarded for finding the right moment to switch to unconditional income. How can one find the best moment, can be covered in another paper. Other interesting further research-topics are the long-term effects and the social impact of an unconditional income.

The author thinks, that the amount of the unconditional income is more a political decision than a scientific.

REFERENCES

[1] T. Straubhaar, „Wege zur Vollbeschäftigung," *Aus Politik und Zeitgeschichte,* pp. 3-7, Vol. 62 (14/15), 2012.

[2] K.-H. Paqué, „Deutschlands Weg zur Vollbeschäftigung," *Orientierungen zur Wirtschafts und Gesellschaftspolitik,* pp. 28-35, Issue 136 2013.

[3] Eurostat, „Unemployment statistics," Eurostat, March 2019. [Online]. Available: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Unemployment_statistics. [Zugriff am 02 05 2019].

[4] Bundesagentur für Arbeit, „Monatsbericht zum Arbeits- und Ausbildungsmarkt," Bundesagentur für Arbeit, Nürnberg, 2019.

[5] Bundeszentrale für politische Bildung, „www.bpb.de," Bundeszentrale für politische Bildung, 2016. [Online]. Available: http://www.bpb.de/nachschlagen/lexika/lexikon-der-wirtschaft/21068/vollbeschaeftigung. [Zugriff am 05 02 2019].

[6] Welt.de, „Ab wann man von Vollbeschäftigung spricht," welt.de, 01 05 2008. [Online]. Available: https://www.welt.de/wirtschaft/article1955723/Ab-wann-man-von-Vollbeschaeftigung-spricht.html. [Zugriff am 02 05 2019].

[7] R. E. Hall, R. A. Gordon und C. Holt, „Why Is Unemployment Rate So High at Full Employment?," *Brookings Papers on Economic Activity,* pp. 369-410, No. 3 1970.

[8] Bundesagentur für Arbeit, „Langzeitarbeitslosigkeit," Bundesagentur für Arbeit, [Online]. Available: https://statistik.arbeitsagentur.de/Navigation/Statistik/Statistik-nach-Themen/Langzeitarbeitslosigkeit/Langzeitarbeitslosigkeit-Nav.html. [Zugriff am 02 05 2019].

[9] U. Walwei, „Abbau der Langeitarbeitslosigkeit: Der Weg ist steinig und schwer," *Wirtschaftsdienst,* pp. 621-628, 20 09 2017.

[10] B. Klauß, „Wie Richard David Precht den Sozialstaat retten will," 26 05 2019. [Online]. Available: https://www.rnz.de/wirtschaft/wirtschaft-regional_artikel,-bedingungsloses-grundeinkommen-wie-richard-david-precht-den-sozialstaat-retten-will-_arid,442421.html. [Zugriff am 27 05 2019].

[11] T. Kronberger und L. Papakonstantinidis, „„The Win-Win-Win Papakonstantinidis Model": Bargaining Possibilities When there are Three Involved Parties on a Labour Market and two of them are Active Decision-Makers," *International Journal of Innovation and Economic Development,* pp. 68-98, Volume 4 02 2019.

[12] Lohnsteuer kompakt, „Wie lange wird Arbeitslosengeld gezahlt?," Lohnsteuer kompakt, [Online]. Available: https://www.lohnsteuer-kompakt.de/fag/0/677/wie_lange_wird_arbeitslosengeld_gezahlt. [Zugriff am 05 02 2019].

[13] Hartz IV, „Hartz IV Erhöhung kommt Mehr Geld ab 2019," Hartziv.org, 12 09 2018. [Online]. Available: https://www.hartziv.org/news/20180912-hartz-iv-erhoehung-kommt-mehr-geld-ab-2019.html. [Zugriff am 02 05 2019].

[14] A. Brück-Klingberg und J. Althoff, Langzeitarbeitslosigkeit in Niedersachsen - wenig Bewegung und hohes Niveau: Entwicklung, Struktur und Abgänge in Beschäftigung, Nürnberg: IAB-Regional Niedersachsen-Bremen, 2018.

[15] besserbewerben.de, „bewerbungstipps/bewerbungskosten-erstattung-vom-arbeitsamt-die-5-euro-pauschale," [Online]. Available: https://www.besserbewerben.de/bewerbungstipps/bewerbungskosten-erstattung-vom-arbeitsamt-die-5-euro-pauschale. [Zugriff am 02 05 2019].

[16] S. Kreuzfeld, M. Weippert, M. Kumar, A. Rieger und R. Stoll, „Arbeitsmarktintegratives Setting mit Gesundheitsberatung unterstützt gesundheitsförderlichen Lebensstil bei Langzeiterwerbslosen," *KNP/BMBF-Förderschwerpunkt Präventionsforschung – Wirksamkeit Erwachsene,* p. 77 (Suppl. 1): S101–S102, 2015.

[17] H. Limm, H. Gündel, M. Heinmüller, K. Liel, K. Seeger und P. Angerer, „Gesundheitsförderung für Menschen in Langzeitarbeitslosigkeit," *KNP/BMBF-Förderschwerpunkt Präventionsforschung – Wirksamkeit Erwachsene,* p. 77 (Suppl. 1): S99–S100, 2015.

[18] K. Liel, „Evaluation eines Gesundheitskompetenztrainings für Menschen in Langzeitarbeitslosigkeit," 2012. [Online]. Available: https://edoc.ub.uni-muenchen.de/14510/1/Liel_Katrin.pdf. [Zugriff am 02 05 2019].

[19] T. Gurr und M. Jungbauer-Gans, „Stigma consciousness among the unemployed and prejudices against them: development of two scales for the 7th wave of the panel study "Labour Market and Social Security (PASS)", *Journal of Labour Market Research,* pp. 335-351, Volume 46 December 2013.

[20] C. Thiel und S. Götz, „Mehr als nur reden - Methodische Betrachtungen zu Interviews mit Familien," *Sozialer Sinn,* Heft 1 Band 19 2018.

[21] I. Kumpmann, „Im Fokus: Sanktionen gegen Hartz-IV-Empfänger: Zielgenaue Disziplinierung oder allgemeine Drohkulisse?," *Wirtschaft im Wandel,* pp. 236-239, 06 2009.

[22] R. Göckler, „Sanktionsgespräche in der Grundsicherung für Arbeitssuchende (SGB II) und ihre Anschlussfähigkeit zu Beratungsstandards," *Sozialer Fortschritt,* pp. 264-272, Heft 10-11 2010.

[23] dpa, „Bundesagentur für Arbeit: Befragung offenbart desaströses Betriebsklima," Handelsblatt.com, 22 11 2017. [Online]. Available: https://www.handelsblatt.com/politik/deutschland/bundesagentur-fuer-arbeit-befragung-offenbart-desastroeses-betriebsklima/20620814.html?ticket=ST-892172-ZxsUfDxeopcGn3VE67kA-ap3. [Zugriff am 02 05 2019].

[24] A. Gehrmann, „Egal, Hauptsache irgendein Job," spiegel.de, 27 04 2017. [Online]. Available: https://www.spiegel.de/lebenundlernen/job/arbeitsagentur-7-tage-als-sachbearbeiter-in-a-1144744.html. [Zugriff am 02 05 2019].

[25] NDR, Regisseur, *Jobs, soziale Sicherheit, Hilfe? Der Alltag bei der Agentur für Arbeit - 7 Tage.* [Film]. Deutschland: NDR, 2017.

[26] kununu.com, „Bundesagentur für Arbeit als Arbeitgeber," kununu.com, [Online]. Available: https://www.kununu.com/de/bundesagentur-fuer-arbeit/kommentare. [Zugriff am 02 05 2019].

[27] wiwi-treff,de, „Arbeitsvermittler Bundeagentur für Arbeit - und danach?," wiwi-treff.de, [Online]. Available: https://www.wiwi-treff.de/Berufseinstieg-Wo-and-Wie/AA/Arbeitsvermittler-Bundesagentur-fuer-Arbeit-und-danach/Diskussion-19429. [Zugriff am 02 05 2019].

[28] Glassdoor, „Arbeitgeberbewertung: Bundesagentur für Arbeit," glassdoor.com, [Online]. Available: https://www.glassdoor.de/Bewertungen/Bundesagentur-f%C3%BCr-Arbeit-Arbeitsvermittler-Bewertungen-EI_IE930843.0,24_KO25,42.htm. [Zugriff am 02 05 2019].

[29] dpa, „Jobcenter zahlen 60 Millionen Euro, um 18 Millionen einzunehmen," faz.net, 27 02 2019. [Online]. Available: https://www.faz.net/aktuell/wirtschaft/rueckforderung-von-kleinbetraegen-kostet-jobcenter-millionen-16062458.html. [Zugriff am 02 05 2019].

[30] J. v. Neumann und O. Morgenstern, Theory of games and economic behavior, Princeton: Princeton University Press, 1944.

[31] T. Kronberger, „Unethical cooperation and its consequences for stakeholders: Insights from Game Theory," Brno, 2017.

[32] F. Bauer und G. Sieglen, „Individuell verfestigte Langzeitarbeitslosigkeit," *Arbeit - Zeitschrift für Arbeitsforschung, Arbeitsgestaltung und Arbeitspolitik,* pp. 87-107, 14 05 2018.

[33] Bundeasagentur für Arbeit, „Statistikdaten Langzeitarbeitslosigkeit," 03 2019. [Online]. Available: https://statistik.arbeitsagentur.de/Statistikdaten/Detail/201903/langzeitarbeitslosigkeit/ langzeitarbeitslosigkeit/langzeitarbeitslosigkeit-dlk-0-201903-xlsm.xlsm. [Zugriff am 02 05 2019].

[34] N. Blüm, R. Dreßler, K. Murmann und E. Breit, „Wie kann die Langzeitarbeitslosigkeit abgebaut werden?," *Wirtschaftsdienst,* pp. 323-331, Vol.69 (7) 1989.

[35] K. F. Gräditz, „Das verfassungsrechtliche Existenzminimum im „Hartz IV"-Urteil des Bundesverfassungsgericht," *BRJ,* pp. 4-11, 1 2010.

[36] Handelsblatt, „Hartz IV auf Griechisch," handelsblatt.com, 26 01 2015. [Online]. Available: https://www.handelsblatt.com/politik/international/grundsicherung-in-europa-und-den-usa-hartz-iv-auf-griechisch/10968098-all.html. [Zugriff am 09 03 2019].

[37] Radio Free Europe, „Lukashenka Cancels 'Parasite Tax' Unemployed in Belarus," Radio Free Europe, 26 01 2018. [Online]. Available: https://www.rferl.org/a/belarus-lukashenka-cancels-parasite-tax/28999724.html. [Zugriff am 02 05 2019].

[38] F. Diekmann, F. Kalinowski und C. Kurt, „Armes Deutschland, reiches Deutschland," spiegel.de, 21 03 2016. [Online]. Available: https://www.spiegel.de/wirtschaft/soziales/ungleichheit-wo-deutschland-stark-und-schwach-ist-in-10-karten-a-1083053.html. [Zugriff am 06 05 2019].

[39] iDoméstica, „Salário Mínimo de Empregada Doméstica em 2019," idomestica.com, [Online]. Available: https://www.idomestica.com/tabelas/salario-empregada-domestica . [Zugriff am 02 05 2019].

[40] Bom Dia Brasil, „Brasil tem oito mil escolas sem energia elétrica e até sem água," globo.com, 30 04 2014. [Online]. Available: http://g1.globo.com/bom-dia-brasil/noticia/2014/04/brasil-tem-oito-mil-escolas-sem-energia-eletrica-e-ate-sem-agua.html. [Zugriff am 02 05 2019].

[41] A. Herzog-Stein, M. Lübker, T. Pusch, S. T. und A. Watt, „Der Mindestlohn: Bisherige Auswirkungen und zukünftige Anpassungen," Hans-Böckler-Stiftung, Düsseldorf, 2018.

[42] A. Endres, „Interview with Stefan Sell: "Es gäbe gute Gründe für eine Erhöhung"," handelsblatt.com, 26 04 2018. [Online]. Available: https://www.zeit.de/wirtschaft/2018-04/mindestlohn-erhoehung-hans-boeckler-stiftung-arbeitsmarkt-stefan-sell/komplettansicht. [Zugriff am 02 05 2019].

[43] Lexikon der Nachhaltigkeit, „Bruttonationalglück in Bhutan," nachhaltigkeit.info, 12 11 2015. [Online]. Available: https://www.nachhaltigkeit.info/artikel/bruttoinlandsglueck_in_buthan_1869.htm. [Zugriff am 02 05 2019].

[44] D. R. Hoftstadter, Gödel Escher Bach, New York: Basic Books, 1979.

[45] Quora, „Why do computers never resign in chess when they are going to lose for sure?" Quora.com, [Online]. Available: https://www.quora.com/Why-do-computers-never-resign-in-chess-when-they-are-going-to-lose-for-sure. [Zugriff am 02 05 2019].

DEVELOPMENT OF MODERN EDUCATIONAL APPROACHES WITH A VIEW TO INCLUSION OF THE EDUCATION AREA IN SERBIA IN THE EUROPEAN HIGHER EDUCATION AREA

Milan Počuča[1]
Jelena Matijašević-Obradović[2]

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Abstract: *Intensive development of Information-Communication Technologies (ICT) provides a favourable technical and technological basis for modern approaches in education. In the European and generally worldwide education area, two quite represented modern approaches to education are Open Educational Resources (OER) and Distant Learning System (DLS). The scope of this work is the notional establishment and survey of the importance of implementation of both concepts in the area of education, as well as analysis of the implementation of DLS in the higher education in Serbia as an important step to inclusion of the educational area of Serbia in the European Higher Education Area (EHEA). The conclusion which is derived on the basis of the analysis of available data of Commission for Accreditation and Testing of Quality (CATQ) is that DLS study programmes are not represented to a larger extent in the system of higher education of Serbia.*

Keywords: *higher education, OER, DLS, EHEA.*

1. INTRODUCTION

The modern system of education has been facing numerous challenges since the 90s of the 20th century, to the present day. The opportunity for changes in the manner of presenting the teaching content has been created through the expansive development, implementation and wide availability of ICT. Over the past few years the education system has actively included information technology support in the teaching process. Under such circumstances significant changes in the European higher education system inevitably took place. At present, however, one of the goals of united Europe is certainly the creation of a European society of knowledge that is based on two pillars – the European Research Area – ERA, and the European Higher Education Area – EHEA.

In the European and generally worldwide education area, two highly represented modern approaches to education are the concept of Open Educational Resources (OER) and the concept of the Distance learning System (DLS). In its basic interpretation the OER concept encompasses every educational resource that is publicly available for use by teachers and students with no-cost access. The DLS is a concept that, in a broader sense, can be subsumed under the OER concept because it is a form of learning that is based on the implementation of ICT, especially the Internet, as a global computer network, thus also implying, among other things, physical distance between students and teachers, an organisation that provides the teaching content in electronic form and its delivery in electronic form, and (mostly) an interactive realisation of classes by means of information technology.

[1] Faculty of Law for Commerce and Judiciary, University Business Academy, Geri Karolja 1, Novi Sad, Serbia
[2] Faculty of Law for Commerce and Judiciary, University Business Academy, Geri Karolja 1, Novi Sad, Serbia

The aim of this paper is to conceptually determine and understand the importance of applying both concepts in the field of education, to consider the possibilities for application and the very application of modern approaches in education in Serbia as an important step in including Serbia's education area in the European Higher Education Area.

2. THE CONCEPT AND IMPORTANCE OF OER AND DLS

As the name of the concept indicates, OER implies openness and accessibility of educational resources. As Mossley [1] states, the key idea of OER is openness in creating, sharing and reusing teaching materials, with as little cost as possible for accessing these materials that the student or end user would have to pay.

OER has emerged as a concept with great potential to support educational transformation. While its educational value lies in the idea of using resources, that is, in supporting learning based on a large number of available resources, its power in the field of transformative education lies in the ease with which such resources, when digitized, can be shared via the Internet. [2]. Larsen and Vincent-Lancrin [3] join the authors who stress the advantages of the OER concept over any other educational concept. According to them, the main argument in favour of the OER concept is that OER can be described as an innovative practice that provides a good example of the use of current opportunities and challenges offered by ICTs in order to trigger radical innovations in pedagogical work. Digitalization and its current potential, the financially affordable possibility of global communication, have opened tremendous new opportunities for the use, dissemination and exchange of learning material.

The benefits of the OER concept can also be understood by looking at the impact on the users in an OER network. For authors, publications with open and allowed access, i.e. those accessible to everyone, have the widest possible audience, or circle of users. Studies show that their articles are cited more frequently. For readers, on the other hand, open access grants access to an entire body of literature, not requiring permission or compensation. Finally, for publishers, open access to publications guarantees the widest dissemination, i.e., use by users, of their published articles and books [4].

The OER concept has largely alleviated and overcome the significant limitations of the traditional approach in the field of education, especially in the field of higher education. The possibilities that OER has introduced into the education system have radically changed the attitude of not only the students, but also of the teaching staff and staff at colleges and universities, towards the educational process, interaction and communication in the higher education system. According to Butcher: "the OER's transformative educational potential revolves around three interconnected perspectives: 1. Increase in the accessibility of relevant high-quality learning resources can contribute to a higher productivity of students and teachers alike; 2. The principle of allowing material adaptations has provided one of many mechanisms of giving the students the role of active participants in educational processes; 3. OER provides institutions and teachers with free or reasonably priced access to the necessary resources, in order to improve their skills in creating teaching materials, and integrating such materials in learning programmes" [2].

In analysing the application of the DLS concept in the higher-education area in Serbia, Milunović and Ćurčić quote that DLS is "a completely new form of education, in which information technologies act as an intermediary in the contacts of teachers and users who are not at the same place at a previously defined period of time" [5], while Tepšić and associates point out that "contemporary information-communication technologies (the Internet, computer networks, digitalization, etc.) have turned distance learning into a primary concept in acquiring open knowledge. Distance learning

may be a supplement to traditional education, or a replacement for traditional education" [6]. When speaking of the traditional models of teaching and learning, and of the model which has only in recent years been gaining ground in our country – the DLS model, we cannot ignore several important factors which largely influence the acceptance of a certain approach. Namely, what strongly affects the way a society reacts to innovations not only in the field of education, but other areas of life and work as well, is the value system promoted in that society, and the cultural and motivational aspects. No less significant is the social aspect. This means that the preference for a particular approach in the education system is not only dependent on the comparison of the good and bad sides of the approach, but also on our society's capacities and willingness to understand, comprehend and objectively assess the advantages of a certain model of teaching and learning, and apply it in accordance with that assessment [7]. DLS undoubtedly has numerous advantages compared to the traditional approach in teaching and education, as quoted by Stanić and Gavrilović [8]: temporal and spatial flexibility, student – teacher interaction taking place online (email, forums) is often more direct and intense than communication during lectures; using interactive learning resources.

Besides the advantages mentioned above, in favour of the DLS concept we may also quote the possibility of attending prestigious courses of study in high-quality educational institutions, held by acclaimed experts, without changing one's place of residence, then the acquisition of additional skills and knowledge on the use of modern information technology, building independence in seeking information sources, etc. All the aforesaid advantages are of great help to students, and represent a strong motivation for learning and improvement, in particular with regard to the financial aspect, as the practice demonstrates that the DLS approach is more easily accessible than any one of its traditional equivalents.

3. THE INITIATIVES OF OER AND DLS DEVELOPMENT IN EUROPE AND WORLDWIDE

Based on investigating OER application in higher education in European Union universities, we can conclude that there are numerous initiatives in the field of higher education which are focused on promoting publicly accessible education for learning and teaching. The table that follows lists the most important initiatives of OER development in the field of higher education in Europe, as well as the initiatives existing in the region and in Serbia.

A lot of effort has been invested in the development of DLS in Europe and on the global level. A large number of world-famous higher-education institutions incorporate this form of education in their programmes of studies. According to the data of The United States Distance Learning Association (USDLA) for 2003, "some of the most important institutions that apply it in their work in the USA are: National Technological University, Western Governors University, University of Phoenix, California Distance Learning Program, Columbia Network for Engineering Education; in Europe: The International Council for Open and Distance Education – Oslo, United Kingdom Open University, Virtual University Enterprises, University for Industry, etc." [10].

The same author also states that significant distance learning development initiatives in Europe have been realized through the European Distance Education Network - EDEN and the European Association of Distance Education Teaching Universities, while the European Commission in its documents (E-learning Action Plan 2004–2006) strongly supports the development of distance learning, i.e. e-education in all the EU member states. The EDEN members from Serbia are: The E-Learning Network, the Link Group (which is the incorporator of the Belgrade Academy of Computer Sciences), and the Faculty of Economics of Subotica [10].

Table 1. Initiatives of OER development in the field of higher education in Europe, the region and Serbia [9]

Europe	Region	Serbia
Open Education Europa – part of the European consortium on publicly available educational programmes	Be an Engineer – Faculty of Architecture and Civil Engineering of the University of Banja Luka	Knowledge is All - "Svetozar Marković" University Library in Belgrade
Miriada X - Spain	-	DLS - LINKgroup Company, Belgrade
iMOOC - Portugal	-	-
FutureLearn as a branch of Open University and JORUM – Great Britain	-	-
Alison and IREL-Open – Ireland	-	-
FUN (fr. France Université Numérique) - France	-	-
Eliademy – Finland	-	-

4. THE STRATEGIC FRAMEWORK FOR THE APPLICATION OF MODERN APPROACHES IN EDUCATION IN SERBIA

The starting point for the application of the OER and DLS concepts in Serbia is the Strategy for Education Development in Serbia to 2020 [11], which is based on the openness of education.

The mission of Serbia's education system in the 21st century is to ensure the basic foundation of life and development of each individual, the society, and the country as a whole, which is based in knowledge [11].

According to Ćamilović, "as one of the measures, the Strategy provides support to a greater use of e-learning methodology and technologies as an addition to traditional learning, through the development of courses of study which are provided in parallel (both in the classic form, and as distance studies), and courses of study which are only realised as distance studies, provided that the quality standards for distance studies should be harmonised with global and EU practices. The importance of distance learning courses and e-learning programmes has been recognised in adult education, as well as the potential for using distance learning resources to ensure accessibility of education to persons with developmental disabilities" [12].

5. ANALYSING THE APPLICATION OF THE DLS CONCEPT IN COLLEGES, FACULTIES AND UNIVERSITIES IN SERBIA

Following the theoretical introduction and consideration of the importance of OER, and DLS in particular as the most widespread OER initiative, and following the analysis of the most significant developmental initiatives associated with these modern approaches in Europe and globally, as well as the strategic framework, and the possibilities of applying the modern approaches to education in Serbia, we should briefly analyse the current situation in Serbia with regard to the actual presence of the DLS concept in the higher education system. In other words, the question is to what extent is the concept of distance studies being applied in teaching in the courses of study of colleges, faculties and universities.

More specifically, we should analyse the following aspects: 1) the relative presence of distance study courses between colleges (of academic and applied studies), faculties and universities (having specifically in mind the studies organised and carried out in universities) 2) the relative presence of distance study courses between the universities and faculties founded by the Republic of Serbia, and the universities and faculties not founded by the Republic; 3) the presence of courses of distance studies in relation to the total number of the study courses realised in all the faculties and universities in Serbia.

The analyses presented in the following tables have been conducted based on the official data of the Commission for Accreditation and Quality Assurance, and they have included all the current courses of study, both those which have not yet entered the reaccreditation process, and those which have completed the process with success. The analyses have not included the study courses which were accredited in the first (initial) accreditation cycle, and which gained a new Accreditation Certificate in the reaccreditation cycle. The data on which the analyses are based were updated by the Commission to 31 March 2017. The methodological framework of the paper primarily includes the analytic method, the deductive method, and a basic quantitative analysis of data.

Table 2. The presence of DLS study courses in universities in Serbia [13]

	Universities in Serbia – university studies		***Total:***
	Universities founded by the Republic	Universities not founded by the Republic	
DLS – Academic Bachelor studies	/	8	8
DLS – Academic Master studies	/	3	3
DLS	/	11	11

Table 3. The presence of DLS study courses in faculties in Serbia [13]

	Faculties in Serbia		***Total:***
	Faculties founded by the Republic	Faculties not founded by the Republic	
DLS – Specialist academic studies	1	/	1
DLS – Academic Bachelor studies	1	18	19
DLS – Academic Master studies	2	7	9
DLS – Applied Bachelor studies	1	/	1
DLS	5	25	30

Table 4. The presence of DLS study courses in colleges in Serbia [13]

	Colleges in Serbia		***Total:***
	Colleges of academic studies	Colleges of applied studies	
DLS – Academic Bachelor studies	/	/	/
DLS – Academic Master studies	/	/	/
DLS – Applied Bachelor studies	/	11	11
DLS – Applied Specialist studies	/	1	1
DLS	/	12	12

Taking a closer look at the presented data, we become aware of several things. First, no college of academic studies has accredited a DLS course of study, whereas 12 distance study courses have been accredited by colleges for applied studies, 11 of which are in applied bachelor studies, and 1 course of study in specialist applied studies. The ratio of the number of accredited courses of study for distance studies between colleges on one side, and faculties and distance studies organised in universities, on the other side, approximates 1:3.5.

Second, it is noticeable that the number of accredited courses of study for distance studies in the faculties and universities not founded by the Republic is seven times higher than the number of courses of study for distance studies in the faculties and universities founded by the Republic. To be exact, the ratio of the number of accredited distance study courses between the faculties and universities founded by the Republic and those not founded by the Republic is 1:7.2.

Third, the universities founded by the Republic, which organise and carry out studies at the university, have in fact no DLS course of study available to potential students. As opposed to them, the universities not founded by the Republic have 11 accredited DLS courses of study, 8 of which in academic bachelor studies, and 3 DLS courses in academic master studies.

Fourth, the faculties founded by the Republic have 5 accredited DLS courses of study, i.e. 1 study course in specialist academic studies, 1 in academic bachelor studies, 2 study courses in academic master studies, and 1 course of study in applied bachelor studies. The faculties not founded by the Republic have 25 accredited DLS courses of study, 18 of which in academic bachelor studies, and 7 courses of study in academic master studies. This data and the information provided above indicate that the universities and faculties not founded by the Republic of Serbia are much more willing to adopt new educational approaches, without being "a slave" to decades-old, traditional (classical) approaches to teaching.

Fifth, if we compare the total number of accredited DLS courses of study in all the faculties, universities and colleges of Serbia (53 DLS courses of study in total) with the number of all the universities (18), faculties (around 140) and colleges (around 80) and the courses of study accompanying the concept of traditional (classical) approach to education (over 1,770), we can see that a very small number of faculties / universities / colleges have decided in favour of the introduction of the DLS concept in certain courses of study, with the institutions for the most part opting for accrediting one or two courses of study per institution.

6. CONCLUSION

The intensive development of electronics, computers, telecommunications, and other ICT components provides a fitting technical and technological foundation to modern approaches in education, which contribute to the improvement of teaching, student motivation, raising the quality of learning, etc. The OER concept functions very successfully in a large number of countries, in particular the most highly developed countries on the global level. In line with that, a large quantity of educational resources within OER, which are promoted for purely educational, non-commercial purposes, have in recent years been accessible worldwide, while the Open Educational Resources are growing in capacity on a weekly and monthly basis.

What can undeniably be classified as a significant advantage of distance learning is the fact that students lose nothing in terms of the quality of teaching and the scope of knowledge they acquire through distance learning, while on the other hand they are given an opportunity to study at their own pace, at the time that best suits them, from home, which makes it easier for them to fit their studies alongside other responsibilities of everyday life. A properly established DLS system (in terms of technology, human resources, organisation, etc.), adequate teaching materials, and the correct approach of teachers in communicating relating to distance learning, may greatly contribute to the achievement of several crucial objectives of long-term development of education in the context of the Strategy for Education Development.

In Serbia, the application of OER is at the very beginning. There is a very small number of initiatives which would expand and intensify the application of this modern approach. Only in the years that follow can we expect any significant steps forward in the number and types of initiatives which would contribute to a further development and strengthening of OER. As is evident from CATQ's analysis of available data, DLS courses of study are not overly represented in the higher education system of Serbia. In other words, a rather small number of higher education institutions have decided to accredit any DLS courses of study, primarily in bachelor or master academic studies. The presented data lead to the conclusion that a much higher representation of modern educational approaches is required in Serbia, in particular in the higher education segment. A faster development and improvement of DLS is certainly highly demanding work, first of all an organisational challenge, owing to which many faculties and universities are compelled to change the traditional educational approach, which was practically inconceivable a few years ago.

With regard to the aforesaid, further research is required with a view to defining the ways of change of the current situation in terms of the application of modern approaches in education, primarily OER and DLS in higher education institutions in Serbia, which is certainly an essential and very significant step in harmonising the educational area of Serbia with the EU's higher education area.

REFERENCES

[1] Mossley, D. (2013) *Open Educational Resources and Open Education*. United Kingdom, Heslington: The Higher Education Academy (HEA), p. 11.
[2] Butcher, N. (2015) *A Basic Guide to Open Educational Resources (OER)*. France: United Nations Educational, Scientific and Cultural Organization (UNESCO) and Canada: Commonwealth of Learning, p. 5-13.
[3] Larsen, K., Vincent-Lancrin, S. (2006) The impact of ICT on tertiary education: advances and promises. In B. Kahin & D. Foray (Eds.), *Advancing Knowledge and the Knowledge Economy*, Washington, Cambridge, Massachusetts: MIT Press, 151-168, pp. 164-165.
[4] Downes, S. (2006) *Models for Sustainable Open Educational Resources*. Canada: National Research Council, p. 2.
[5] Milunović, S., Ćurčić, S. (2012) Metodika obrazovanja iz oblasti tehnike zasnovana na primeni učenja na daljinu [=The Methods of Education in the Field of Engineering Based on Distance Learning]. In D. Golubović (Ur.), *IV Internacionalna konferencija - Tehnika i informatika u obrazovanju*, Čačak: Tehnički fakultet Čačak Univerziteta u Kragujevcu, 512-518, p. 513.
[6] Tepšić, M., Borovnica, T., Bakić, S. (2015) Sistemi za elektronsko testiranje znanja studenata [= The Systems of Electronic Student Knowledge Testing]. *Primus global – ekonomija, informatika, pravo*, 1 (1), 1-10, p. 2.
[7] Matijašević-Obradović, J., Joksić, I. (2014). Zastupljenost koncepta učenja na daljinu u sistemu visokog obrazovanja u Srbiji [= The Representation of the Distance Learning Concept in the Higher Education System in Serbia], *Nastava i vaspitanje*, 63 (1), 145-158, p. 149.
[8] Stanić, N., Gavrilović, J. (2011). Komparativna analiza sistema učenja na daljinu [= A Comparative Analysis of the Distance Learning System]. In *VIII Naučni skup sa međunarodnim učešćem Sinergija*, Bijeljina: Univerzitet Sinergija, 139-143, pp. 140-141.
[9] Izveštaj sa Tempus projekta BAEKTEL - Spajanje akademskog i preduzetničkog znanja kroz tehnološki potpomognuto učenje. (2014). DEV 1.1 Analiza postojeće evropske prakse i principa u razvoju otvorenih obrazovnih resursa (OER) [= Report from the BAEKTEL

Tempus Project – The Merging of Academic and Entrepreneur Knowledge Through Technologically Aided Learning]. Project No.: 544482-TEMPUS-1-2013-1-IT-TEMPUS-JPHES, pp. 12-20.

[10] Pokorni, S. (2009). Obrazovanje na daljinu [= Distance Learning]. *Vojnotehnički glasnik*, br. 2, 138-146, p. 138.

[11] *Strategija razvoja obrazovanja u Srbiji do 2020. godine* (2012) [= *The Strategy for Education Development in Serbia to 2020* (2012)]. Službeni glasnik Republike Srbije, broj 107/2012.

[12] Ćamilović, D. (2013). Visokoškolsko obrazovanje na daljinu [= Higher Education at a Distance], *Tranzicija*, 15 (31), 29-39, p. 36.

[13] Komisija za akreditaciju i proveru kvaliteta (2017) [= Commission for Accreditation and Quality Assurance]. *Vodič kroz akreditovane visokoškolske ustanove i studijske programe u Republici Srbiji*, p. 5-60, available at: https://drive.google.com/file/d/0Bwr8qEMuakSJS0E3SnNRdDFVdUE/view (27.04.2017.)

SUSTAINABLE MARKETING IN FASHION INDUSTRY – GREEN IS THE NEW BLACK

Saša Virijević Jovanović[1]
Dragan Doljanica[2]

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Abstract: *The undeniable economic importance of the fashion industry has opened many research questions that have become the subject of relevant scientific institutions worldwide. Starting from the fact that the fashion industry is one of the few that has made constant growth in the past decade, it is challenging to continue its growth in the future, but on a sustainable basis. The paper analyzes the concept of modern fashion from the aspect of economy and its effects on the environment. With the current pace of production and consumption of fashion products, the industry faces the threat caused by the neglect of the environment and excessive use of resources. It is calculated that more than $500 billion of value is lost every year due to clothing underutilization and the lack of recycling. This situation is unfavorable not only for society and the environment, but also for fashion companies taking into account the cost of resources, which will jeopardize the profitability. The core priorities for immediate implementation in fashion industry are supply chain traceability, combating climate change, efficient use of resources and secure work environments. Therefore, this research tends to emphasize the main obstacles that fashion industry will face toward its sustainable development in future as well as to explore the possible solutions.*

Keywords: *sustainable development, fashion industry, fast fashion, sustainable fashion, Pulse Score of the fashion industry.*

1. INTRODUCTION

If we look at the history of fashion, we can conclude that fashion styles have been the most obvious indicator of intercultural exchange for centuries. The emergence of fashion product created the need for marketing in this industry whose task is to adapt the product to national market features, providing at the same time something new, different, creative, special and unique.
The processes of deregulation and trade liberalization, the emergence of economic integrations, such as the EU, the development of technology have affected the trends in the fashion market, which has become a major global business. However, in addition to the visible economic achievements, the strong development of the fashion industry has also brought concerns related to its negative effects on the environment. Measuring the influence of the fashion industry has provided the data that confirm the importance of sustainable development in this area.

The following data illustrate only one part of the environmental concerns that refer to fashion business:

- The total greenhouse gas emissions from textile production amount to 1.2 billion tons annually. [1]
- The fashion industry is projected to use 35% more land for fibre production by 2030—an extra 115 million hectares that could be left for biodiversity or used to grow crops to feed an expanding population.[2]

[1] Faculty of Applied Management, Economics and Finance, Jevrejska 24, Belgrade, Serbia
[2] Faculty of Applied Management, Economics and Finance, Jevrejska 24, Belgrade, Serbia

- The apparel and footwear industries generated between 5 and 10% of global pollution impacts in 2016.[3]
- Water used by the fashion industry today amounts 79 billion cubic meters.
- Only 20% of clothing is recycled, most of which turn into low-quality clothes due to the use of inadequate technology.[4]

2. FASHION – THE BUSINESS, CULTURAL AND ENVIRONMENTAL PHENOMENON

The term fashion represents popular styles in various spheres of human activity, in every period of history. Merriam Webster Dictionary defines the term as a popular way of dressing during a certain time and within a particular group of people. [5] Fashion can also be regarded as an extraordinary art, in which designers are artists who create. The modern term „fashion" means to construct, shape or make. Therefore, design and creation are important components of fashion. [6] The designer's essence is crucial and it can be seen in all fashion products.

The development of fashion through history has been documented in various fields such as: architecture, art, cosmetics, music, economics, management, politics, sociology, technology, media, service industry, philosophy, religion, sports, etc. Therefore, when studying fashion, one should bear in mind that it is an interdisciplinary field that connects the economic, cultural, creative, religious and artistic context. Fashion as a way of dressing represents a cultural phenomenon, and it is shaped depending on social, moral and religious norms. Accordingly, the awareness of the fashion brand has a different meaning in different cultures and countries.

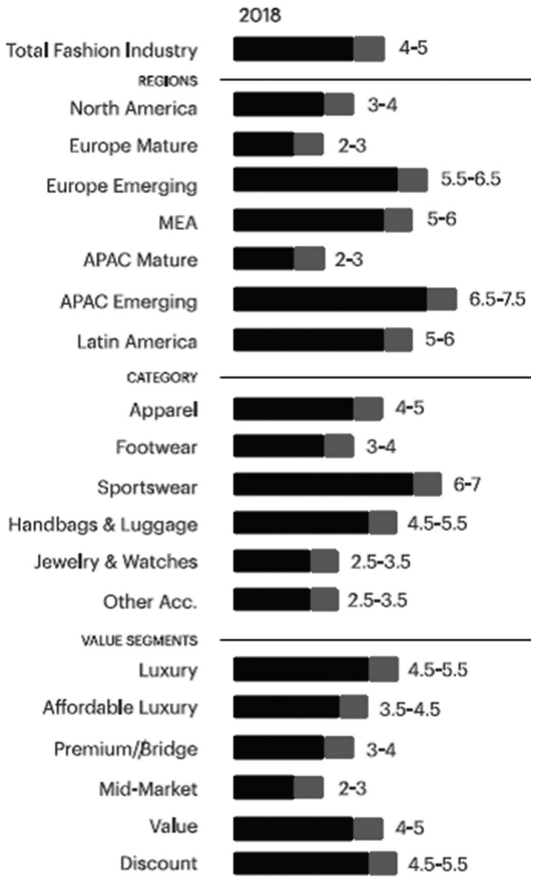

Figure 1: Fashion industry sales growth by region, category, and segment, 2018 % [9]

In recent decades, the fashion industry has grown into a prosperous business, causing to become a topic for researchers dealing with its impact on the economic flows in the world. According to consultants McKinsey the global apparel, fashion and luxury industry has achieved growth in the market during the last 15 years, outstripping even high-growth sectors like technology and telecommunications. [7] Figure 1 demonstrates fashion industry sales growth by region, category and segment during 2018. The highest sales growth (6,5 - 7,5) is recorded in Asia-Pacific emerging countries, with an expectation to continue its performance in 2019. [8] The analysis of value segment performance in fashion industry showed that sportswear category had the highest sales growth in 2018, followed by the sector of handbags and luggage.

The global fashion market is characterized by strong competition among a large number of companies. The fashion business brings to successful „players" a lot of money, but at the same time the industry is known for its often changes as well as the high risk for new entities that appear on the market. Another consequence of the fashion globalization is the geographical distribution of textiles, clothing and footwear, which has changed significantly over the past 30 years. In addition, the globalization has led to the relocation of production from Europe and North America to Asia and developing countries. However, 2018 was marked by trade policies and barriers, which also reflected on the global fashion market. These tendencies are particularly pronounced in US, where the fashion industry accounts for 6 percent of imports but pays 51 percent of tariff receipts.[10]

Besides the economic and cultural context of fashion, scientific attention in recent years has been focused on the issues of sustainable development. There are many topics that are raised in relation to the sustainable development of the fashion industry, but the most important are the following:[11]

- The development of standards and practices for designing fashion products that can be easily reused or recycled;
- Investing in the development of new fibres, which will reduce the negative effects on the environment;
- Managing innovations that will contribute to reducing CO2 emissions;
- Encouraging consumers to be ecologically conscientious;
- Support the development of recycling technologies;
- Setting high environmental standards and mechanisms for better control along the supply chain.

When it comes to sustainable development of fashion, the first association is overproduction and the problem of recycling. It is estimated that 400 billion square meters of textiles are produced each year globally and 60 billion square meters end up as cutting floor waste. With the current production and consumption of fashion products, the industry faces the threat caused by the neglect of the environment and excessive use of resources. However, if the fashion industry successfully solves environmental and social issues, it is estimated that by 2030 the world economy would achieve 160 billion euros. [12]

The issues of excessive production of fashion products are most often associated with the concept of fast fashion that is applied by profitable companies like Inditex and H&M. However, it is evident that manufacturers of luxury fashion products, such as Burberry for example, are also facing this problem. During 2017 the public was shocked by the famous British label which decided to destroy unsold clothes, accessories and perfume worth £ 28.6m in order to protect its brand. [13]

3. THE FAST FASHION – GROWTH ON SUSTAINABLE BASIS

'Fast fashion' is a term used to describe a fashion business model that involves increased numbers of new fashion collections every year, quick turnarounds and often lower prices. [14] Fast or instant fashion began its development during the 1970s. The essence of business philosophy that fast fashion companies implement is that they are constantly monitoring the latest trends from the catwalks in order to quickly turn them into final products and deliver them to customers at affordable prices.

A company that is associated with the initiation of this phenomenon in the fashion market is Inditex, the most successful fashion company in the world with economic profit about 4bn dollars in 2017. [15] Inditex's most recognizable brand is Zara, which needs only two weeks to develop a new product and places it in the stores. If we explore the business concept of the company, we can conclude that Zara is a vertically integrated retailer. This means that it has better control along the supply chain, since the company itself designs, produces and distributes independently. Another important feature of fast fashion model is that Zara is a fashion imitator and focuses its attention on understanding consumer behaviour and current tendencies in the market.

However, although the philosophy of fast fashion companies is a good case study which shows how to increase the profitability, at the same time it is seen as a business model that encourages over-consumption and generates excessive waste. The fashion designer Phoebe English has accused the business model of 'fast fashion' for making the sector a "monstrous disposable industry". [16]

The development of fast fashion on a sustainable basis may at first glance seems like a contradiction, but it is still possible. The solution lies in a circular economy which would ensure that clothes are made from safe and renewable materials, resulting in turning old clothes into new. [17] The idea of circular fashion was launched by the Ellen MacArthur Foundation in 2016, and presented at the World Economic Forum in Davos. In May 2017, Make Fashion Circular was originally launched as the Circular Fibres Initiative, at the Copenhagen Fashion Summit. Today, under the auspices of this initiative, the leaders of the fashion industry (Burberry, Gap Inc., H&M Group, HSBC, NIKE Inc., and Stella McCartney as Core Partners) are gathered, in order to define new sustainable rules for doing business as well as the new paradigm of a fashion industry. The main strains of circular fashion are: [18]

- The safe and healthy material input which will allow cycling and avoiding negative impacts during the production, use, and after-use phases;
- Increase utilization of purchased fashion products;
- Radically improve recycling;
- Make effective use of resources and move to renewable inputs.

4. THE FASHION SUSTAINABILITY PERFORMANCE

Raising awareness of the negative effects of the fashion industry has created the need to closely monitor the performance of its companies and products.

4.1. The pulse score of the fashion industry

The Pulse Score was developed in order to measure and track the sustainability of the global fashion industry on key environmental and social impact areas. The Score is based on the Higg Index which is developed by the Sustainable Apparel Coalition. It represents a set of tools that measure and score a company or product's sustainability performance. [19] The Index has three

modules: brand, facilities and product. [20] The brand module measures the degree of transparency, environmental/social impact tracking as well as fashion brands' collaboration with facilities. The facilities module deals with environmental and social measures applied by fashion-industry suppliers. The product module refers to design processes in order to find the best solution regarding design and material choices in coordination with sustainability.

The Pulse Score of the fashion industry represents measures on a scale from 1 to 100, where scores below 20 are defined as weak, and scores higher than 70 are strong. In the past few years, the fashion industry's Pulse Score improved from 32 to 42 (Figure 2), which is significant improvement. The overall Pulse Score gap from 42 to 100 indicates the size of the industry's opportunity to create new value for society and individual businesses. [21]

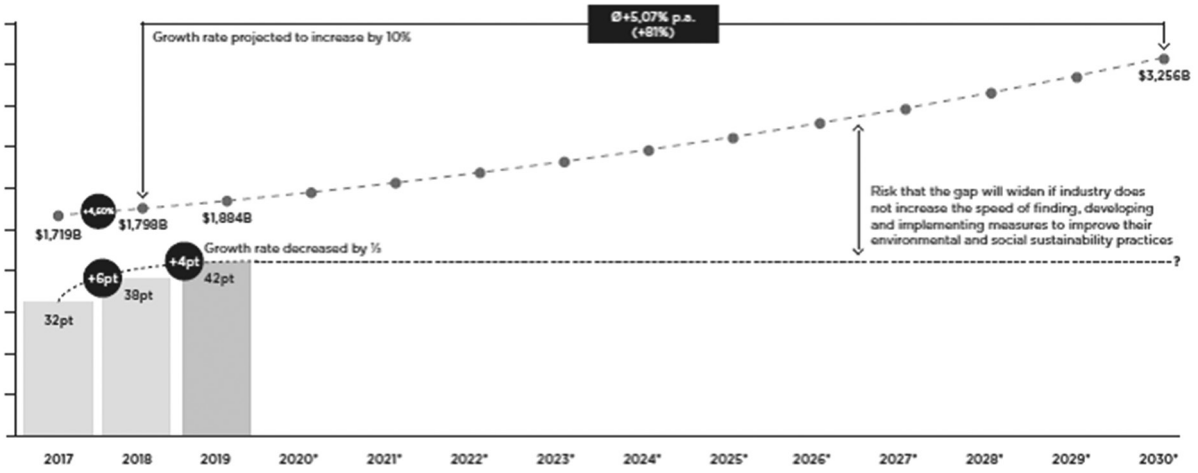

Figure 2: The 2019 Pulse Score growth rate from 2017 [22]

4.2. Sustainability targets in fashion industry

According to Global Fashion Agenda fashion brand CEOs have important influence on sustainable development in the industry due to the fact that their decisions affect the entire value chain. Therefore, the CEO Agenda 2019 emphasizes two sections of actions towards the sustainability: four core priorities for immediate implementation, and four transformational priorities for fundamental change in the longer term. The core priorities for immediate implementation are the following: [23]

1. *Supply chain traceability*, which is in direct correlation with the implementation of circular business model. This process begins with the raw material extraction, continues with the material processing, manufacturing, product packaging, transporting and disposal. According to the Agenda, 12.5 percent of the global fashion market, including big brands like Nike, Adidas, Levi's and Gap, have signed up to 2020 sustainability targets, which include publishing lists of all the suppliers producing for them.
2. *Combating climate change*. It is necessary to monitor and measure the fashion impact on climate change during the entire value chain. According to Quantis (2018) the Dyeing and Finishing, Yarn Preparation and Fiber Production life cycle stages appear to be the 3 main drivers of the industry's global pollution impacts. It is also interesting to look at the findings of the Carbon footprint of clothing in the UK which demonstrate that extraction and washing are the processes of the biggest concerns (Figure 3).
3. *Efficient use of water, energy and chemicals*. The fashion industry is known for its negative impact as a dominant user of water and energy. Cotton is one of the thirstiest fibers

in fashion. [25] One kilogram of cotton used in production of a shirt and pair of jeans - can take as much as 10,000–20,000 litres of water to produce. [26] Another important problem is the utilization of chemicals like fertilizers, pesticides and dyes. The use of fertilizers is particularly evident in the cotton production as well, which uses nitric and phosphoric fertilizers whose overuse leave its trace in water.

4. *Secure work environments*. A particular challenge for the sustainable development of the fashion industry are issues related to working conditions, labour exploitation, employees' rights, gender discrimination and child abuse. Regarding all of these questions the fashion industry is often accused to be supporter of modern slavery. The Global Slavery Index's 2018 report, published by the Walk Free Foundation, emphasizes that $127.7 billion worth of garments at risk of including modern slavery in their supply chain are imported annually by G20 countries, a group of nations which account for 80 percent of world trade. [27]

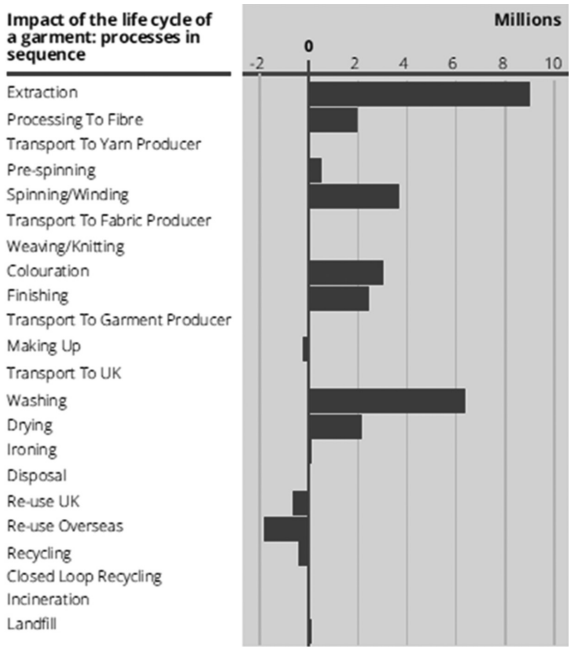

Figure 3: Carbon footprint of clothing in the UK (t CO2e) in 2016, by process [24]

The other section refers to transformational priorities for fundamental change which include:

1. Decreasing the negative effects of existing fibers and developing new innovative, more sustainable fibers.
2. Circular fashion system that will empower recycling and re-use of products as well as utilization of purchased fashion products.
3. Promotion of better wage systems.
4. Fourth industrial revolution based on digitization of processes along the value chain.

Realization of stated goals will help achieve the €160 billion annual opportunity for the world economy. [28] Therefore, nowadays we can find many examples of successful sustainable fashion. Some of them are the following:

- Adidas has made one million shoes from recycled ocean plastic. [29] Another revolutionary innovation, developed by this brand is the DryDye technology that allows dyeing without water use.
- Famous brand Stella McCartney was a pioneer who fought against the use of animal fur in the fashion industry. After many years of fighting, Stella McCartney traced the

path for fur-free fashion which is today accompanied by the well-known luxury brands, such as: Chanel, Jean Paul Gaultier, Burberry, Versace, John Galliano, Furla, DKNY, Michael Kors, Gucci, Giorgio Armani, Phillip Lim, Diane von Furstenberg, St. John and The Kooples. Stella McCartney has also made important steps towards the fashion revolution, by introducing sustainable materials such as leather made from mushrooms, bioengineered spider silk and others.

- The Italian fashion house Salvatore Ferragamo, which is recognizable for its luxury items, began producing lines of scarves and dresses with beautiful prints, using silk blends made largely from recycled fruit. This green innovation was created through cooperation with Orange Fiber, which deals with the recycling of orange peel. Orange Fiber was founded by two Italian entrepreneurs who recognized the potential for eco-innovation by finding that the juice industry in Italy produces 700,000 tons of orange peel every year, which ends at landfills. [30]
- Regarding the issues of supply chain traceability brand leaders such as Zara and Tesco have taken responsibility for the negative effects of their production processes. In order to achieve a better sustainability, they are testing the wastewater from the factories, looking for better solutions and building relationships with the workers in Asia and developing countries, where they have relocated their productions. [31]

5. SUSTAINABLE FASHION FROM THE CONSUMER POINT OF VIEW

Fashion globalization has opened many issues related to the cultural and social dimensions that shape the behaviour of contemporary consumer, who is becoming more aware of sustainability problems that occur in the industry. A research launched by Boston Consulting Group has showed that 75% of consumers in the five countries surveyed view sustainability as extremely or very important. The survey also pointed out that 38% of consumers are ready to switch from their preferred brand to another because it credibly stands for positive environmental. [32] This very fact shows the importance of the sustainable development in fashion, seen through the eyes of consumers, who are ready to break their long-standing loyalty to a brand that does not behave environmentally conscientious. Similar findings came from Nielsen survey which demonstrated that 81% of global respondents feel strongly that companies should help improve the environment. [33]

Thus, the issue of sustainable development went from the margins of the fashion industry to the mainstream. From the fashion consumer point of view "the green has become the new black". Sustainability is today one of the important criteria on the basis of which consumers make their purchasing decisions. According to Fashion Revolution, the survey of 5000 people aged 16-75 in the five largest European markets, including Germany, United Kingdom, France, Italy and Spain showed that when choosing a fashion brand to buy, consumers said it is important for brands to: [34]

- publish how products are sustainable on the packaging (72%),
- explain what products are made from on the packaging (77%),
- make it clear where they source materials, ingredients and components from and who manufactured the product (77%),
- share detailed information about wages and working conditions for people in its global supply chain (66%), and
- provide information about how they apply socially responsible practices (70%),
- provide information about how they apply environmentally responsible practices (74%).

CONCLUSION

The main challenge that fashion industry faces on its path towards the sustainable development is to find the balance between environment, society and economy. This is a very demanding task that should connect all the stakeholders: owners, managers, fashion designers, engineers, researchers, workers, institutions, as well as the consumers, who are also responsible for the utilization of fashion products.

Recent surveys taken by Boston Consulting Group and Nielsen showed that modern consumers see the sustainability as extremely or very important. Therefore, sustainable conscience of fashion brands has strong impact on the buying behaviour. Taking into account such consumer views and demands, fashion brands have begun a good practice of applying the concept of sustainability. In the past few years, the fashion industry's Pulse Score improved from 32 to 42, leaving the gap at 58 points as an indicator that it is still far from sustainable. According to Global Fashion Agenda there are four core priorities for immediate implementation that fashion brands should make: supply chain traceability, combating climate change, efficient use of resources and secure work environment. These priorities are related to the issues such as recycling and re-using of fashion products, the concept of circular fashion, value chain management, environmental protection as well as social justice and labour rights that are often in question when it comes to production in fashion.

REFERENCES

[1] Fashion Industry (2018) *UN Pursue Climate Action for Sustainable Development, INITIATIVE / 22 JAN, 2018,* https://unfccc.int/news/fashion-industry-un-pursue-climate-action-for--sustainable-development
[2] WRAP (2017) *Valuing Our Clothes: the cost of UK fashion*, file:///C :/Users/User/Documents/fashion/valuing-our-clothes-the-cost-of-uk-fashion_WRAP.pdf
[3] Quantis (2018) *Measuring Fashion: Insights from the Environmental Impact of the Global Apparel and Footwear Industries,* https://quantis-intl.com
[4] BCG (2017) *Puls of the Fashion Industry*, pp.11
[5] https://www.merriam-webster.com
[6] Easey M. (2009) *Fashion marketing,* John Wiley & Son, Oxford, pp. 5
[7] McKinsey & Company, (2015) *Creating value in fashion: How to make the dream come true*
[8] McKinsey and Company, Business of Fashion (2019) *The State of Fashion*, pp.97
[9] McKinsey Global Fashion Index (MGFI)
[10] McKinsey and Company, Business of Fashion (2019) *The State of fashion*, pp.31
[11] Remy N., Speelman E. and Swartz S. (2016) *Style that's sustainable: A new fast-fashion formula*, www.mckinsey.com
[12] BCG (2017) Puls of the Fashion Industry, pp.2
[13] Burberry burns bags, clothes and perfume worth millions, https://www.bbc.com/news/busines, 19 July 2018
[14] House of Commons Environmental Audit Committee (2019) *Fixing fashion: clothing consumption and sustainability, Sixteenth Report of Session 2017–19,* House of Commons, UK, pp.6
[15] McKinsey Global Fashion Index (MGFI)

[16] House of Commons Environmental Audit Committee (2019) *Fixing fashion: clothing consumption and sustainability, Sixteenth Report of Session 2017–19*, House of Commons, UK, pp.6
[17] Make Fashion Circular, https://www.ellenmacarthurfoundation.org/our-work/activities/make-fashion-circular
[18] Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, (2017, http://www.ellenmacarthurfoundation.org/publications), pp.23
[19] https://apparelcoalition.org/the-higg-index/
[20] Global Fashion Agenda & The Boston Consulting Group (2017) *Pulse of The Fashion Industry,* pp.28
[21] Seara J, Boger S, Hase C, Berlepsch V, and Deichmann S. (2018) Sustainability *Is Good Business for Fashion,* https://www.bcg.com/publications/2018/sustainability-good-business-fashion.aspx
[22] Lehmann M., Arici G., Boger S. and others (2019) *Pulse of the fashion industry 2019 update*, Global Fashion Agenda, Boston Consulting Group, and Sustainable Apparel Coalition pp.1
[23] Tärneberg S., Lehmann M., Eder- Hansen J., Kruse E. and Chalmer C. (2019) *CEO Agenda 2019*, Global Fashion Agenda
[24] WRAP, Valuing Our Clothes: the cost of UK fashion, July 2017, file:///C:/Users/User/Documents/fashion/valuing-our-clothes-the-cost-of-uk-fashion_WRAP.pdf pp.12
[25] House of Commons Environmental Audit Committee (2019) *Fixing fashion: clothing consumption and sustainability, Sixteenth Report of Session 2017–19*, House of Commons, UK, pp.29
[26] WRAP (2017) Valuing Our Clothes: the cost of UK fashion
[27] https://www.globalslaveryindex.org/
[28] *How Innovation and Collaboration Can Accelerate Sustainability in Fashion*, https://www.bcg.com/publications/2017/retail-how-innovation-collaboration-accelerate-sustainability-fashion.aspx
[29] Europe Consumer Trends 2019, http://reports.mintel.com
[30] http://orangefiber.it/en/
[31] *How to fashion a better world,* https://www.greenpeace.org, 12 July 2018,
[32] Lehmann M., Arici G., Boger S. and others (2019) *Pulse of the fashion industry 2019 update,* Global Fashion Agenda, Boston Consulting Group, and Sustainable Apparel Coalition, pp.11
[33] Global consumers seek companies that care about environmental issues, 11-09-2018, https://www.nielsen.com/ssa/en/insights/news/2018/global-consumers-seek-companies-that-care-about-environmental-issues.html
[34] Fashion revolution, Consumer survey report, November 2018, https://www.fashionrevolution.org/resources/consumer-survey/

FISCAL EQUALISATION IN CROATIA: FINE TUNING OF THE LORENZ CURVE

Vinko Miličević[1]
Zoran Bubaš[2]
Olivera Jurković Majić[3]

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Abstract: *Since 2018, Croatia has a new fiscal equalisation model that, besides simplifying the (horizontal) revenue sharing with a formula-based fiscal capacity equalising system, transparently distributes the overall personal income tax revenues to the local government units (LGUs). The LGU's fiscal capacity and equalisation share are based on per capita calculations that use 2011 census data. This paper argues that the new model's fairness is devalued because the serious demographic change Croatia has been facing over the last few years is not considered, and that distortion should be mitigated by using official population estimates.*

Keywords: *Local Government Units, fiscal capacity, equalisation model, depopulation, Croatia.*

1. INTRODUCTION

At the end of 2017, the Croatian Parliament passed a new law on financing local and regional self-government units [1]. The previous one, from 1993, was amended 16 times during the 1997-2016 period, illustrating conceptual wandering in the design of a socially and financially acceptable fiscal decentralisation and equalisation model. Although the new revenue equalisation based model represents a step towards a more straightforward, transparent, and predictable system of (re)allocation of the PIT [2], this paper argues that the equalisation scheme has a "fairness defect".

A brief description of the new framework is given in part two of the paper. By examining the challenges of the model, the central section points to the necessity of adjusting the formula based fiscal equalisation scheme. The final, fourth part, gives a short conclusion.

2. OUTLINE OF CROATIA'S CURRENT FISCAL EQUALISATION

The fact that Croatia today has 576 units of local and regional self-government makes designing an affordable, efficient/effective and fair model to reduce LGU's fiscal disparities a severe challenge [3]. As Jurlina Alibegović from the Institute of Economics in Zagreb states, "there are cities that cannot justify being called cities by neither their level of income nor the performance of the functions legally prescribed for them. The situation is similar in municipalities." [4] However, while public administration experts generally share the same opinion on too much territorial-administrative fragmentation [5]-[11], public finance analysts have to accept it as a predetermined, given fact. Pressured by the fiscal equalisation system's ineffectiveness [12]-[16], the Croatian Ministry of Finance (MoF) finally prepared the new model of LGU financing, whereby all income tax revenue (PIT) goes to the LGUs, and an equalisation model based on fiscal capacity is established.

[1] Office of the Mayor, City of Zagreb, Trg Stjepana Radića 1, Zagreb, Croatia
[2] Office of the Mayor, City of Zagreb, Trg Stjepana Radića 1, Zagreb, Croatia
[3] Zagreb School of Economics and Management, Jordanovac 110, Zagreb, Croatia

The PIT total revenues are shared among municipalities, cities and counties: 60% goes to municipalities and cities, 17% to counties, 6% for decentralised functions and 17% for fiscal equalisation. The 6% for decentralized functions were allocated to elementary education (1,9%) and secondary education (1,3%), social care (0,8%, social care centers 0,2%, and homes for elderly and infirm persons 0,6%), healthcare (1,0%) and firefighting (1,0%). LGUs that have assumed decentralised functions and do not obtain enough funds to cover minimum financial standards[4] are entitled to funds from the state budget, i.e. from the position of the ministry relevant to the decentralised function.

The aim of the 17% of the total PIT for fiscal equalisation is to level capacity disparities in revenue collection between LGUs of the same sub-national level. Redistribution of funds intended for fiscal equalisation is formula based, and based upon both capacity of LGU income tax revenues and difference to the reference value.

The "capacity of realised tax revenues" is calculated for each LGU, i.e. for each municipality, city and county. In municipalities and cities, the capacity of realised tax revenue is a five-year average of PIT revenues generated in the area of a particular LGU and surtax revenues that can be achieved with the highest legal surtax rate, per capita of the LGU in question.[5] The county's realised tax revenue capacity is calculated as a five-year average of PIT revenue generated on its territory multiplied by 17% of the legally established share of counties in the allocation of PIT income, per capita of the particular county.

The reference value of the capacity of realised tax revenues is determined for each of the three LGU groups, i.e. three reference values are defined: (1) cities, (2) municipalities and (3) counties. The reference value for cities is defined as a five-year average of PIT revenues generated in all cities and surtax revenues that can be achieved with the highest legally permitted surtax rate, per capita of all cities in total. The same principle applies to municipalities, with a distinction that the reference value thus obtained for municipalities is increased by 50%.[6] For the counties, a five-year average of PIT revenues earned from their prescribed (17%) share for counties is used, per capita for counties in total. The capacity of a particular LGU is compared to the reference value and, if it is smaller than the corresponding reference value of the realised tax revenue capacity, the LGU is entitled to fiscal equalisation funds. Also, if the capacity of an LGU is above the reference value, it is not eligible for fiscal equalisation funds. The difference in the capacity of the realised tax revenues and the reference value are the funds needed per capita in a particular LGU for its fiscal equalisation in full amount. When multiplied by the number of inhabitants of the LGU in question, it provides the total amount of funds required for fiscal equalisation up to full reference value.

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4 They are determined annually by a Government decision, for each decentralized function.

5 The law stipulates the highest surtax rate for municipalities up to 10%, for cities under 30.000 inhabitants up to 12% and those over 30.000 inhabitants up to 15% and 18% for the City of Zagreb. As some LGUs have opted for lower surtax rates than the maximum established by law, they are not maximizing their own effort to raise revenue. The fiscal capacity is therefore established by assuming that each LGU makes the same, i.e. maximum effort to raise revenue.

6 This is, as the legislator explains, applied to reduce the (too) massive difference between the reference values for cities and municipalities, or two groups at the same level of local government, taking into account the statutory obligations of the municipalities and cities and the public services they provide. Also, the City of Zagreb is excluded from the calculation of the reference values for cities and counties, with the explanation that, were it involved, due to the size of its fiscal capacity, it would distort the „real picture" of the average fiscal capacity value for cities and counties. [17]

To sum up, the total required fiscal equalisation means the sum of funds needed for fiscal equalisation in full amount for all units of local and regional self-government, while the share of each LGU in that total sum simultaneously represents their allocation share in funds that will actually be obtained from the 17% PIT intended for fiscal equalisation. Thus, how much will be allocated to a particular LGU via fiscal equalisation will depend on its share in the total amount of fiscal equalisation funds in full, and the total amount of PIT collected, i.e. the available funds collected from the PIT share for fiscal equalisation (17%).

3. THE FAIRNESS (EQUITY) PROBLEM

Fairness, admittedly, is a vague and subjective concept, but in any case, closely connected with equity, and equity is at the heart of (horizontal) fiscal equalisation. Thereby, the principle of fiscal equity does not stem from the territorial administrative organisation of the state, but from egalitarian reasoning in providing public service at a comparable standard to citizens [18]. In the complex problem of determining/measuring the inequality and the corresponding level of equalising transfers, the revenue equalisation model has shown itself to be an established policy [19]-[21]. It is transparent and straightforward, and, if well designed, predictable with redistributive effects that vary directly with fiscal needs and inversely with fiscal capacity [22]. Since the fairness of the redistribution depends on the equalisation formula, in practice, the equalisation model has to rely on robust variables and up-to-date data that genuinely reflect the existing state and enable its improvement.

The share of fiscal equalisation funds for a particular LGU in total fiscal equalisation funds, as well as the capacity of the realised tax revenue and the reference value, are determined for each fiscal year. In practice, the Croatian Minister of Finance, at the end of the current fiscal year, issues a Decision on the Amount of Fiscal Equalisation Funds for a particular municipality, city and county in the total amount of fiscal equalisation in the upcoming year. For example, for fiscal equalisation purposes in 2019, PIT revenue data for the period 2013-2017 are used, combined with the number of people in the LGUs' area, which is the key to redistribution between jurisdictions. Using the known data for the last five years, i.e. their (simple moving) average as a "fiscal strength indicator", has no methodological objection. However, there would be no such objection if decision-makers, for example, opted to use a three-year moving average, or, instead of the simple average, calculate a weighted average with more specific weight on recent data. In that case, also with a smoothed time series, the calculation of fiscal strength would be closer to reality. Furthermore, the use of quarterly data or, for example, the inclusion of estimates for the current fiscal year, and, as soon as actual data is available, including the harmonization of any deviations for e.g. three months, would also contribute to the credibility, i.e. the objectivity in resource allocation. However, the above-mentioned concerns appear to be negligible in comparison to the major flaw of using the Croatian Bureau of Statistics (CBS) data from the last Croatian population census, i.e. from 2011. In Croatia's case, the demographic change since 2011 is significant[7] and ignoring the dynamics of population change, due to, e.g., its diluting effect on the model's stability/predictability, actually represents a downgrading of the fundamental principle of redistribution fairness.

[7] According to the last census, 4,28 million people lived 2011 in Croatia [23], while for 2017 the CBS year-end estimate was 4.105.493 inhabitants [24]. Croatian demographers have already rated the situation as very alarming, and in their view, it is highly likely that the actual proportions of depopulation are significantly higher because official statistics do not cover external (e)migration flows well. [25]-[30]

Alongside the adjustment of the population parameter in the equalisation model by using the latest available data (year-end estimates) from the CBS, the complete picture changes significantly. Table 1 shows the deviations of officially established reference values according to the calculation of the MoF and a calculation that reflects the situational picture of the Croatian population more realistically. Logically, the latter per capita values are higher, since the same fiscal capacity is allocated to fewer people.

Table 1: Reference values of the realised tax revenue capacity for the years 2018 and 2019

Reference values (in HRK, per capita)	Official		Adjusted	
	2018	2019	2018	2019
Municipalities	1.927,00	1.942,77	2.034,22	2.090,14
Cities	2.585,00	2.545,42	2.678,56	2.670,34
Counties	319,00	315,60	332,51	334,07

Note: The official calculation of equalisation for 2018 and 2019 is based on fiscal data from 2012-2016 and 2013-2017 respectively, and data from the 2011 census. At the time of the official calculation of the LGU's share in fiscal equalisation funds for 2019 (by the end of Q3 2018), the CBS compounded the 2017 year-end estimates on LGU's population, so the adjusted fiscal equalisation for 2019 is based on fiscal data for 2013-2017 and population data from 2017. For 2018, the adjusted calculation uses fiscal data for 2012-2016 and 2016 year-end population estimates.
Source: Author's work based on CBS and MoF data [24], [31]-[34].

Official and "adjusted" Lorenz curves for Croatian counties, cities and municipalities (Figure 1) show three adapted curves lying closer to the uniform distribution line. In other words, the MoF overestimates the inequality in fiscal capacities, and our calculations show a lower amount needed for optimal fiscal equalisation: for the counties -10,2%, municipalities -4,6% and cities -5,5%, or in total by HRK 120,5m (Table 2). As the optimal amount of fiscal equalisation in the existing model is overestimated, it is transferred to the officially determined LGUs' share in the total fiscal equalisation funds, which implies unfairness in the (re)allocation.

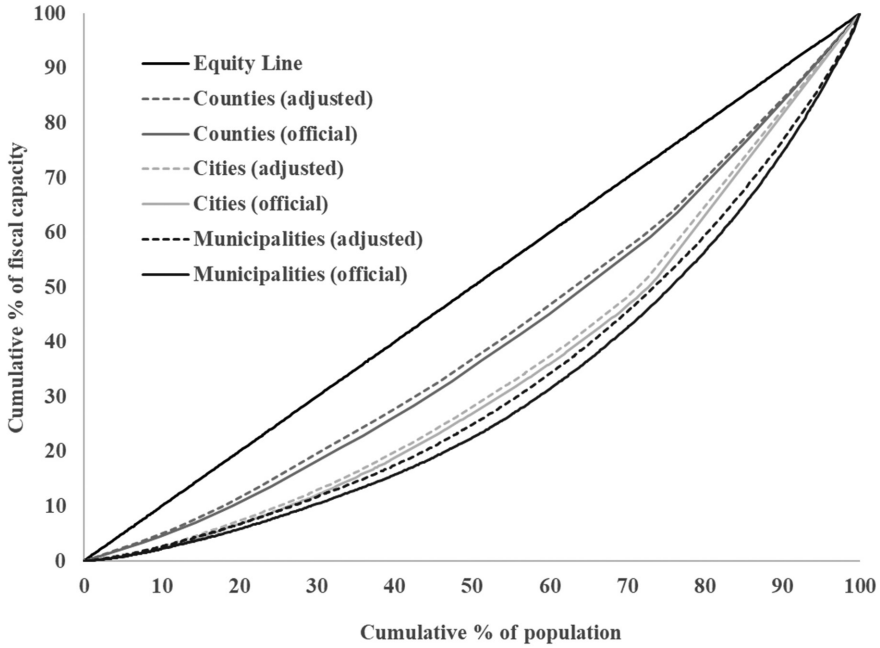


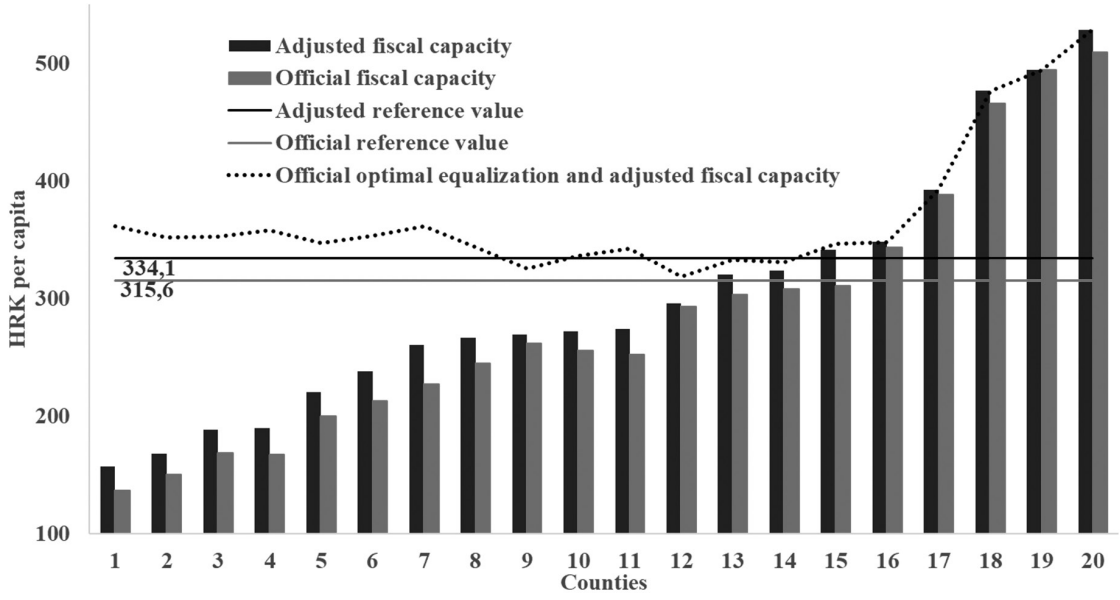
Figure 1: Lorenz curves for Croatian counties, cities and municipalities (2019)
Source: Author's work based on CBS and MoF data [24], [31], [33].

Table 2: Total nominal fiscal capacities and optimal equalisation amounts for 2019 (in HRK)

LGUs	Fiscal capacity	Optimal equalisation amount	
		Official	Adjusted
Counties	1.102.965.070	164.049.026	147.306.905
Cities	10.991.336.582	1.023.046.565	967.150.971
Municipalities	1.625.978.123	1.033.336.251	985.471.052
Total	13.720.279.775	2.220.431.842	2.099.928.928

Source: Author's work based on CBS and MoF data [24], [31], [33], [34].

Figure 2 shows, on the example of the regional level, how a different population image, i.e. different shares in equalisation funds, affect the (un)fairness in redistribution. Fiscal capacity is shown for 20 counties, from left to right, from the lowest adjusted fiscal capacity per capita to the largest. Side-by-side, the fiscal capacity officially established by the MoF is shown which is above the official reference line (HRK 315,6) for five counties, while the other 15 are entitled to withdraw funds for horizontal fiscal equalisation. In the adjusted picture, there are 14 counties with fiscal capacity per capita below the corresponding reference value of HRK 334,1. The combination of adjusted fiscal capacity with the official optimal equalisation values serves as a kind of "fairness indicator". The optimum equalisation adds up, from below, to the difference between the fiscal capacity and the reference line. Therefore, the dotted line strictly follows the adjusted fiscal capacity line when both the adjusted and official fiscal capacity lines have crossed their respective reference lines. If the dotted line is above the adjusted reference value, then the corresponding LGU receives officially more than the optimal allotment from equalisation and vice versa. The difference between the adjusted and official fiscal capacity reveals how the total population decline (2011 vs 2017) affected Croatian regions. Most regions officially eligible for fiscal equalisation exercise this right in a more significant proportion than belongs to them, while two of them should have a higher share. The equivalent comparison at the local level, i.e. for cities and municipalities (Figures 3 and 4), more convincingly points to the need for change, i.e. methodological adjustment, that would level the dotted line around the reference value, i.e. reduce the unfairness of the existing equalisation.



Note: The City of Zagreb excluded.

Figure 2: Fiscal capacity with corresponding reference values for Croatian counties in 2019
Source: Author's work based on CBS and MoF data [31], [33], [34].

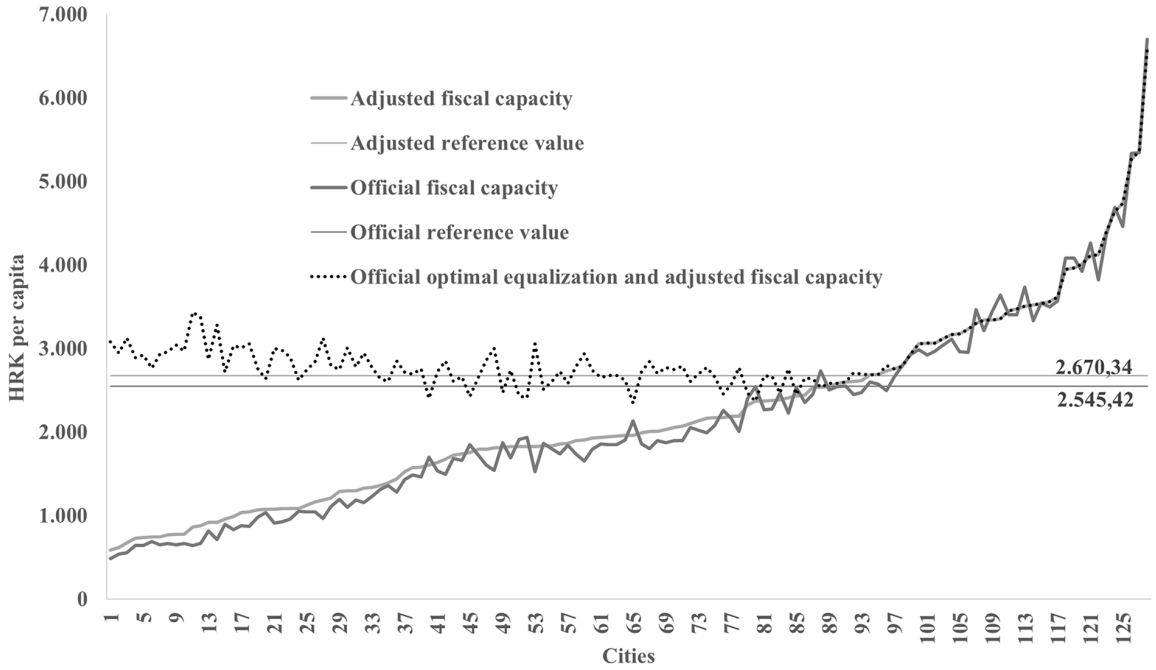


Figure 3: Fiscal capacity with corresponding reference values for Croatian cities in 2019
Source: Author's work based on CBS and MoF data [24], [33], [34].

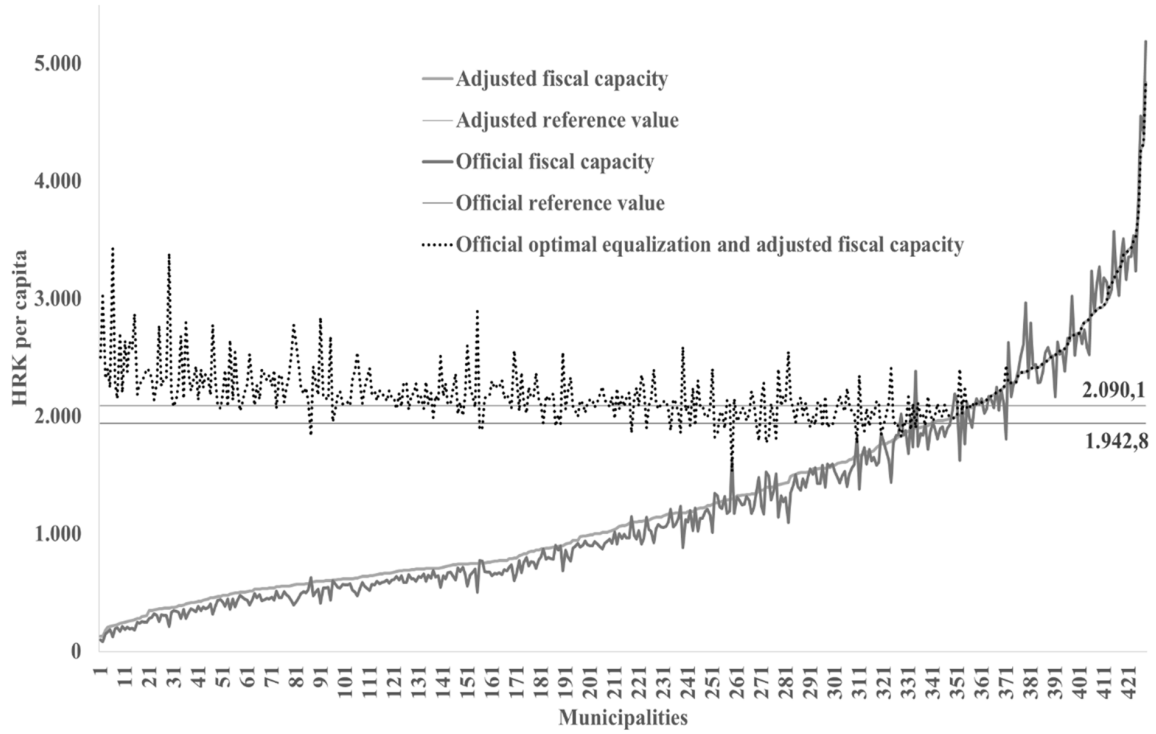


Figure 4: Fiscal capacity with corresponding reference values for Croatian municipalities in 2019
Source: Author's work based on CBS and MoF data [24], [33], [34].

The Croatian MoF points out that the established (horizontal) fiscal equalisation model is exclusively focused on equalising fiscal capacity, providing a comparable level of public services with a comparable level of the tax burden. It is stated that the goal of fiscal equalisation is not to direct capital investment and encourage regional development and that additional resources to stimulate regional development and/or demographic renewal will be taken into account

within other legislative regulations [17], [35] - [37]. In reality, it is a different story: the existing fiscal equalisation method contains a redistributive "overflow" channel whereby the majority of LGUs affected by depopulation, also less developed, achieve a disproportionately and unjustifiably higher share in fungible horizontal fiscal equalisation funds.

4. CONCLUDING REMARKS

It is a given fact that revenue equalisation models are nowadays established policy, but due to data inputs that are hardly compatible with reality, even the best model will yield inferior results. The official Croatian model's adherence to the 2011 population data creates an illusion of stability/predictability: mid-2021 Croatia will face a new population census, and demographers warn that the actual data will be considerably worse than the current already gloomy estimates of the CBS. Therefore, today's passive approach will provide more imbalance and stress for local budgets in the future. The dynamics of population change shall ultimately not be ignored because, as things stand now, the decision-makers are downgrading the fundamental principle of redistribution fairness and equality. Only when this crucial deficiency is eliminated, it will be possible to say that Croatia has an acceptable model of (horizontal) fiscal equalisation.

REFERENCES

[1] Zakon o financiranju jedinica lokalne i područne (regionalne) samouprave. Narodne novine, 127/2017. Retrieved from: https://narodne-novine.nn.hr/clanci/sluzbeni/full/2017_12_127_2874.html

[2] Bajo, A., & Primorac, M. (2017). Poboljšava se sustav fiskalnog izravnanja u Hrvatskoj. *Aktualni osvrti, Institut za javne financije, br*, *96*.

[3] European Commission (2018). Recommendation for a COUNCIL RECOMMENDATION on the 2018 National Reform Programme of Croatia and delivering a Council opinion on the 2018 Convergence Programme of Croatia. Brussels: Secretariat-General. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52018DC0410

[4] Jurlina Alibegović, D. (2018). Porezna autonomija gradova u Hrvatskoj u razdoblju 2002.–2016. *Radni materijali EIZ-a*, (1), 5-36. Retrieved from: https://hrcak.srce.hr/198604

[5] Lozina, D. (2018). Refleksije o lokalnoj hrvatskoj samoupravi. *Zbornik radova Pravnog fakulteta u Splitu*, *55*(3), 683-695.

[6] Blagojević, A. (2012). Teritorijalna reforma hrvatske lokalne samouprave: ustavnopravne pretpostavke. *Pravni vjesnik, 28* (3-4), 31-44. Retrieved from: https://hrcak.srce.hr/134369

[7] Kregar, J. (2011). (Ed.) Decentralizacija. Zagreb: Centar za demokraciju i pravo Miko Tripalo. Retrieved from: https://bib.irb.hr/datoteka/532254.Decentralizacija_text.pdf

[8] Koprić, I. (2010). Prijedlozi za reformu lokalne i regionalne samouprave u Hrvatskoj. *Croatian Public Administration*, 10 (4), 941-959.

[9] Koprić, I. (2010). Kriteriji za prosudbu racionalnosti teritorijalne organizacije lokalne i regionalne samouprave. *Riznica*, *12*, 40-47.

[10] Koprić, I. (2010). Karakteristike sustava lokalne samouprave u Hrvatskoj. *Hrvatska i komparativna javna uprava: časopis za teoriju i praksu javne uprave*, 10 (2), 371-385. Retrieved from: https://hrcak.srce.hr/135426

[11] Bratić, V. (2008). Lokalna samouprava u središnjoj i istočnoj Europi: snažan, neovisan instrument upravljanja na lokalnoj razini ili tigar od papira?. *Financijska teorija i praksa*, 32 (2), 139-157. Retrieved from: http://www.ijf.hr/FTP/2008/2/bratic.pdf

[12] Bajo, A., & Bronić, M. (2007). Procjene učinkovitosti modela fiskalnog izravnanja u Hrvatskoj. *Financijska teorija i praksa*, 31 (1), 1-24. Retrieved from: http://www.ijf.hr/FTP/2007/1/bajo-bronic.pdf

[13] Bronić, M. (2008). Tekuće dotacije Ministarstva financija općinama i gradovima na područjima posebne državne skrbi. *Newsletter Nr. 35*. Institut za javne financije, Zagreb. Retrieved from: http://www.ijf.hr/newsletter/35.pdf

[14] Bronić, M. (2010). Evaluating the current equalization grant to counties in Croatia. *Financial Theory and Practice*, 34 (1), 25-52. Retrieved from: http://www.fintp.hr/upload/files/ftp/2010/1/bronic.pdf

[15] Primorac, M. (2014). The restructuring of the fiscal equalization system in Croatia. *Zbornik radova Ekonomskog fakulteta u Rijeci*, 32 (2), 213-232. Retrieved from: https://hrcak.srce.hr/131532

[16] Primorac, M. (2015). The effectiveness of fiscal equalisation in Croatia. *Economic research-Ekonomska istraživanja*, 28 (1), 299-311. DOI: 10.1080/1331677X.2015.1043780.

[17] Vlada Republike Hrvatske (2017). Konačni prijedlog Zakona o financiranju jedinica lokalne i područne (regionalne) samouprave. Retrieved from: https://vlada.gov.hr/UserDocsImages//2016/Sjednice/2017/11%20studeni/67%20sjednica%20Vlade%20Republike%20Hrvatske//67%20-%203.pdf

[18] Greiner, N., Brumby, J., & Carter, B. (2012). GST Distribution Review: Final Report. Retrieved from: http://www.gstdistributionreview.gov.au/content/reports/finaloctober2012/downloads/GST_final_consolidated.pdf

[19] Blöchliger, H., & Charbit, C. (2008). Fiscal equalisation. *OECD Journal: Economic Studies*, 2008 (1), 1-22. Retrieved from: http://www.oecd.org/economy/public-finance/42506135.pdf

[20] Martinez-Vazquez, J., & Boex, J. (2001). The design of equalization grants: theory and applications. Andrew Young School of Policy Studies: Georgia State University. Retrieved from: https://www.researchgate.net/profile/Jameson_Boex/publication/265142703_The_design_of_equalization_grants_Theory_and_applications/links/543043570cf27e39fa9e1624/The-design-of-equalization-grants-Theory-and-applications.pdf

[21] Yilmaz, S. (2001). Equalization Across Subnational Governments: Fiscal Capacity. *World Bank*. Retrieved from: http://www1.worldbank.org/publicsector/decentralization/fiscal%20capacity.doc

[22] Shah, A. (2014). Principles and the Practice of Fiscal Equalization Transfers with special emphasis on Solidarity or Robin Hood Programs [PowerPoint slides]. Retrieved from: http://www.worldbank.org/content/dam/Worldbank/Event/ECA/Poland/pl-fiscal-equalization-anwar-shah.pdf

[23] Croatian Bureau of Statistics (n.d. -a). Census of Population, Households and Dwellings 2011. [Data file]. Retrieved from: https://www.dzs.hr/Eng/censuses/census2011/results/xls/Grad_01_EN.xls

[24] Croatian Bureau of Statistics (n.d. -b). Population estimate by sex, by towns/municipalities, 31 December. [Data file]. Retrieved from:
https://www.dzs.hr/PXWeb/Selection.aspx?px_tableid=SP31_2.px&px_path=Stanovni%C5%A1tvo__Procjene%20stanovni%C5%A1tva&px_language=en&px_db=Stanovni%C5%A1tvo&rxid=7f862abe-01a9-4d4c-87ee-434320c95407

[25] Šterc, S. (2019). Demografski gubici su katastrofalni, a iz Hrvatske se ne bježi samo zbog posla, Interview by Maja Šubarić Mahmuljin for *Generacija.hr*, 27.02.2019. Retrieved from: http://generacija.hr/intervju-tjedna/stjepan-sterc-demografski-gubici-su-nam-katastrofalni-a-obitelji-ne-bjeze-samo-zbog-posla/

[26] Živić, D. (2018). Demografski slom Hrvatske. *Vijenac*, 26 (626). Retrieved from: http://www.matica.hr/vijenac/626/demografski-slom-hrvatske-27603/
[27] Wertheimer-Baletić, A. (2017). Demografska teorija, razvoj stanovništva Hrvatske i populacijska politika (izbor radova). Samobor: Meridijani.
[28] Akrap, A. (2015). Demografski slom Hrvatske: Hrvatska do 2051. *Bogoslovska smotra*, 85 (3). Retrieved from: https://hrcak.srce.hr/file/217706
[29] Jurasić, D. (2019). Demografi: Pali smo ispod 4 milijuna stanovnika. *Večernji list*. Retrieved from: https://www.vecernji.hr/vijesti/demografi-pali-smo-ispod-4-milijuna-stanovnika-1302706
[30] Draženović, I., Kunovac, M. & Pripužić, D. (2018). Dynamics and determinants of emigration: the case of Croatia and the experience of new EU member states. *Public Sector Economics*, 42 (4). Retrieved from: https://doi.org/10.3326/pse.42.4.3
[31] Croatian Bureau of Statistics (n.d. -c). Population estimate, by age groups and sex, by counties, 31 December. [Data file]. Retrieved from:
https://www.dzs.hr/PXWeb/Selection.aspx?px_tableid=SP22_2.px&px_path=Stanovni%C5%A1tvo__Procjene%20stanovni%C5%A1tva&px_language=en&px_db=Stanovni%C5%A1tvo&rxid=7f862abe-01a9-4d4c-87ee-434320c95407
[32] Ministarstvo financija RH (n.d. -a). Fiskalno izravnanje. Retrieved from: http://www.mfin.hr/hr/fiskalno-izravnanje
[33] Ministarstvo financija RH (n.d. -b). Tablica udjela po JLP(R)S za fiskalno izravnanje u 2019. [XLS file]. Retrieved from: http://www.mfin.hr/adminmax/docs/Tablica%20udjela%20po%20JLP(R)S%20za%20fiskalno%20izravnanje%20u%202019..xlsx
[34] Ministarstvo financija RH (n.d. -c). Tablica udjela po JLP(R)S za fiskalno izravnanje u 2018. [XLS file]. Retrieved from: http://www.mfin.hr/adminmax/docs/IZRACUN%20udjela%20u%20sredstvima%20izravnanja.xlsx
[35] Ministarstvo financija RH (2017a). Izvješće o provedenom savjetovanju - Nacrt Prijedloga zakona o financiranju jedinica lokalne i područne (regionalne) samouprave. Retrieved from: https://esavjetovanja.gov.hr/ECon/EconReport?entityId=5786
[36] Ministarstvo financija RH (2017b). Obrazac prethodne procjene učinka propisa. Retrieved from: https://esavjetovanja.gov.hr/Documents/Download?documentId=5805
[37] Ministarstvo financija RH (2017c). Obrazloženje uz nacrt prijedloga zakona. Retrieved from: https://esavjetovanja.gov.hr/Documents/Download?documentId=5807

A SURVEY OF PKI ARCHITECTURE

Radomir Prodanović[1]
Ivan Vulić[2]
Ivan Tot[3]

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Abstract: *PKI architecture is base of e-business security in an insecure Internet environment for a geographically distributed organization. Choosing an adequate PKI architecture is a real challenge. Each PKI architecture has its advantages and disadvantages which should be taken into consideration before choosing the one. Therefore, authors in this paper give description and comparative analysis of the basic PKI architectures. This analysis has two aspects: first, comparison of advantages and disadvantages, and second, aspect of parameters chosen by the authors. Chosen parameters are: trust, certification path, scalability, flexibility and failure.*

Keywords: *PKI architecture, certification authority, trust, scalability, certification path.*

1. INTRODUCTION

Rapid development of Internet and information technologies has encouraged many companies to switch to a new form of business: e-business. Many companies today develop systems of e-business in order to strengthen its competitive position and adapt to the new models of business.

Companies intend to make profit from the investments in information technologies, e.g. more efficient business and management, by transition to e-business. However, e-business has its risks and information security is a major one in e-business. This risk is one of the main causes why some companies hesitate to fully adopt e-business.

Since companies make transactions via Internet on the global level, their information resources are distributed to the many locations. When we talk about reducing or removing security risks, we have to consider distributed security architecture. Technology which is used in distributed security architecture is public key cryptography. This cryptography is applicable through Public Key Infrastructure (PKI) [1].

The members in communication may get certificates from different certification authorities (CAs), depending on the organization to which they give its trust. In order for these members to trust each other, establishment of mutual trust requires establishing trust relationship between different CAs. In this way the PKI architecture is building up. PKI architecture depends on number of certification authorities, their locations and trust relationship between CAs.

Selecting the best PKI architecture is not a simple task. One of the reasons is non-existence of hard obligatory rules for choosing PKI architecture, and there isn't PKI architecture which provides the solution for all situations. However, the designers need to know all capabilities of the

[1] Centre for Applied Mathematics and Electronics, Serbian Armed Forces, Vojvode Stepe 445, 11000 Belgrade, Serbia
[2] Military Technical Academy, University of Defense, Pavla Jurišića Šturma 1, Belgrade, Serbia
[3] Military Technical Academy, University of Defense, Pavla Jurišića Šturma 1, Belgrade, Serbia

PKI architectures in order to make the best possible PKI architecture. Some authors are trying to define rules for selection PKI architecture or appropriate commercial Certification Service Providers [2], [3] to make selection of PKI architecture as easier as possible. Also, very important part of selection a PKI architecture is identifying historical development and problems of the real PKI architectures (for example EuroPKI) [4]. Authors consider that an organization at first need to be inform of advantages and disadvantages of the basic PKI architectures before starts deeper analyze which includes certification practices, services and applications. Authors in this paper give an overview of the basic PKI architectures and two comparative analysis for the purpose of identifying advantages and disadvantages of these PKI architectures.

In Section 2, the authors show review and description of fundamental PKI architectures. Section 3 shows comparative analysis of the PKI architectures. The first analysis shows advantages and disadvantages of the PKI architectures. The second is based on parameters chosen by authors. The authors chose such parameters which enable easy selection of the most appropriate PKI architecture. The conclusion is given in Section 4.

2. FUNDAMENTAL PKI ARCHITECTURES

There are more PKI architectures, but all of them can be classified in one of the next fundamental architectures [5]-[8]:

- Simple PKI architecture,
- Enterprise PKI architecture,
- Hybrid PKI architecture.

2.1. Simple PKI Architecture

Single CA Architecture. The single CA is most common in practice. It provides services to all entities in PKI environment (issuing certificates, publishing them in public directory, issuing certificate revocation lists (CRL), etc.). All entities trust only to one CA in this PKI architecture.

Single CA architecture is suitable for small organizations with limited number of users but not for organizations with fast development because it does not allow adding new CAs.

Basic Trust List Architecture. CAs do not establish a relationship between them in this model, so there are no certification paths. The entities establish relationship to CAs from trust list which is in possession of the entities.

There are various interpretations of trust lists because there is no single way for defining or formalizing these lists. It can be interpreted as a certificate list (for example, a certificate storage used by a web browser) or as a signed list that can contain any confidential information (certificate hash or file names) in the case of a Microsoft Certificate (Certificate Trust List, CTL) [9]. In [10], a trust list is defined as a signed set of certificates with information defining the characteristics and constraints of trust. User trust list is the most used PKI architecture since it has been extended through operating systems and web applications. Trust list with vital information in this architecture is maintained by every user himself and that can cause additional problems.

This architecture, in essence, consists of several independent CAs, i.e. from several single CA architectures, so compromising one CA does not affect all architectures.

2.2. Enterprise PKI Architecture

Several single CAs establish trust relationship with each other and build growing PKI architectures. CAs can make such relations where some CAs are superior or subordinate to others or equal (peer to peer) CAs. Every organizational structure in theory can be realized over hierarchical PKI and mesh PKI.

Hierarchical PKI Architecture. This architecture is mostly implemented in hierarchical organization because it follows hierarchical development of organization. This PKI architecture is built on one-way trust relationships between superior and subordinate CA, as on Figure 1. There is one CA (root CA) at the top of the hierarchy that all users trust [11]. The CA distributes public key to every entity and initiates trust to PKI. But this trust is having a bad side as it is now root CA is weakest point of this architecture. Overall architecture becomes useless and unsecure if it gets compromised.

The superior CA (root CA) issues certificates only to subordinate CAs, but the subordinate CA issues certificates to its subordinate CAs and to end entities. In that way CA can delegate added functions or limit some functions to subordinate CA. The certification path is short, and the longest one is equal to sum of subordinate CAs's certificates plus end entity's certificate.

This architecture is scalable enough, because it can simply follow the changes in growing organization [12]. This architecture during the expansion establishes trust relationships between root CA and new CAs or between subordinate CAs and new CA.

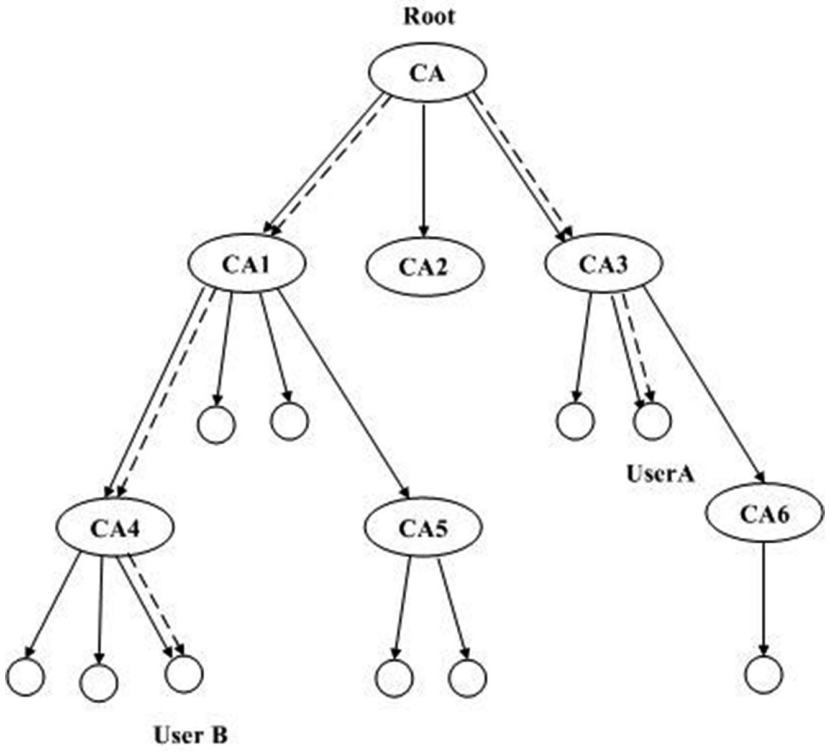

Figure 1: Hierarchical PKI architecture

Mesh PKI Architecture. The CAs provide PKI services and establish peer-to-peer relationships in the mesh PKI architecture. This architecture is, usually, alternative to hierarchical model because of its advantages [12], [13].

The network PKI architecture builds bidirectional trust relationships between equal CAs on peer-to-peer basis, by issuing CA certificates to each other, as on Figure 2. The CA may restrict trust by issuing certificates with restrictions contained in the certificate, such as: name constraints, policy constraints and path-length constraints [14].

There are many trust points, so compromising any of them does not affect architecture functioning. The compromised CA recovers trust by revoking all issued certificates and issuing new certificates.

The certification path construction is more complex than in hierarchical PKI architecture. There is not established path from certificate end entities to the trust point. The certification path construction is difficult because there are many path options and some of the certification paths lead to useless dead ends. The maximum length of a certification path in a mesh PKI is equal to the number of CAs in the PKI.

Mesh PKI architecture can be extended by simple addition of new CAs and establishing trust relationships with them. Scalability of this architecture is not generally good despite simplicity of growth. The causes of bad scalability are complexity of certificates, discovering and verification of a certification path.

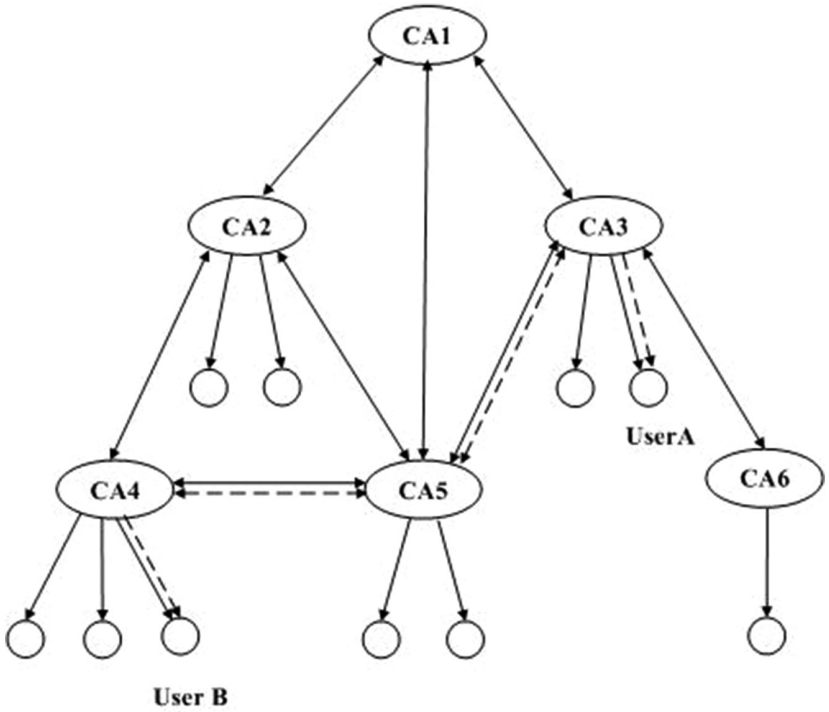

Figure 2: Mesh PKI architecture

2.3. Hybrid PKI Architecture

Many organizations use electronic communication with other organizations in order to extend their business. The organization which has hierarchical PKI architecture can have problems in communication with mash PKI architecture other organization. In this situation PKI needs to implement solution which will enable safe communication between users in different PKI architectures. The solution is a hybrid PKI architecture which allows organizations with different PKI architectures to establish safe environment for secure exchange of information.

There are three type of hybrid architecture:

- Extended Trust List Architecture,
- Cross-certified PKI Architecture,
- Bridge Certification Authority Architecture.

Extended Trust List Architecture. End entities, not CAs, in this architecture establish trust relationships through maintenance of the trust list. It contains many trust points to which end entities trust, as it shows in Figure 3.

This architecture can establish trust to hierarchical and mesh PKI architecture. The entries in this trust list contain root CA from hierarchical and some CAs from mesh architecture. The complexity of the certification path construction depends on the architectures connecting to each other.

The Extended Trust List generates a certificate cache in order to eliminate such problems. This cache contains all the possible certification paths. Path mechanism can refer to the cache and search for the appropriate path instead of constructing a certification path. Every certification path has path value based on the complexity of the certification path.

This architecture can be easily extended by adding more CAs from different PKI architectures to user trust lists. Trust list maintenance and problems are the same as in Trust List architecture.

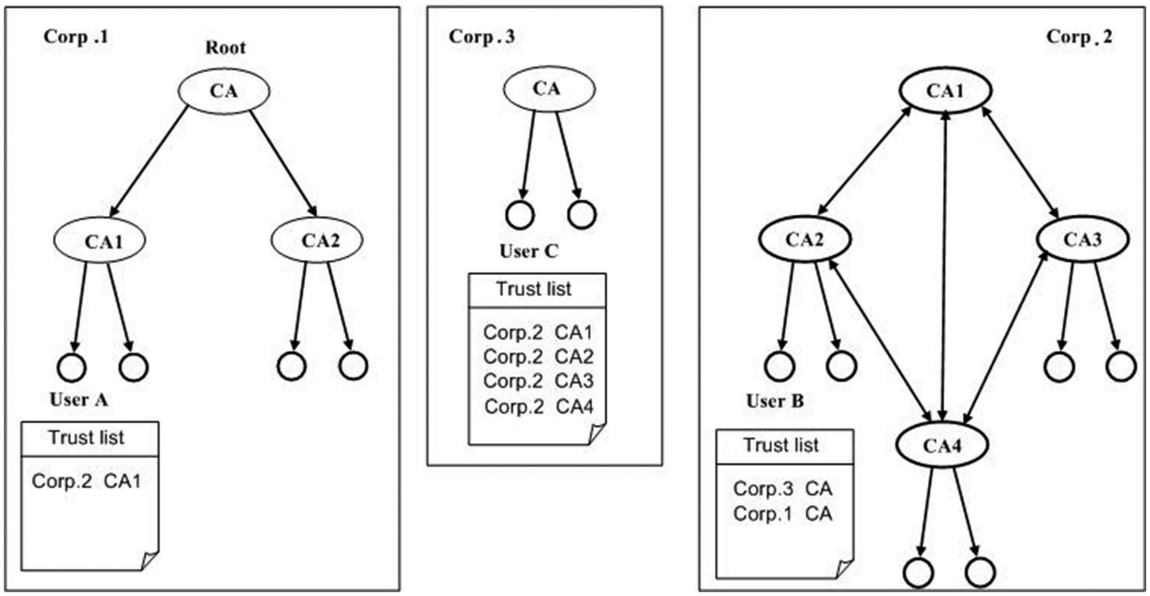

Figure 3: Extended Trust List architecture

Extended Trust List architecture does not have a trust point which crashes the whole architecture. We consider these failure points from the aspect of entities functionality which establishes trust with other PKI architectures. The first failure point is trust list. The entity will not trust any CA or architecture when trust list fail. The second failure point is failed certificate cache mechanism and certification paths searching.

When CA is a failure point, it will recover itself by suspending issued certificates, generating new public key and issuing new certificates. The solution when the trust list fails is a creation of a new trust list and recovering of the cache and search mechanisms.

Cross-Certified Enterprise PKI. The peer to peer trust relationships in this architecture are established between same or different organization architecture [15]. Trust relationship established with cross-certification can be restricted by defining restrictions in one or more cross-certificate pair extensions.

This architecture enables adding one or more new PKI architectures by simple establishment of cross-certification pair. The root CA or any subordinate CAs in hierarchical architecture can establish peer-to-peer trust relationship to any CAs from mash architecture, to CA from single CA architecture or to other hierarchical architecture. Likewise, mash architecture and single CA architecture can establish trust relationship to one or more same or different architectures. The Figure 4 shows peer to peer trust relationship and certification path by double lines between Enterprise PKI architectures.

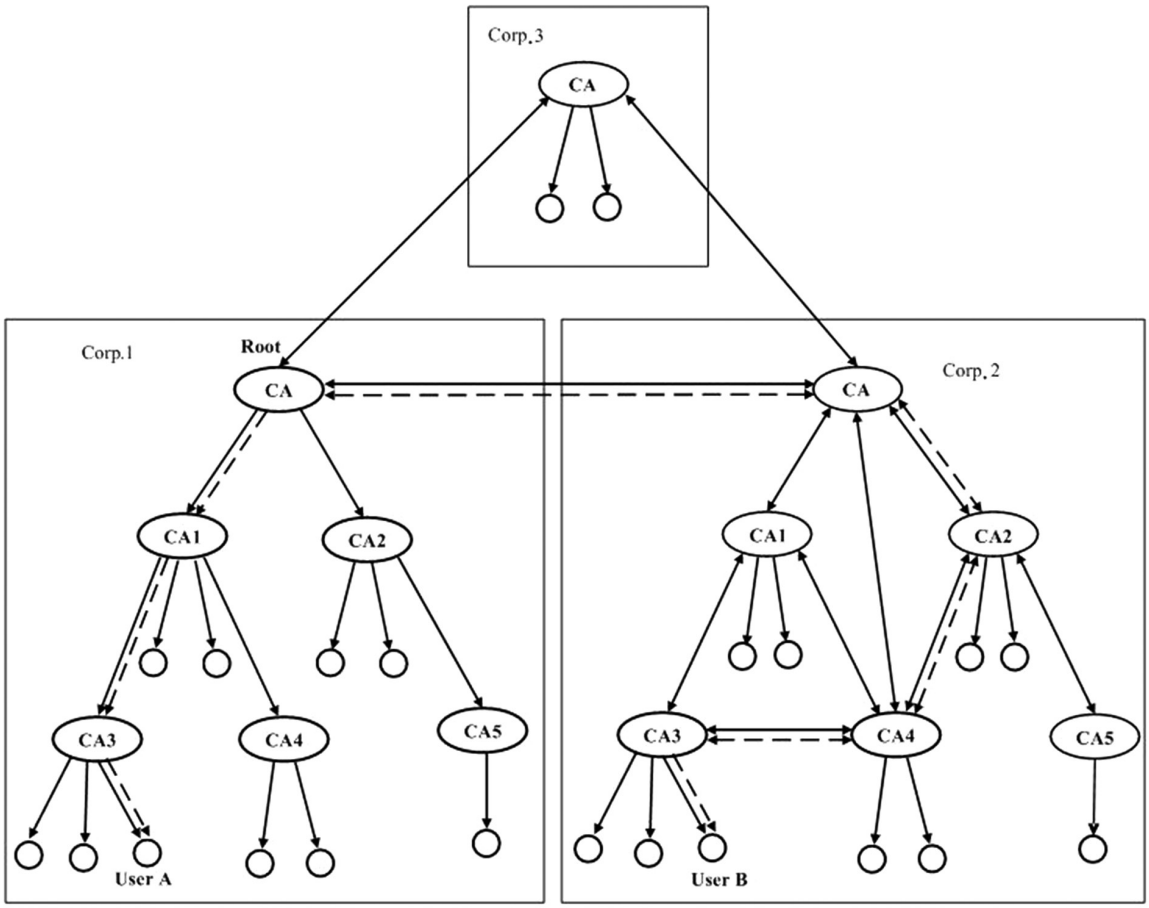

Figure 4: Cross-Certified Enterprise PKI architecture

When CAs from different architectures establish trust relationships with cross-certificates, then their entities can confirm existence of other entities. It enables secure communication between all users in PKI architecture. Different users construct different certification paths for the same end entity certificate in Cross-certified PKI architecture. The certification path begins at the trust point. Construction method depends of native architectures between which trust relations are established.

Failure of root CA, subordinate CA or CA in mesh PKI architecture will cause whole or partial architecture failure when we consider Cross-certified architecture. The compromised CA will recover in the way that was described earlier in this paper in the Section on Enterprise PKI Architecture. New CA can establish trust relationship to CA from other PKI Architectures.

This type of architecture is not applicable for connecting more enterprise architectures, so we can say that its scalability is restricted.

2.4. Bridge Certification Authority Architecture

The Bridge Certification Authority Architecture (Bridge CA architecture) is introduced by U.S. Federal Government in order to simplify connection of the PKI architectures by cross-certified pairs [12], [15]. This architecture connects different PKI architectures by introducing new CA (bridge CA) which establishes relations between PKIs.

The Bridge CA is not trust point and does not issue digital certificates to users. The users of Bridge CA consider it as mediator between different PKI architectures. The enterprise architecture establishes trust relationship to bridge CA (Principal CA) via root CA or some CA from mesh architecture. The new CA or Enterprise PKI architectures can be easily added by establishing peer-to-peer trust relationships. Every expansion is transparent for users because trust point is not changing. Figure 5 shows Bridge CA which establishing trust relations to three PKIs, Comp.1., Comp.2. and Comp.3.

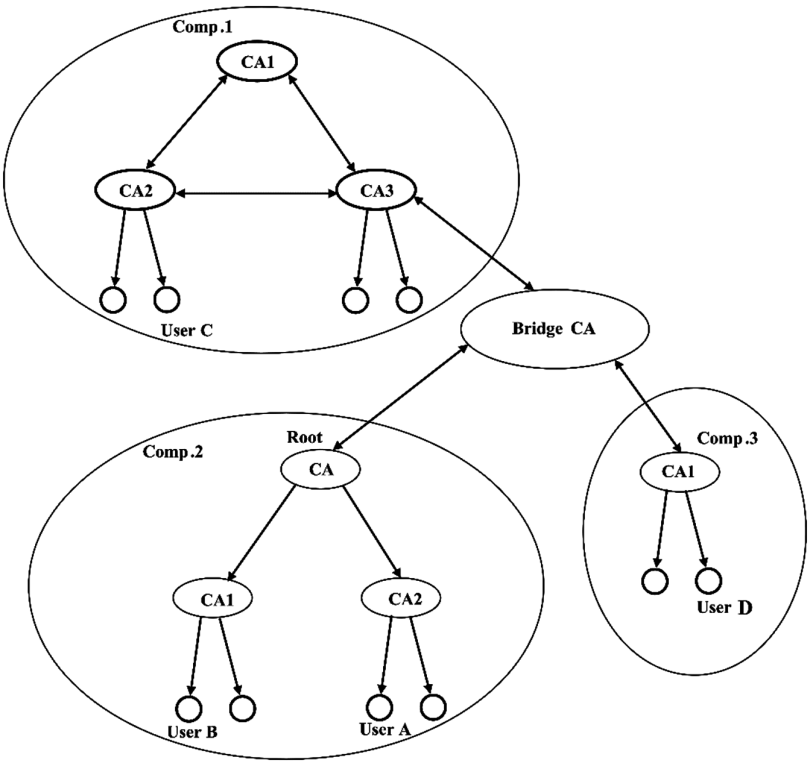

Figure 5: The Bridge PKI architecture

The bridge CA can be compromised entirely or partially. The former refers to compromising of all private keys for which bridge CA is signed certificates issued for Principal CAs. Compromising Principal CA in this architecture will disable Enterprise PKI architecture to establish secure communication to other PKI architectures. If Principal CA uses only one private key for signing certificates, compromising that key causes complete bridge CA architecture failure. Also, the hardware and software failure can cause complete PKI architecture failure. The re-establishing trust relationships with each Principal CA Enterprise PKI of architecture establishes trust between different or same architectures.

The users know path to the bridge CA, and they only need to determine the path from the bridge CA to the entity certificate. Depending of certification chain length, however, processing can be complicated because of requirements in the certificates, i.e. policy and name constraints, certificate status, policy mappings.

This architecture expands by adding new Enterprise PKI architectures. The Bridge CA architectures have to establish mutual relationships, but this is followed by many technical and operative problems, as described in [16].

3. THE COMPARATIVE ANALYSIS OF PKI ARCHITECTURES

There are technical and policy problems in building PKI in practice. The organization have to choose architecture which best fulfils its requirements. Combination of different architectures can develop the optimal PKI architecture.

In this section, the authors make comparative analysis through advantages and disadvantages aspect of PKI architectures and aspect of selected parameters. Through the first aspect of comparative analysis, Table 1, the authors show advantages and disadvantages of PKI architectures. The authors selected some parameters and made comparison of PKI architectures in second aspect of comparative analysis. The authors selected next parameters:

- Trust. Authors consider this parameter through a trust point and a trust relationship establishing in architecture. The trust point is a point, or CA, from which the certificate user begins validating the certification path. A trust relationship is a link between the user's certificate and the CA to which the user trusts, assuming that the CA has issued the appropriate valid certificate [17].
- Certification path. The certification path is a chain of certificates achieved through trust relationships between certification authorities, in order to determine whether the certificate being checked is signed by its publisher.
- Scalability. Scalability is the ability of the PKI architecture to expand by adding new CAs or new PKIs, or reduce by excluding one or more CAs from the PKI architecture, or by excluding one or more PKI architectures.
- Flexibility. This parameter shows the ability of the PKI architecture to adapt to failure and expansion of the architecture.
- Failure. The failure point is the weakest point in the PKI architecture whose dysfunction is questioning the work of the part or the entire PKI architecture. The failure point in PKI architecture is CA with compromised private key. Failure recovery is a process of re-establishing trust in the PKI architecture [18].

Single CA architecture is the simplest to implement from all described PKI architectures in this paper. This architecture does not have possibility of extension by establishing trust relationships to other CAs. Certification path processing is much faster as a result. This architecture, however, has single trust point which violating the whole architecture. It is closed architecture because trust relationships exist only between its entities. This architecture is suitable for small organizations.

Table 1: The comparative analysis of advantages and disadvantages of PKI architectures

Architecture	Advantages	Disadvantages
Simple CA Architecture		
Single CA Architecture	Simple architecture, Ease implementation, Simple certification path processing, Suitable for small organizations with a limited number of users.	Non scalable, Crush of the whole architecture when CA is compromised, Does not establish trust Relationship to other CAs.
Trust List Architecture	Enables secure communication between different single CA architectures, Enables architecture extending, Simple establishing trust.	Does not exchange certificate between CAs, Growth of architecture can cause its complexity, There are problems with trust list management
Enterprise PKI Architecture		
Hierarchical Architecture	Adjustable within hierarchical organization structure, Simple discovering and processing of certification path The certification paths are short.	There cannot be one CA on the World, The organizations do not have to have hierarchical structure, Compromising of the root CA causes compromising of the whole architecture.
Mash Architecture	Flexible architecture, The users trust CA that issued certificate, no matter where the CA is in PKI architecture, Direct making a cross certificate pair. It accelerates certificate path construction, The recovery procedure is simple because of small number of users.	The certification path construction is complex, There are useless dead ends or endless loops of certificates, Bad scalability because increased number of CAs causes performance degradation, The certification policy causes more complex certificates and certification path processing.
Hybrid PKI Architecture		
Extended Trust Architecture	Simple establishing trust between organizations with different PKI architectures, Simple architecture extension, Users have full control of trust list.	Certificate end entity does not define to which architectures that certificate belongs, There are problems in discovering certification path initial point, Architecture can become more complex in time, There are problems in trust list management.
Cross-Certified Enterprise Architecture	It can consist of same or different Enterprise PKI architectures, Simple adding new PKI architectures, Secure communication between entities from different architectures, Trust relationship between PKI architectures can be required	Limited scalability, Complex certification path, depend on native PKI architecture.
Bridge CA Architecture	Removing disadvantages of hierarchical and mash architecture, Simple architecture extension. It is transparent to users, Reliable after compromising of keys, Simple certification path processing, It is very scalable architecture because adding new certificate does not complicate certification path.	Bridge CA compromise causes crash of the whole architecture, Discovering certification path is more difficult than in hierarchical architecture, Certification path length is approximately double then in hierarchical architecture, More problems in connecting bridge CA architectures.

Table 2a: The comparative analysis of PKI architectures based on selected parameters

		Architecture			
Parameter		Single CA	Basic Trust List	Hierarchical PKI	Mash
Trust	Trust Anchor	Single CA	Single CA	Root CA	Any CA in architecture
	Trust relationship	-	Trust list	Unidirectional	Bidirectional
Certification path	Certification path	One certificate	One certificate	Sum of subordinate CAs certificates plus end entity certificates	Sum of all CAs certificates on selected path plus end entity certificates
	Certification path Construction	-	Simple	Simple	Complex
Scalability		Bad	Bad	Good	Bad
Flexibility		Bad	Bad	Bad	Good
Failure	Failure point	Single CA	No failure point	Root CA	No failure point
	Recovery after compromise	Simple	Simple	Medium complex	Simple

Table 2b: Continued Table 2a.

		Architecture		
Parameter		General Extended Trust	Cross-Certified Enterprise	Bridge CA
Trust	Trust Anchor	Any CAs	Trust point of PKI architectures	Trust point of PKI architectures
	Trust relationship	Trust list	Unidirectional and bidirectional	Unidirectional and bidirectional
Certification path	Certification path	One certificate	Sum of the longest certification path certificates of PKI architectures to which end entities belong	Sum of the longest certification path certificates of PKI architectures to which end entities belong plus bridge CA certificate
	Construct Certification path	-	Complex	Medium complex
Scalability		Bad	Bad	Good
Flexibility		Good	The best	The best
Failure	Failure Point	Any CA in architecture and trust list	Characteristic point of architecture failures that establishing trust relationship	Bridge CA and characteristic point of architecture failures that establish trust relationship
	Recovery after compromise	Depending on complexity	Simple/complex	Simple

The Basic Trust List architecture resolves problem of closed architecture. It introduces trust list on end entities side of different PKI architectures. The end entity manages the trust list. On the one hand, it is good because end entity determines other entities with which will establish secure communication. On the other hand, there is a problem of maintaining and managing the trust list. This architecture is suitable for establishing small number of the trust relationships between different PKIs.

The Hierarchical architecture is suitable for organization with hierarchical structure because it can follow their development. It has automated trust check mechanism. This mechanism is built in certification path processing process, so the end entity does not have to update trust list. The

trust depends on root CA's private key which represents failure point. Compromising this point causes failure of the whole architecture. It is a big problem with this architecture. The hierarchical architecture has more scalability then single CA and trust list architectures because it can easily follow expansion of the organization. It is not flexible, however, because there is one failure point.

The mesh architecture is more flexible then hierarchical architecture because it has more failure points. Compromising any of trust point cannot cause PKI architecture crash. Scalability of this architecture is diminished because numerous trust relationships between CAs complicate certification path processing. The discovering of the certification paths is more complex than in hierarchical architecture because there are more certification paths to an end entity. The consequences of bigger number of certification paths are bidirectional trust relationships. Constraints in this architecture are bidirectional, while these are unidirectional in hierarchical architecture.

The hybrid PKI architectures are the result of necessity of communication between organizations with different PKI architectures. Hybrid PKI architectures produce environment for secure information exchange between organizations.

The Extended Trust List architecture is similar to Basic Trust List architecture. This architecture, however, is more complex because it establishes trust relationship between different PKI architectures. End entity certificates cannot reveal to which architectures certificate belongs. It creates more problems in defining initial point of certification path. This architecture can be easily expanded but it causes problems with trust list maintenance. This is the reason for bad scalability. The extended trust list architecture does not have single failure point which will cause crash of the whole architecture. Compromising CA in users trust list will prevent users from establishing relationship with users of that particular CA, but will leave communications with users of other CAs intact. The biggest problem is situation when trust list and mechanism for generation of a certificate cache fail. Users will not be able to communicate with users of other PKIs in this situation.

The Cross-certified Enterprise PKI architecture resolves the Extended Trust list architectures problems. This architecture establishes trust relationships between a number of different PKI architectures. Establishing trust relationships by cross-certified pair to several CAs produce more certification paths from user to end entity and make this architecture more flexible. Compromising CA with established trust relationships to other PKI architectures does not affect secure communication between users of other architectures. Increasing the number of relationships between CAs causes complicate discovering and processing of certification path which affects to limited scalability.

The Bridge CA architecture is developed to increase scalability and flexibility of Hybrid PKI architectures, reduce number of cross-certified and certification paths and enable simple extension of architecture. The Bridge CA architecture has shorter trust path then mash PKI with same number of CAs. The mechanism for discovering certification path is more complex than for hierarchical architecture, and certification path is approximately twice as long. Every Principal CA (hierarchical root CA or mash architecture CA) in Bridge CA architecture establishes one trust relationship with Bridge CA. The mash cross-certified architecture establishes n^2 trust relationships between CAs, while this architecture establishes n trust relationships. The Bridge CA does not have function of superior CA over PKI architectures to which makes cross certificates.

4. CONCLUSION

Selecting suitable PKI architecture is not simple task. Implementation of PKI into a corporation is a solution that requires adjusting the organization's business, educating employees, and financial investing. It is necessary to consider the needs of the business, as well as the advantages and disadvantages of PKI architecture in order to choose the best PKI architecture. It depends on more factors, like scalability, flexibility, trust point, trust relationships, compromise CA recovering, certification path processing. Also, there is a need for identifying advantages and disadvantages of every architecture which can be applied as a solution.

The selected parameters describe the architecture more closely and give an insight into its functionality. If PKI-based services speed is essential for an organization it is important to choose an architecture that will not have a long certification path and complex constraints. Organizations can quickly grow and incorporate with other organizations, and it is therefore necessary to consider the scalability and flexibility parameters in order to reduce the cost of adapting to another architecture. One of the organization goals is safe business that can be achieved only if chosen PKI architecture can be quickly recovered in the event of a cancellation.

New solutions for PKI architectures should be in simplicity, in establishing trust between different PKI architectures and in increasing scalability and flexibility.

REFERENCES

[1] Pfleeger, C.P., Pfleeger, S.L., Margulies, M. (2015) *Security in Computing*, 5th Edition Prentice Hall.
[2] Casola, V., Mazzeo, A., Mazzocca, N., Rak, M. (2005) An Innovative Policy-Based Cross Certification Methodology for Public Key Infrastructures. EuroPKI 2005, pp. 100-117.
[3] Lopez, J., Oppliger, R., Pernul, G. (2005) Classifying Public Key Certificates. EuroPKI 2005: pp. 135-143.
[4] Lioy, A., Marian, M., Moltchanova, N., Pala, M. (2006) PKI past, present and future, Int. Journal of Information Security, pp. 18-29.
[5] Linn, J. (2000) Trust Models and Management in Public-Key Infrastructures. RSA Laboratories,
[6] Polk, W. T., Hastings, N. E. (2000) Bridge Certification Authorities: Connecting B2B Public Key Infrastructures. National Institute of Standards and Technology.
[7] Perlman, R. (1999) An Overview of PKI Trust Models, IEEE Network, Vol. 13, pp. 38-43.
[8] Choudhury, S., Bhatnagar, K., Haque, W (2002) *Public Key Infrastructure Implementation and Desig*n, John Wiley & Sons, Inc. New York.
[9] Microsoft, (2016) Certificate Trust List Overview. [Online]. Available: https://msdn.microsoft.com/en-us/library/windows/desktop/aa376545%28v= vs.85%29.aspx
[10] Certipost, (2004) Trust List Usage Recommendations for a European IDABridge/Gateway CA Pilot for Public Administrations. IDA PKI II / EBGCA /WP1.2
[11] Moses, T. (2003). PKI trust models. Draft, [Online]. Available: http://www.it-c.dk /courses/ DSK/F2003/ PKI_Trust_models.pdf
[12] Burr, W. E. (1998) Public Key Infrastructure (PKI) technical Specification: Part A –Technical Concept of Operations. National Institute of Standards and Technology Working Draft.
[13] Adams, C., Lloyd, S. (2002) *Understanding PKI: Concepts, Standards, and Deployment Considerations*. Second Edition Addison Wesley.

[14] Santesson, S., Farrell, S., Boeyen R., Housley, S., Polk, W. (2008) Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile. Network Working Group Request for Comments, IETF RFC 5280.
[15] Turnbull, J. (2001) Cross-Certification and PKI Policy Networking. Version: 2.0, Entrust. [Online]. Available: https://www.researchgate.net/publication/245817335_Cross-Certification_and_PKI_Policy_Networking
[16] Author unknown (2002) A bridge CA for Europe's Public Administrations. Feasibility study, European Commission - Enterprise DG, Public Key Infrastructure for Closed User Groups Project.
[17] Shirey, R. (2007) Internet Security Glossary, Version 2, RFC 4949, IETF.
[18] Prodanović, R. I., Vulić, I.B. (2017) Failure Points in the PKI Architecture, Vojnotehnički glasnik/Military Technical Courier, Vol 65, Issue 3, pp. 771-784.

THE ROLE OF FOREIGN AID IN SUPPORTING TRANSITION AND SUSTAINABLE DEVELOPMENT IN CENTRAL ASIA

Mária Bábosik[1]

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Abstract: *This paper presents the role of foreign aid in the transition to market economy and fostering sustainable development in the five countries of Central Asia after they gained independence. It focuses on the amount and relative size of foreign aid, the main recipient countries, its split by providers, the largest donors and the major focus areas. It concludes with stating that foreign aid had a positive effect on some of the important development indicators, but cannot be considered as the main source of progress. Approach is multidisciplinary, method is descriptive analysis.*

Keywords: *Foreign aid, international development assistance, Central Asia, transition, sustainable development.*

> "Foreign Assistance is not an end in itself. The purpose of aid must be to create the conditions where it is no longer needed − where we help build the capacity for transformational change in a society" (President Barack Obama)

1. INTRODUCTION

After the collapse of the Soviet Union in 1991 five new states, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan emerged in Central Asia, who had to consolidate their statehood, reshape their political, economic and social systems and foster development to raise living standard of their population. Their transition has not been completed yet, and they need to cope with it in times of major geopolitical changes when China is rising, and Russia is trying to regain influence in their neighbourhood. Central Asia is rich in natural resources and can play an important role both for Europe and for Asia to diversify their huge import needs.

The aim of the paper is to highlight the role of foreign aid in the transition and sustainable development of the five newly established Central Asian countries. Research questions include how much foreign aid has been provided for Central Asia, who are the largest donors, what purposes do they finance, and which countries are the major recipients? Is the role of foreign aid positive and significant in fostering transition, growth and sustainable development in Central Asia?

Approach for finding an answer for these questions is multidisciplinary combining international relations, economics and geopolitics. Method used is descriptive analysis based on literature review, statistical analysis, reports and media news.

2. LITERATURE REVIEW

For this paper, literature is reviewed on two different topics: (1) history and development of Central Asia, and (2) providing foreign aid.

[1] University of Pécs, Doctoral School of Earth Studies, Geopolitical Program, 7624 Pécs, Ifjúság útja 6, Hungary

For Central Asia, in [1] Gyene provides excellent insight into the history, political regime and international relations of Central Asia from the expansion of the Russian Empire to date. In [2] Gyuris, Szabó introduces the new independent states of the region and highlights their characteristics. In [3] Szálkai studies the development of the relations between the EU and Central Asia. In [4] Boonstra, Panella argues why the EU matters for Central Asia. In [5] Hudec presents a study on China's Emergence in Central Asia.

Regarding foreign aid, in [6] Paragi, Szent-Iványi, Vári give an overview on basic principles, norms, functioning, actors and efficiency of international development assistance. In [7] Furuoka, Fumitaka, Munir, Qaiser present the importance of international capital flow into the developing world, the motives of the donors, the critics of the functioning and results of foreign aid. In [8] Riddell explores if foreign aid really works, and if not, why does it fail? In [9] Easterly collects views of top experts how to improve effectiveness of foreign aid.

This list of reviewed publications represents only a fragment of the very rich literature on the subject and could easily be enlarged. Nevertheless, there has been little written about foreign aid for Central Asia, so the main sources of information about this topic are the news and statistics, which are mainly available through the websites.

3. GEOPOLITICAL IMPORTANCE AND COUNTRIES OF CENTRAL ASIA

Central Asia is of great geopolitical importance. It is a vast land-locked area covering 4 million km2 and having some 70 million people of different nationalities in five countries. The region is gifted with natural resources such as carbon-hydrogens and minerals like uranium and gold. It is a historical transit route between East and West, today the "One Belt One Road" (OBOR) new Chinese initiative also crosses it. Its strategic location and natural resources gave reason for the "Great Game" between England and Russia – using Kipling's term in his novel "Kim" [10] − and the "New Great Game" between the West and Russia now because dominance over this region is crucial for the global and regional powers.

Figure 1: Countries of Central Asia
Source: The Astana Times [11]

After the collapse of the Soviet Union in 1991 five independent states were established in Central Asia. They were challenged by the difficulties of creating their statehood, fixing borders, setting up institutions, raising living standard, etc. Kazakhstan stands out in size and importance and together with Turkmenistan belongs to the upper middle-income group of countries, while the other three countries – Kyrgyzstan, Tajikistan and Uzbekistan – are in the group of lower middle-income countries. Uzbekistan is the largest of all by population with over 30 million people. Table 1 below presents an overview of the five countries of Central Asia and some of their major indicators.

Table 1: Overview of Central Asia

	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Capital city	Nursultan (Astana)	Bishkek	Dushanbe	Ashgabat	Tashkent
Surface area (km2)	2 724 902	199 949	142 600	488 100	448 969
Population (000)	18 204	6 045	8 921	5 758	31 911
Population density (per km2)	6.7	31.5	63.7	12.3	75.0
GDP (million, current USD)	181 754	6 572	7 853	37 597	69 004
GDP growth rate (annual %, const. 2005 prices)	1.2	3.5	4.2	6.5	6.8
GDP/capita (current USD)	10 312,1	1 106,4	925,9	6 996,7	2 308,3
Unemployment (% of labour force)	5.6	7.7	10.8	8.6	8.9
Individuals using the Internet (per 100 inhabitants)	72.9	30.2	19.0	15.0	42.8
Exports (million USD)	36 775	1 423	899	3 741	27 947
Imports (million USD)	25 175	3 844	3 030	2 616	25 652
Major export partners	Italy (20.3%)	Switzerland (45.5)	Kazakhstan (27.3%)	China (70.9%)	Switzerland (38.1%)
	China (11.5%)	Kazakhstan (10.6%)	Turkey (20.3%)	Turkey (5.4%)	China (21.4%)
	Russia (9.5%)	Russia (10.2%)	Italy (10.0%)	Italy (5.4%)	Russia (10.1%)
Major import partners	Russia (36.3%)	China (38.1%)	China (52.0%)	Turkey (24.9%)	China (21.0%)
	China (14.6%)	Russia (20.8%)	Russia (20.1%)	Russia (11.4%)	Russia (20.3%)
	Germany (5.7%)	Kazakhstan (16.5%)	Kazakhstan (11.3%)	Japan (7.9%)	Rep of Korea (9.6%)
Balance of payments, current account (million USD)	-5 464	-721	-472	n.a.	n.a.
Net ODA received (% of GNI)	0.05	12.16	4.55	0.07	0.66

Source: UN data [12]

4. FOREIGN AID FOR CENTRAL ASIA

Foreign aid at its broadest meaning "consists of all resources – physical goods, skills and technical know-how, financial grants (gifts), or loans (at concessional rates) – transferred by donors to recipients." [8, p.17.] This definition is too broad, so a narrower definition will be used in this paper. It defines foreign aid as provision of resources "from rich countries to poor countries, and to poor people, which help to address acute human suffering and which contribute to human welfare, poverty reduction and development." [8, p. 17] In this sense, foreign aid is also termed as development aid or development assistance.

From the donor side foreign aid can be either bilateral or multilateral. Bilateral foreign aid is provided by the members of the Development Assistance Committee (DAC) or other countries, while multilateral foreign aid is provided by multilateral development institutions and funds. For the entitlement for receiving foreign aid there are set conditions for the recipient countries in both cases. In Central Asia both bilateral and multilateral foreign aid is equally important.

4.1. Entitlement and amount of foreign aid

All five countries of Central Asia are entitled for receiving Official Development Assistance (ODA) − consisting of disbursements of loans made on concessional terms and grants by official agencies − from the DAC countries, multilateral donors and other countries.

Between 1992 and 2017 annual total net ODA to this region increased from USD 74.17 to close to USD 1500 million in constant 2015 prices. The increase was sharp between 1992 and 1998, then it remained relatively constant − except for 2008 and 2015 when the annual growth of the total net ODA received was exceptionally high. The share of Central Asia gradually grew from 0.10 to around 1 percent of the total net ODA provided for the low- and middle-income countries of the world.

Table 2 below presents total net ODA received by Central Asia between 1992 and 2017 in USD million, on constant 2015 prices.

Table 2: Total net ODA Received by Central Asia between 1992-2017 (million USD, constant 2015 prices)

Country Name	1992	1993	1994	1995	1996	1997	1998	2008	2015	2016	2017	Total	Share (%)
Kazakhstan	15.69	22.16	72.24	76.46	160.34	173.75	275.47	329.95	77.46	63.58	58.25	**4 404.88**	17.13
Kyrgyz Republic	28.80	140.06	211.32	312.85	267.66	305.05	311.74	327.14	754.16	515.96	435.41	**8 632.66**	33.57
Tajikistan	18.12	38.60	91.25	81.47	128.52	114.21	213.19	270.45	424.86	342.56	297.40	**6 160.28**	23.96
Turkmenistan	9.94	46.24	38.00	40.82	30.99	26.56	35.83	13.68	23.34	32.90	28.53	**970.66**	3.77
Uzbekistan	1.62	10.76	36.57	84.54	93.78	154.10	182.55	170.74	460.92	457.25	638.80	**5 545.27**	21.57
Total	**74.17**	**257.82**	**449.38**	**596.14**	**681.29**	**773.67**	**1 018.78**	**1 111.96**	**1 740.74**	**1 412.25**	**1 458.39**	**25 713.75**	**100**
Low & Middle income countries	72 655	69 465	71 747	64 309	61 596	60 790	64 684	116 039	152 608	157 966	160 579	**2 613 204**	
Share of Central Asia	0.10	0.37	0.63	0.93	1.11	1.27	1.58	0.96	1.14	0.89	0.91	**0.98**	
Central Asia ODA increase (previous year = 100%)	100	347.61	174.30	132.66	114.28	113.56	131.68	122.77	140.85	81.13	103.27		

Source: OECD [13]

During this period Kyrgyzstan received one third of the total net ODA directed to this region, Tajikistan got close to 25 percent and Uzbekistan a bit more than 20 percent respectively. Kazakhstan received higher and higher net ODA amounts from 1992 to 2008 and less and less since then because it became a donor country. Its high share of 30 percent in 2008 dropped to only 4 percent by 2017. Turkmenistan received the smallest amount of net ODA representing not more than 4 percent.

Figure 2 below shows total net ODA received by Central Asia and its split amongst the five countries of the region between 1992 and 2017 in constant 2015 prices.

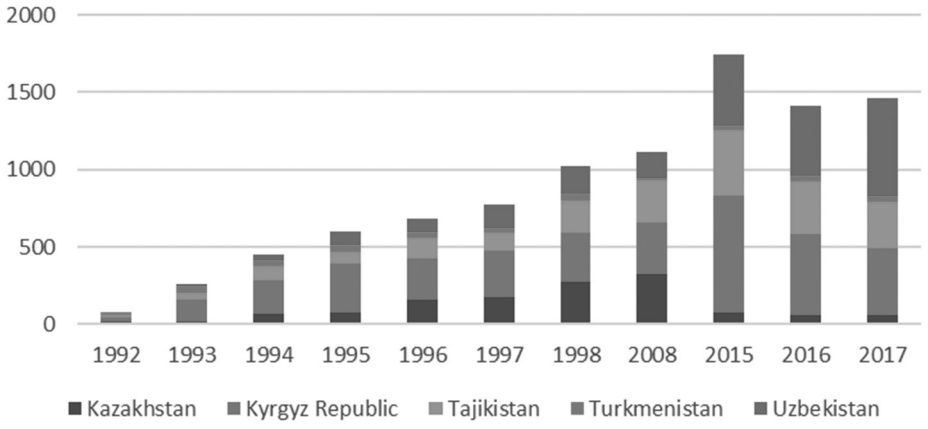

Figure 2: Net ODA received by Central Asia in 1992-2017 (million USD, constant 2015 prices)
Source: OECD [13]

4.2. Foreign aid and gross national income

Net ODA received by the countries of Central Asia compared to their gross national income (GNI) is the highest in Kyrgyzstan and Tajikistan. These are the two countries with the lowest GNI in the region that amounted to USD 7341 million and USD 8244 million in current prices in 2017. In the Kyrgyz Republic net ODA relative to GNI grew from 0.91 percent to 17.51 percent between 1991 and 1995 and reached the peak of 24.10 percent in 1999. After that it started to fall and since 2007 it is around 7 percent each year − except for 2015 when net ODA was close to 12 percent of the GNI. In Tajikistan net ODA received in relation to GNI increased from 0.62 percent to 10.66 percent between 1992 and 1996 and grew to the maximum of 16.07 percent by 2001. Since then it gradually decreased − except for two years −, and in 2017 it amounted to 3.69 percent of GNI. In Kazakhstan, Turkmenistan and Uzbekistan, where GNI is much higher, − USD 141480 million, USD 40781 million and USD 50605 million respectively −, the share of net ODA in relation to GNI was less than 2 percent throughout the entire period.

Figure 3 below shows the net ODA compared to GNI in percentages in the five countries of Central Asia between 1992-2017.

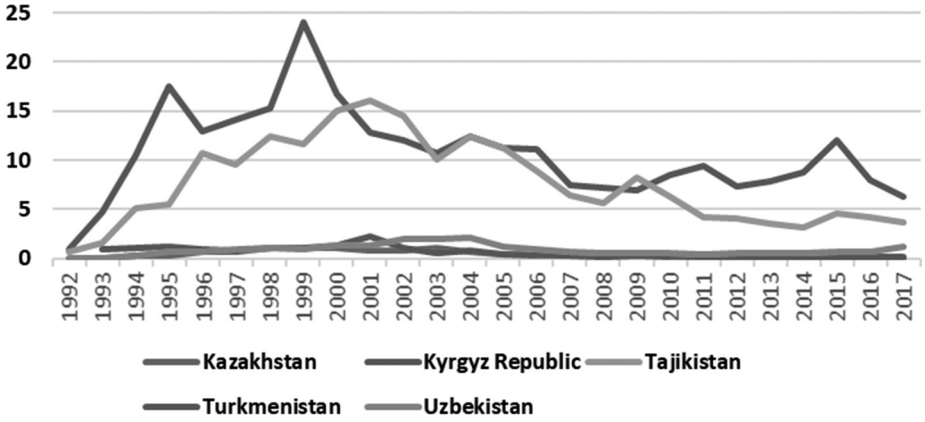

Figure 3: Net ODA compared to GNI in Central Asia between 1992-2017
Source: World Bank [14]

4.3. Major donors

To identify major donors for Central Asia the split between multilateral and bilateral foreign aid providers is essential.

The largest share of foreign aid for Central Asia is provided by multilateral development institutions (44 percent). Half of this amount comes from the regional development banks, 17 percent from the IDA, 13 percent from the EU institutions, 8-8 percent from the UN Agencies and global funds, and the rest from other multilateral sources.

Foreign aid from the DAC countries represents 42 percent. There is an extreme concentration of the major donors as the five largest donors provide 95 percent of this amount. The largest aid provider by far is Japan who provided USD 258.5 million aid for the region in 2017 representing over 40 percent of bilateral aid from the DAC members. The second largest donor is the US who provided USD 118.6 million of aid amounting to nearly 20 percent. Germany is the third with USD 88.9 million equal to almost 15 percent. They are followed by Korea (USD 69.4 million, 11 percent) and Switzerland (USD 53.9 million, 9 percent).

Other donor countries, who are not DAC members, − like Russia − also play an important role providing 14 percent of foreign aid altogether.

Figure 4 below presents the split of foreign aid for Central Asia provided by the DAC members, multilateral donors and other countries.

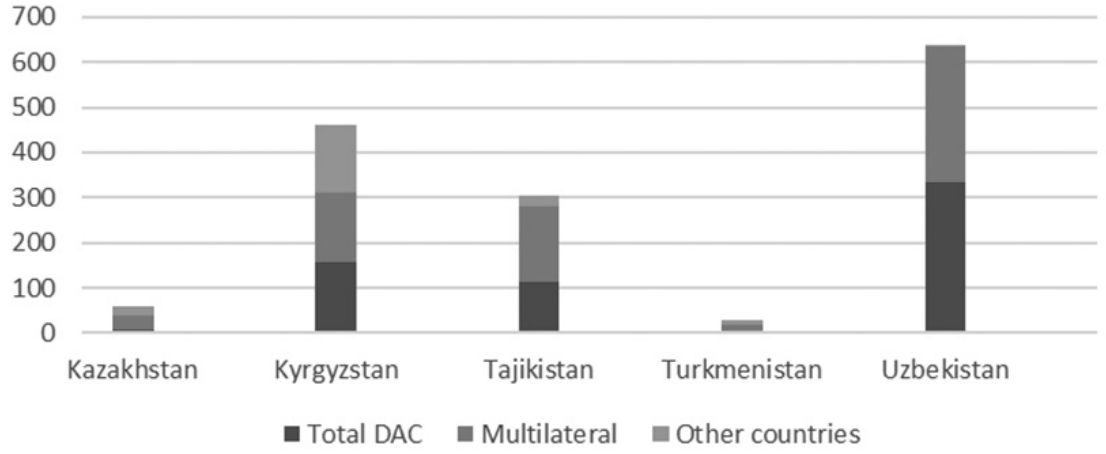

Figure 4: Distribution of Foreign Development Assistance Provided for Central Asia (million USD, 2017)
Source: OECD [15]

4.4. Foreign aid by purpose

Foreign aid by purpose can be analysed using annual bilateral ODA commitments. Last available figures for 2017 show that nearly half of all commitments for Central Asia was dedicated to social infrastructure and services, over 20 percent to economic infrastructure, nearly 10 percent to production sectors, and slightly more than 10 percent for humanitarian aid.

Figure 5 presents bilateral ODA commitments by purpose in USD million in 2017.

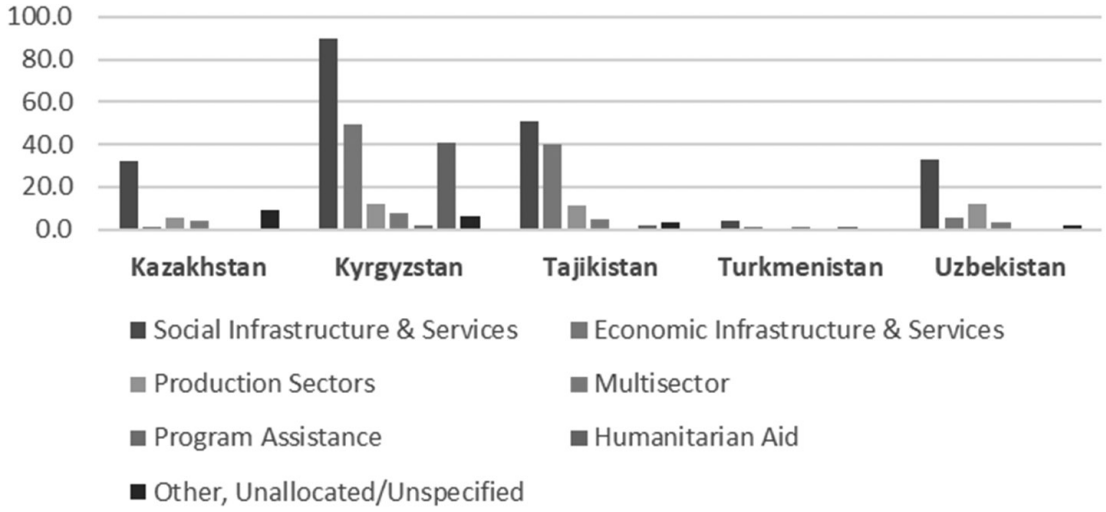

Figure 5: Bilateral ODA by purpose (USD million, 2017)
Source: OECD [15]

Social infrastructure and services − education, health and population, water and sanitation − received the most in all countries ranging from 62.21 percent in Kazakhstan to 43.04 percent in Kyrgyzstan. Education got far more than health and population − except for Tajikistan −, while water and sanitation lagged behind. Economic infrastructure and services were the second most important purpose in Kyrgyzstan and Tajikistan − being the two poorest countries of Central Asia − with 23.90 and 35.95 percent respectively. Production sector received over 20 percent in Uzbekistan, and a bit more than 10 percent in Tajikistan and Kazakhstan. In Uzbekistan the focus was on industry, mining and construction, while in Kazakhstan on agriculture. Trade and tourism exceeded 2 percent of bilateral ODA commitment only in Turkmenistan, but the amount was rather small, not more than USD 0.2 million. The share of humanitarian aid was close to 20 percent in Kyrgyzstan and Turkmenistan, but it was more than USD 40 million in Kyrgyzstan and not more than USD 1.5 million in Turkmenistan. ODA for other, unspecified purpose was remarkable only in Kazakhstan, where it represented 17.44 percent of ODA commitments. Program assistance was neglectable.

5. FOREIGN AID CONTRIBUTING TO TRANSITION AND DEVELOPMENT

Though foreign aid is only one of the factors besides domestic and other efforts contributing to transition and development, it certainly has a positive effect on the major indicators measuring progress.

Figures show that GDP/capita increased in three of the five countries from 1991 to 2017: in Kazakhstan, Turkmenistan and to a less extent in Uzbekistan. In Kyrgyzstan it was stable and in Tajikistan it declined. In the meantime, Human Development Index improved in all countries, especially in Kazakhstan and Uzbekistan. Economic Freedom also increased in all the five countries, but Democracy Index improved only in Kyrgyzstan.

The changes in these indicators suggest that foreign aid did contribute to transition and development in Central Asia but was not the main driver of progress. There is still a lot to do to help these countries catch up, so there will be a need for foreign aid in the future as well. It would be essential though to improve its effectiveness in order that people of the region have a better life and a brighter future in peace.

REFERENCES

[1] Gyene, P. (2017) *Független államiság a poszt-szovjet Közép Ázsiában*, Aposztróf Kiadó, Budapest, p. 296.
[2] Gyuris, F., Szabó, P. (2019) *Oroszország és Közép-Ázsia: hat szovjet utódállam*, http://www.geopolitika.hu/hu/521-2/ (accessed: 12.02.2019)
[3] Szálkai, K. (2015) *Közép-Ázsia és az Európai Unió kapcsolatrendszerének alakulása*, AJRC-Elemzések, Antall József Tudásközpont, Budapest, 11 p.
[4] Boonstra, J., Panella, R. (2018) *Three Reasons Why the EU Matters to Central Asia*, http://voicesoncentralasia.org/three-reasons-why-the-eu-matters-to-central-asia/ (accessed: 30.09.2018)
[5] Hudec, M. (2018) *China's Emergence in Central Asia*, IAS Institute of Asian Studies, Bratislava, p. 14.
[6] Paragi, B., Szent-Iványi, B., Vári, S. (2007) *Nemzetközi fejlesztési segélyezés – tankönyv*, TeTT Consult Kft., Budapest, p. 238.

[7] Furuoka, Fumitaka, Munir, Qaiser (2011) *An Empirical Analysis of the Motivations Behind Foreign Aid Distribution*, IUP Journal of Applied Economics Vol. 10, No. 2, pp. 28-47.
[8] Riddell, R.C. (2007) *Does Foreign Aid Really Work?* Oxford University Press, Oxford, p. 495.
[9] Easterly, W. R. (ed.) (2008) *Reinventing Foreign Aid*. The MIT Press, Cambridge, Massachusetts, p. 584.
[10] Kipling, R. *Kim*, http://mek.oszk.hu/02000/02093/02093.htm (accessed: 30.04.2019)
[11] Lee, D. (2017) *Central Asian integration: more real than ever?,* The Astana Times, https://astanatimes.com/2017/05/central-asian-integration-more-real-than-ever/ (accessed: 05.05.2019)
[12] UN data http://data.un.org/en/index.html (accessed: 05.05.2019)
[13] OECD https://stats.oecd.org/Index.aspx?DataSetCode=Table2A# (accessed: 05.05.2019)
[14] World Bank https://data.worldbank.org/indicator/DT.ODA.ODAT.GN.ZS?contextual=default&end=2017&locations=KZ-KG-TJ-TM-UZ&name_desc=false&start=1992&view=chart (accessed: 05.05.2019)
[15] OECD (2019) *Geographical Distribution of Financial Flows to Developing Countries*, https://www.oecd.org/dac/geographical-distribution-of-financial-flows-to-developing-countries-20743149.htm (accessed: 03.05.2019)

PROSUMER ENERGY AS AN OPPORTUNITY FOR THE DEVELOPMENT OF RURAL COMMUNITY IN POLAND

Anna Bartkowiak[1]
Piotr Bartkowiak[2]

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Abstract: *Prosumer energy is currently one of the main directions of agricultural development in Poland. Prosumer activity can bring many benefits, e.g.: ensure a stable energy supply, use waste generated by agricultural production, lower production costs, ensure social development. The aim of the article is to present the importance of prosumer energy in agricultural production to the development of rural community in accordance with the concept of sustainable development.*

Keywords: *prosumer energy, sustainable agricultural development, rural community.*

1. INTRODUCTION

Agriculture is one of the most important branches of Polish economy. Agricultural land, which occupies 18776.5 thousand hectares, accounts for 60% of the country's total area. The total number of agricultural farms is 1.4 million, while the number of people living in rural areas and working in agriculture is over 15.3 million (almost 40% of the total population in Poland). [11] In the last several years the development of agriculture in Poland has been quite dynamic. Both technical and technological progress is visible, as well as the increasing awareness of the rural community in terms of protection of the surrounding natural environment. Much attention is currently paid to activities aimed at the development of dispersed energy generation using renewable energy sources (RES) and prosumer activities in this area. They are an element of sustainable development aiming at social and economic progress and taking into account the protection of the natural environment against pollution from agricultural production.

According to the energy policy of the European Union [7], the share of RES energy in total energy consumption should be at least 20% (15% in the case of Poland). According to data from the Central Statistical Office [11], the share of renewable energy in the EU-28 countries in 2016 amounted to 27.9% in total and increased by 3.3 percentage points from 2013 onwards (Tab. 1). Among EU countries, the highest share of RES was recorded in Lithuania, Austria, Italy, Finland, Germany and Slovakia. In Poland, on the other hand, in 2016 it amounted to 13.6% and increased from 2013 only by 1.5 percentage points.

The agricultural sector is the largest contributor to the achievement of the EU targets related to renewable energy sources. [18], [20] Despite the fact that in Poland the rate of RES development is quite slow, a gradual progress can be observed in terms of investment into green energy sources. In the last 8 years, the number of agricultural biogas producers and installations has increased from 4 and 8 in 2011 to 86 and 96 in 2018, respectively (Fig. 1). The total capacity of the installed agricultural biogas installations in 2018 was over 4 million cubic meters, while the total electrical capacity of the installation was 102.786 MWe, of which the smallest installation was 0.080 MWe and the largest - 2.400 MWe [12].

[1] Institute of Technology and Life Sciences Poznań Branch, 60-463 Poznań, Biskupińska 67, Poland
[2] Department of Investment and Real Estate, Poznań University of Economics and Business, 61-875 Poznań, Al. Niepodległości 10, Poland

Table 1: Share of energy from renewable sources in primary energy in Poland, EU-28 and selected EU member states in 2013-2016 (%)

Description	2013	2014	2015	2016
Poland	12,1	12,1	13,1	13,6
UE-28	24,6	25,6	26,8	27,9
Lithuania	91,1	91,3	92,5	92,5
Austria	77,6	76,9	77,8	79,1
Italy	63,7	64,2	65,2	70,5
Finland	55,2	55,9	59,3	59,9
Germany	28,0	30,1	32,5	34,1
Slovakia	22,9	22,8	25,2	25,9
France	17,1	15,7	16,0	18,3
Czech Republic	13,5	14,2	14,9	15,8
Netherlands	6,3	7,6	9,9	10,2

Source: the author based on [11].

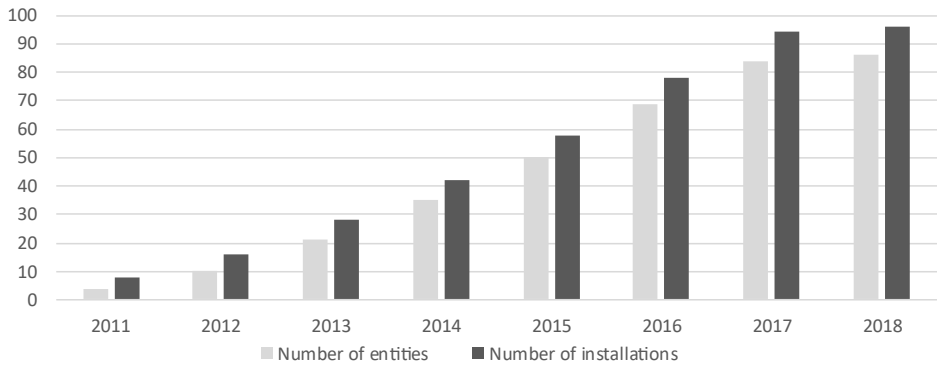

Figure 1: Number of entities and installations in the register of agricultural biogas producers in the years 2011-2017 (as of 1 January 2019) Source: the author based on [12]

Agriculture has a very high potential of biomass, which is used for energy production, and an equally high potential of liquid and gaseous fuels. In 2017 a total of about 3.8 million tons of raw materials was used for the production of agricultural biogas; most of it was slurry - over 21%, followed by distillers' soluble and residues of fruit and vegetables (Table 2). [12]

Table 2: Selected raw materials used for agricultural biogas production in 2017

Raw material	Consumption (thousand tons)
Slurry	807
Distillers' soluble	762
Residues of fruit and vegetables	757
Maize silage	472
Beet pulp	280
Green fodder	96
Manure	83
Grass and cereal silage	25
Avian manure	21
Straw	12

Source: the author based on [12]

Thanks to the growing number of biogas installations, the production of agricultural biogas, and thus the amount of electricity and heat, also increases every year (Table 3). In 2011, 73.4 GWh of electricity was produced from 37.7 million m^3 of biogas, while in 2018, almost 8 times more agricultural biogas was produced, from which 608.3 GWH of electricity was obtained. [12]

Table 3: Production of agricultural biogas, electricity and heat from agricultural biogas in 2011-2017

Year	Quantity of agricultural biogas produced (million m^3)	Amount of electricity produced from agricultural biogas (GWh)	Amount of heat produced from agricultural biogas (GWh)
2011	37,7	73,4	82,6
2012	73,2	141,8	160,1
2013	112,4	227,9	246,6
2014	174,3	355,0	373,9
2015	206,2	429,4	225,0*
2016	250,2	524,5	bd
2017	291,7	608,3	bd

*data for Q1 and Q2 2015; n.a. - not available
Source: the author based on [12]

The data presented above are optimistic, but further development of renewable energy in the agricultural sector still requires many actions, e.g. in terms of legal regulations, reduction of costs of green energy production or availability of financial support. It is also indispensable to activate Polish farmers, who still show a low propensity to undertake collective actions [18].

The aim of the article is to present the importance of prosumer energy in agricultural production to the development of rural community in accordance with the concept of sustainable development.

2. PROSUMER ENERGY IN AGRICULTURAL ACTIVITY IN THE CONCEPT OF SUSTAINABLE DEVELOPMENT

The concept of sustainable development is now applied in all sectors of the economy, including agriculture, where it refers to important social, ecological and economic values, creating a new approach to the principles of management and living in the rural environment. These values make it possible to ensure balance through the use of renewable natural resources, climate protection, introduction of new technologies as a strategy related to all aspects of sustainable agricultural production or protection of social interests. [1], [2], [3], [4], [5], [14]

The concept of sustainable development is particularly important in agriculture and rural areas, as it takes into account the need to achieve strategic development objectives. However, these actions face many social, economic, intellectual and ethical difficulties. They include a low level of affluence of the inhabitants, limited investment opportunities, low level of education and ecological awareness of the inhabitants, as well as tolerance for inappropriate behaviour.

The implementation of the concept of sustainable development is an important direction of the development of agricultural activity and rural areas in Poland. Efforts are made to improve the quality of life of the rural community, and an active participation in innovative activities is observed. These activities consist, among others, in the development of a model of low-emission, innovative and more effective agriculture.

A new direction of activities in the economy, i.e. prosumerism, is helpful in this respect. Prosumerism is a certain set of behaviours and social attitudes (of prosumers), where the maximisation of material benefits, as well as intangible benefits, those resulting from the production

process and those arising at the moment of consumption, is considered as a determinant of the value of a product.

The term „prosumer" was introduced in 1980 by Alvin Toffler. Initially, it meant a proactive consumer whose aim was to design and improve goods and services. Nowadays, it means a consumer who consumes what he produces [13].

According to Paltrinieri & Esposti [16], the introduction of the new term has led to a better understanding of the social changes resulting from the development of social media, as well as the role of the consumer who participates in these changes. Therefore, being a prosumer means, first and foremost, being involved in production and consumption processes and having a social role and function resulting from the opportunities offered by digital technology and augmented reality. In this way, civic engagement and building relationships based on specific interests, mutual trust and thus mutual support are promoted.

In today's economy, both in Poland and around the world, prosumers are becoming increasingly important in the consumer market. They constitute a growing group of users thanks to technological changes, access to modern solutions and the Internet. The essence of prosumer activity is to interact with various companies. Nowacki [15], referring to the cooperation of prosumers with enterprises, distinguished several types of prosumers based on the criterion of involvement in the cooperation process:

- Level I - active users who make little contribution through the social networks of which they are members;
- Level II – engaged users who create ideas for the enterprise. The enterprise offers these ideas only to the co-creating prosumer;
- Level III – an innovative user who creates innovations for other prosumers or enterprises that use them exclusively for their own needs;
- Level IV – partners of the enterprise, who, together with the enterprise, jointly create innovations subsequently offered to all buyers;
- Level V – co-creators of the market, who build an E2E (*everyone-to-everyone*) market where everyone works together;
- Level VI – market creators who create sectors on their own with the participation of other prosumers.

Currently, a lot of attention is paid to prosumer energy, which, through the implementation of basic aspects of sustainable development, is one of the most important trends in the field of renewable energy. Newly emerging RES technologies may ensure both environmental protection and stimulate the country's economic development, increase competition on the energy market and introduce innovations in the energy sector. Agriculture and rural areas, where there is a huge potential for the future energy market, occupy a special place in the implementation of the principles of sustainable development. Thanks to the development of social capital in the field of prosumer energy among the inhabitants of rural areas, taking into account the increase in their ability to act collectively through prosumer groups, including cooperatives, it is possible to create synergistic effects, create interactive information exchange models/procedures and conduct social dialogue.

Prosumer energy (PE) implemented in the agricultural sector can generate many benefits, e.g. ensure stable energy supply, use waste generated by agricultural production, reduce production costs, protect the natural environment, promote local development, ensure social development,

and increase the competitiveness of enterprises. The rural community has an opportunity to become involved in these activities, *inter alia* through the acquisition of new knowledge, modernisation of farms and implementation of new technologies. The creation of prosumer groups may constitute an important counterbalance for both state and market units. It is important to develop tools that will enable the use of RES installations both for energy production and sanitation of animal production in order to reduce its pressure on the environment.

Increasing energy efficiency and minimizing energy consumption are the main elements of energy strategies of highly developed countries. Parallel to this there is also the question of sources from which households, enterprises and institutions are supplied with electricity. Currently, Poland's energy mix is not favourable from the point of view of energy efficiency, energy generation costs and emissions of harmful substances into the atmosphere. Combined with the growing demand for energy and the unsatisfactory condition of the generation and transmission infrastructure, it does not guarantee full and effective protection of the country's energy needs. In this respect, there is a need to increase the share of renewable energy in the energy balance, especially on a local scale, to support the production of energy by prosumers and to protect them, which in turn gives a chance to meet these challenges.

The name *prosumer* refers to every type of economic activity, but in the case of agriculture it is an evolutionary process with a change in thinking and, as a consequence, the transformation of the energy sphere. Prosumers enable the production and use of energy at local level to become a natural stimulus for rural development and a factor in the continuous improvement of the quality of life of the rural community [10].

3. DEVELOPMENT OF THE RURAL COMMUNITY IN THE PROCESS OF PROSUMER ENERGY GENERATION

The increase in the number of prosumers is an extremely expected trend. This may contribute to the widespread use of renewable energy sources, the development of additional economic activities, as well as an increase in energy security. In this respect, there is a need for legislative, administrative and financial support, i.e. undertakings aimed at the development of a dispersed generation [6].

In modern farms the demand for electricity and heat is growing, which is also associated with higher costs. Therefore, it is important to implement an economy based on renewable energy sources and to strive for energy self-sufficiency of agricultural farms through the development of prosumer energy. There are many possible applications of RES in Poland. Current technologies for the production of electricity and heat include: biomass processing, the use of solar collectors and photovoltaics, the use of wind and water energy, the use of heat pumps and the operation of agricultural biogas plants [9].

The energy situation in rural areas is much worse than in cities. To date, access to energy sources, especially modern and low-carbon ones, has been reduced. This problem is all the more important as farmers, in addition to household energy needs, also need a significant amount of energy for agricultural work. Moreover, the use of traditional energy sources, mainly wood and hard coal (over 80% of households), dominates in agriculture. Renewable energy sources are used only to a small extent.

Among renewable energy sources, solar energy is the most commonly used. Research shows that it is associated with cleanliness of use and low operating costs. The problem of incineration of waste, mainly plastic waste in rural households, is also worth mentioning. These activities confirm the still low ecological awareness of the rural population and the resulting consequences. Therefore, it is necessary to modernise farms in rural areas, as this will allow for changes in the awareness of their inhabitants and greater use of renewable and low-emission energy sources [8].

Financial resources of rural communities are often treated as barriers to the development of agriculture and rural areas in Poland. Many inhabitants of rural areas are poor and consequently will never get a loan. Banks often refuse loans because rural applicants cannot provide sufficient repayment guarantees. In addition, the lack of knowledge about renewable energy sources, including the fear of incurring losses as a result of investments in green energy, discourages rural residents from taking action in this area. For this reason, measures are needed to satisfy the financial needs of prosumers for the reconstruction of farms and to guarantee their protection for a long time.

Research carried out by the Forum for the Development of Efficient Energy has shown that the ecological awareness of the rural population is still at a low level. In response to the choice of energy source for their farms, rural residents were guided mainly by the costs of use, installation costs, or the simplicity of operation of the energy installation. Environmental issues were less important [8].

The European Economic and Social Committee [17] considers the development of dispersed prosumer energy to be a necessary direction as a long-established element of EU energy policy, for reasons of energy security, environmental protection and social aspects. The benefits of prosumer energy are primarily related to lower energy transmission costs, better use of local energy sources and professional activation of local communities.

The creation of good relations between prosumers, other energy producers and companies dealing with energy transmission and distribution is one element of the dynamic development of prosumer energy. The creation of prosumer cooperatives is helpful in this respect. For example, in Germany prosumer cooperatives are a group of communities that support each other and are involved in the process of improving energy security in their area and optimizing solutions tailored to the needs and conditions of the community [17]. Tarhan [19] states that as early as in 2014 there were about 3000 renewable energy cooperatives in Europe, of which 80% were located in Germany and Denmark. The aim of the cooperative is energy production, sales and distribution. In a common business structure, the units share the costs, risks and duties of capital-intensive renewable energy projects. In addition, the members share the economic benefits mainly through the sale of the energy produced to the grid, the consumption of the energy produced by the members, the combination of sales and consumption and the generation of additional economic value (income stream). Revenues for cooperatives are also related to the use of guaranteed tariffs or long-term contracts for the sale of electricity from renewable sources. Cooperatives also show positive social results, e.g. through a „strong sense of community", making joint decisions, the possibility of acquiring new knowledge and skills, generating income for the inhabitants of rural areas, strengthening the impact on raising funds related to the activity. Cooperatives also contribute to the care and protection of the natural environment by minimizing hazards and they work for the rationality of energy use.

4. CONCLUSION

Prosumer energy is currently one of the desirable directions of development of farms, ensuring energy security and environmental protection. Each of the actions taken for the benefit of prosumer energy requires a holistic approach in order to implement the principles of sustainable development. The application of these principles is considered to be an integral part of all economic activity and daily practice.

The investment potential in renewable energy sources in Poland is very high. However, it is not used due to numerous barriers that hinder progress in this area. All activities supporting RES should primarily concern innovative technologies, legal support (through appropriate legal acts) and financial support of investments (through e.g. investment grants, guaranteed tariffs, subsidies, tax reliefs), reduction of energy production costs and activities aimed at activating the rural population to cooperate within prosumer cooperatives.

Therefore, we should strive for a kind of revolution, which would accelerate both the use of technical and/or technological and human potential in agriculture, as well as the possibility of obtaining many different natural sources of energy for its processing and use without adverse impact on the natural environment.

REFERENCES

[1] Bartkowiak A., 2012, Analiza wskaźników zrównoważonego rozwoju w produkcji zwierzęcej w kontekście dobrostanu zwierząt według schematu P-S-R. [Analysis of sustainable development indicators in animal production in the context of animal welfare according to the P-S-R scheme]. Problemy Inżynierii Rolniczej, Falenty, z. 3(77), 143-150.
[2] Bartkowiak A., Bartkowiak P., 2012, The determinants of sustainable development of agriculture sector in Poland. Transformations in Business & Economics, Vol. 11, No 2A (26A), Brno-Kaunas-Riga-Vilnius, 42-59.
[3] Bartkowiak A., Bartkowiak P., 2017, Technical and technological progress in the context of sustainable development of agriculture in Poland. Elsevier, Procedia Engineering, ISSN: 1877-7058, nr 182, s. 66-75,
[4] Bartkowiak P., 2008, Zarządzanie przedsiębiorstwem komunalnym w realizacji koncepcji zrównoważonego rozwoju. [Management of a municipal enterprise in the implementation of the concept of sustainable development]. Ed. Akademia Ekonomiczna w Poznaniu, Poznań.
[5] Baum R. 2008, Zrównoważony rozwój rolnictwa i kryteria jego oceny [Sustainable development of agriculture and criteria for its evaluation]. Journal Agribusiness and Rural Development 1(7), last accessed on 15.1.2012. http://www.jard.edu.pl.
[6] Chodkowska-Miszczuk J., 2015, Biogazownie rolnicze w rozwoju małoskalowych instalacji odnawialnych źródeł energii. [Agricultural biogas plants in the development of small-scale installations of renewable energy sources]. Roczniki Naukowe Ekonomiki Rolnictwa i Rozwoju Obszarów Wiejskich. T. 102, z. 1, 97-105.
[7] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.
[8] Energy modernisation of the Polish countryside: towards prosumer energy. Energy Efficiency Development Forum. Warszawa, March 2013.

[9] Galiński Z., 2016, Energetyka prosumencka na obszarach wiejskich. [Prosumer energy in rural areas]. CDR Brwinowie Oddział w Radomiu, Radom.
[10] Gołaszewski J., Rewolucja w rolnictwie. [Revolution in agriculture]. www.klaster3x20.pl, last accessed on 29.11.2017, http://www.sciencedirect.com/science/journal/18777058/182
[11] Central Statistical Office (GUS), 2018, Rocznik statystyczny rolnictwa. [Statistical annual agriculture]. Warszawa.
[12] http://www.kowr.gov.pl/ of 4.03.2019r.
[13] Kotler P., 1986,"The Prosumer Movement: A New Challenge For Marketers", in NA - Advances in Consumer Research Volume 13, eds. Richard J. Lutz, Provo, UT: Association for Consumer Research, Pages: 510-513. last accessed on 9.02.2019 http://acrwebsite.org/volumes/6542/volumes/v13/NA-13
[14] Lampkin, N.H., Pearce, B.D., Leake, A.R., Creissen, H., Gerrard, C.L., Girling, R., Lloyd, S., Padel, S., Smith, J., Smith, L.G., Vieweger, A., Wolfe, M.S., 2015. The Role of Agroecology in Sustainable Intensification. Report for the Land Use Policy Group. Organic Research Centre, Elm Farm and Game & Wildlife Conservation Trust. Technical Report, June 2015.
[15] Nowacki F., 2016, Prosumenci – przyszłość współpracy konsumentów z przedsiębiorcami. Studia Ekonomiczne. [Prosumers - the future of consumer cooperation with entrepreneurs. Economic Studies]. Zesz. Nauk. UE w Katowicach, nr 255, 136-144.
[16] Paltrinieri R. & Esposti P.D., 2013, Processes of Inclusion and Exclusion in the Sphere of Prosumerism. Future Internet 2013, *5*(1), 21-33; doi:10.3390/fi5010021
[17] Pietkiewicz J., Energetyka prosumencka i prosumenckie spółdzielnie energetyczne – możliwości i wyzwania państw członkowskich UE. Opinia [Prosumer energy and prosumer energy cooperatives - opportunities and challenges of EU Member States. Opinion], European Economic and Social Committee, TEN/583, Brussels 2016.
[18] Sulewski P., Majewski E., Wąs A., 2017, Miejsce i rola rolnictwa w produkcji energii odnawialnej w Polsce i UE. [The place and role of agriculture in the production of renewable energy in Poland and the EU]. Zagadnienia Ekonomiki Rolnej 1(350), 50-74.
[19] Tarhan M.D.,2015, Renewable Energy Cooperatives: a review of demonstrated impacts and limitations. JEOD Volume 4, Issue 1, 104-120.
[20] Wiśniewski G., 2016, Odnawialne źródła energii w rolnictwie – uwagi o polityce rolnej i energetycznej [Renewable energy sources in agriculture – comments on agricultural and energy policy]. Czysta Energia No 4, www.cire.pl; last accessed on 12.03.2019.

MDA FINANCIAL DISTRESS PREDICTION MODEL FOR HUNGARIAN COMPANIES

Marek Durica[1]
Lucia Svabova[2]

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Abstract: *Company financial distress prediction is one of the most discussed issues of economists around the world in recent decades. From the first attempts in the 1960s to the present, one of the most widely used method to create these models is Multiple Discriminant Analysis. In the paper, we present the prediction model for Hungarian companies created using this method based on real data from the financial statements obtained from database Amadeus. Our database contains data of more than 250,000 companies and 26 financial indicators used as predictors. There is possibility to predict the financial difficulties of companies one year in advance using this model.*

Keywords: *Prediction model, Multidimensional Discrimination Analysis, Financial distress, Financial ratios, Prediction ability.*

1. INTRODUCTION

Financial distress prediction has been a very interesting topic over the last decades because of its great importance for companies, interested stakeholders and even for the economy of a country. If this prediction is reliable, managers of companies can initiate remedial measures to avoid financial distress situation.

The main aim of the paper is the creation of financial distress prediction model of Hungarian companies. This model is created using Multidimensional Discriminant Analysis (MDA). The originality of the research lies in the using of a large dataset of financial indicators of more than 250,000 real Hungarian companies. The purpose of the paper is to identify potential financial risks considering Slovak economic conditions.

The rest of the paper is divided into four main parts. Literature review briefly describes of theoretical background and most important related works. The data description and principles of MDA is described in the Methodology section. Results is focused on the description of the developed model. In section Conclusion, discussion and analysis of the results is provided.

2. LITERATURE REVIEW

In this area of financial distress prediction, papers by Altman and Ohlson can be considered as groundbreaking. In 1968, Altman created the first commonly used bankruptcy model using a Multidimensional Discrimination Analysis (MDA) [1]. According to many authors, Altman's

[1] University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Quantitative Methods and Economic Informatics, Univerzitna 1, 010 26 Zilina, Slovak Republic

[2] University of Zilina, Faculty of Operation and Economics of Transport and Communications, Department of Economics, Univerzitna 1, 010 26 Zilina, Slovak Republic

model still represents an effective tool to predict bankruptcy [2]. Another commonly used statistical technique for creation of prediction models is logistic regression (logit) models. In 1980, this technique of prediction model creation was used for the first time by Ohlson [3]. These two statistical methods are still commonly used in the area of financial distress prediction [4].

Among machine learning methods based on artificial intelligence, artificial neural networks and decision trees are the most commonly used techniques [5]. In 2018, Popescu and Dragotă [6] identified the financial distress predictors for five post-communist countries (Bulgaria, Croatia, the Czech Republic, Hungary and Romania) using CHAID decision tree and neural networks. In Slovakia, Gavurova [7] and Karas and Reznakova [8] developed prediction models using decision trees.

In 2001, Hajdu and Virág [9] developed the first models of financial distress prediction for the Hungarian companies. Author used a sample of 154 companies, of which half were insolvent. The models were constructed based on MDA and logistic regression approach. In 2005, Virág and Kristóf [10] developed a model based on the same data as in previous models. Also, they built another model using artificial neural networks. This model was characterised by higher efficiency compared with previous models. Again, using the same dataset, Virág and Nyitrai [11] built models using the techniques of support vector machines and rough set theory. In 2014, Ékes and Koloszár [12] estimated models predicting bankruptcy of Hungarian SMEs using MDA, logistic regression analysis, and classification trees. Models estimated by them were highly efficient, mainly, compared to other Hungarian and foreign (Altman, Ohlson, etc.) models. In 2016, based on data from 1996–2014, Bauer and Endrész [13] built a probit model for predicting the insolvency of Hungarian companies. Author included to the model some macroeconomic variables and qualitative characteristics of companies.

3. METHODOLOGY

Our database contains data more than 250,000 companies operating in Hungarian business environment. This database consists of financial indicators that was calculated from the real financial statements obtained from Amadeus - A database of comparable financial information for public and private companies across Europe. Balance sheets and profit-and-loss statements were used. Table 1 lists financial indicators used as potential predictors and the methods of their calculation. These predictors are financial ratios calculated from financial statements from the year 2016. Besides, as predictors, we use Level 1 NACE codes (according to Statistical Classification of Economic Activities in the European Community Rev. 2) and also the company size indicator (Small, Medium and Large, Very Large). These indicators have to be encoded as dummy variables.

The main aim of this research is to create a model predicting the company's financial distress one year in advance. So that the output variable *Distress* identifies the financial distress of the companies was considered in 2017. Table 2 describes the frequencies and percentages of financial-distressed and non-financial-distressed companies in our dataset.

The MDA approach was used to identify significant predictors and create financial distress prediction model. In this field, this approach is still the most frequently used statistical method [14]. The choice of significant predictors can be made based on the test of equality of means of these predictors between the group of financial-distressed companies and the group of non-financial-distressed companies. But, in this research, we use stepwise MDA approach. This approach selects only significant variables one-by-one. Moreover, it solves the problem of multi-collinearity of independent variables (predictors).

Table 1: List of financial indicators used as predictors

Predictor	***Formula***
X01	Sales/Total Assets
X02	Current Assets/Current Liabilities
X04	Net Income/Shareholders Equity
X07	Net income/Total Assets
X08	Working Capital/Total Assets
X09	EBIT/Total Assets
X10	Liabilities/Total Assets
X11	Current Assets/Total Assets
X12	Cash & Cash Equivalents/Total Assets
X15	Current Liabilities/Total Assets
X16	Current Assets/Sales
X18	Stock/Sales
X20	Net Income/Sales
X21	Non-current Liabilities/Total Assets
X22	Cash & Cash Equivalents/Current Liabilities
X24	Working Capital/Sales
X25	Current Ratio
X26	(Current Assets-Stock)/Current Liabilities
X27	ROA
X28	ROE
X30	Solvency Ratio
X35	Profit Margin
X36	Net Current Assets
X37	Working Capital

Table 2: Frequencies and percentages of financial-distressed and non-financial-distressed companies

Distress	Frequency	Per cent
No	205448	81.4
Yes	46923	18.6
Total	252371	100.0

The main result of MDA is Fisher canonical discriminant function, which is a linear function of the significant predictors. This function separates companies into the group of financial-distressed companies and the group of non-financial-distressed companies. We can calculate the discriminant score for the classification of the company into one of these two groups. Then, this score with the weighted averages of centroids (average scores in the groups of companies) can be compared [15]. If the constant in discriminant function is used, it is sufficient to compare the calculated discriminant score with zero. Analogously, based on the values of the two Fisher's linear discriminant functions, we could decide on the prediction of financial distress or non-financial distress of the company.

The quality of the MDA model can be assessed from several points of view. Statistical significance of canonical discriminant function indicates how well the model describes the data. Standardised coefficients of discriminant function and their statistical significance assess the contribution of individual predictors to explain the variability in the dataset.

The analysis of the classification table evaluates the classification or prediction ability of the developed model. This table illustrates the absolute and relative quantity of correctly and non-correctly classified companies in each group. The classification ability is usually overestimated if the ability of the model is calculated on the sample that was used to modelling. It is appropriate to divide the dataset into the sample. Training sample is used for the model creation, and the testing sample is used to calculate the classification ability of the model. We used the random division in the most frequently used ratio of 80:20. [16]

Another approach to analyse the quality of financial distress prediction model is using or Receiver Operating Characteristic (ROC) curve. The ROC curve gives an image of the behaviour of the created model. The vertical axis shows the percentage of financial-distressed companies that have been correctly classified in the financial-distressed group, called a true positive rate or also sensitivity. The horizontal axis shows the percentage of non-financial-distressed companies that have been incorrectly classified in the financial-distressed group, which we also call a false positive rate or 1-specificity.

The AUC (Area Under Curve) is a frequently used criterion for comparing financial distress prediction models or for assessing the classification ability by the created model. The maximum value of AUC is 1, i.e. 100%. Thus, if the size of the AUC is close to 1, then the created model has an excellent classification ability. If the size of the AUC is close to 0.5, the classification ability of the model is not good.

4. RESULTS

To create a prediction model, we use the stepwise MDA approach, as was mentioned already. At first, we look at the results of One-way ANOVA to identify predictors that significantly differentiate companies into a group of companies in financial distress and healthy companies. Table 4 shows these results. We can exclude variables X11, X12, X16, X18, X20, X24, X30, X36 and X37 from the next analysis because we cannot claim that their mean values for the two groups of companies are significantly different.

Table 3: Tests of Equality of Group Means

Predictor	*Wilks' Lambda*	*F*	*df1*	*df2*	*Sig.*
X01	0.999	8.006	1	10719	0.005
X02	0.999	6.881	1	10719	0.009
X04	0.990	105.279	1	10719	0.000
X07	0.989	123.248	1	10719	0.000
X08	0.999	7.325	1	10719	0.007
X09	0.988	127.341	1	10719	0.000
X10	0.977	253.259	1	10719	0.000
X11	1.000	1.339	1	10719	0.247
X12	1.000	0.989	1	10719	0.320
X15	0.982	196.736	1	10719	0.000
X16	1.000	0.038	1	10719	0.846
X18	1.000	0.012	1	10719	0.913
X20	1.000	0.003	1	10719	0.956
X21	0.998	16.773	1	10719	0.000
X22	0.999	6.388	1	10719	0.012

Predictor	*Wilks' Lambda*	*F*	*df1*	*df2*	*Sig.*
X24	1.000	0.012	1	10719	0.913
X25	0.999	6.881	1	10719	0.009
X26	0.999	6.213	1	10719	0.013
X27	0.987	138.952	1	10719	0.000
X28	0.988	126.131	1	10719	0.000
X30	1.000	0.727	1	10719	0.394
X35	0.991	100.793	1	10719	0.000
X36	1.000	2.853	1	10719	0.091
X37	1.000	0.208	1	10719	0.648
NACE=A. Agriculture, forestry and fishing	0.999	5.875	1	10719	0.015
NACE=B. Mining and quarrying	1.000	0.032	1	10719	0.857
NACE=C. Manufacturing	1.000	2.038	1	10719	0.153
NACE=D. Electricity, gas, steam and air conditioning supply	1.000	4.398	1	10719	0.036
NACE=F. Construction	1.000	0.375	1	10719	0.541
NACE=G. Wholesale and retail trade, repair of motor vehicles and motorcycles	1.000	0.112	1	10719	0.738
NACE=H. Transportation and storage	1.000	2.482	1	10719	0.115
NACE=I. Accommodation and food service activities	1.000	1.403	1	10719	0.236
NACE=J. Information and communication	1.000	0.153	1	10719	0.696
NACE=K. Financial and insurance activities	1.000	0.233	1	10719	0.630
NACE=N. Administrative and support service activities	1.000	4.907	1	10719.000	0.027
NACE=P. Education	1.000	1.418	1	10719.000	0.234
NACE=Q. Human health and social work activities	1.000	0.070	1	10719.000	0.791
company_size=Small	0.997	33.518	1	10719.000	0.000
company_size=Medium	1.000	5.146	1	10719.000	0.023
company_size=Large, Very large	0.999	11.816	1	10719.000	0.001

The canonical correlation of discriminant function is significant but is not very high (0.058 only).

Table 4: Canonical correlation

Function	*Eigenvalue*	*% of Variance*	*Cumulative %*	*Canonical Correlation*
1	100.0	100.0	0.234	.058[a]

Test of Function(s)	*Wilks' Lambda*	*Chi-square*	*df*	*Sig.*
1	0.945	603.861	11	.000

The stepwise method included variables to the model one by one. Table 5 shows the final list of relevant predictors in our model. Moreover, Table 5 describes the discrimination ability of individual variables. Variables X10 and X28 have the greatest discrimination ability.

Table 5: Standardized Canonical Discriminant Function Coefficients

Variable	*Coefficient*
X02_2015	0.326
X09_2015	-0.206
X10_2015	1.019
X11_2015	-0.142
X12_2015	0.199
X21_2015	-0.217
X22_2015	-0.201
X28_2015	-0.517
NACE=G. Wholesale and retail trade. repair of motor vehicles and motorcycles	-0.088
company_size=Small	0.278
company_size=Large, Very large	-0.159

We can calculate a discriminant score for every company using unstandardized canonical discriminant function (in Table 6). That allows to include a company into the group of companies in financial-distressed or non-financial-distressed companies.

Table 6: Canonical Discriminant Function Coefficients

Predictor	*Coefficient*
X02_2015	0.044
X09_2015	-1.330
X10_2015	3.867
X11_2015	-0.516
X12_2015	0.927
X21_2015	-1.465
X22_2015	-0.041
X28_2015	-0.596
NACE=G. Wholesale and retail trade, repair of motor vehicles and motorcycles	-0.190
company_size=Small	0.617
company_size=Large, Very large	-0.370
(Constant)	-1.488

Analogously, we could decide on the company's inclusion based on the values of Fisher's Linear Discriminant Functions. For every company, we calculate the value of these discriminant functions. The greater value identifies inclusion to one of the companies' groups.

Table 7: Classification Function Coefficients

Predictor	*Distress*	
	No	*Yes*
X02_2015	0.143	0.220
X09_2015	4.038	1.694
X10_2015	7.193	14.008
X11_2015	7.669	6.760
X12_2015	0.924	2.558
X21_2015	5.119	2.538
X22_2015	-0.070	-0.143
X28_2015	-0.788	-1.838
NACE=G. Wholesale and retail trade, repair of motor vehicles and motorcycles	0.116	-0.219
company_size=Small	1.618	2.706
company_size=Large, Very large	1.447	0.795
(Constant)	-5.966	-10.083

For practical use of the model, the model must have sufficient discrimination ability. We evaluate this ability based on a classification table (Table 8).

Table 8: Classification Results

		Distress	*Predicted Group Membership*		*Total*
Sample			***No***	***Yes***	
Training Sample	Count	No	143120	62328	205448
		Yes	2103	44820	46923
	%	No	69.7	30.3	100.0
		Yes	4.5	95.5	100.0
Testing Sample	Count	No	144935	60513	205448
		Yes	4439	42484	46923
	%	No	70.5	29.5	100.0
		Yes	9.5	90.5	100.0

Table 8 clearly shows the better classification of financial-distressed companies. In the training sample, 95,5 % of financial-distressed companies were classified correctly. This ability is 90,5 % in the test sample. The developed model achieves a relatively high overall prediction ability. It is because 74.3 % of companies were correctly classified.

4. CONCLUSION

We have designed a model predicting the risk of financial distress of Hungarian companies one year in advance. We used the dataset of more than 250,000 Hungarian companies. Financial indicators were calculated based on the real financial statement listed in this database Amadeus. Using MDA, we identified 11 statistically signification predictors These predictors provide the best identification of financial distress.

Developed canonical discriminant function forms our prediction model. One can calculate a discriminant score for some company. Based on this score, there is possible to identify the imminent financial distress situation in this company. The overall prediction ability of our model is more than 74 %, and financial distress prediction ability is more than 90%. So, this model can be considered as relative reliable instrument to financial distress prediction. Model was designed for Hungarian companies. But there is a possibility to use this model also in other emerging market countries. In this case, we expect a lower prediction ability.

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REFERENCES

[1] Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. *The Journal of Finance*, *23*(4), 589-609. doi: 10.1111/j.1540-6261.1968.tb00843.x

[2] Kral, P. (2018). The impact of the ratio indicators on the predictive reliability of the MDA bankruptcy models. *Podniková ekonomika a manažment*, (1)*,* 65-74.

[3] Ohlson, J. A. (1980). Financial Ratios and the Probabilistic Prediction of Bankruptcy. *Journal of Accounting Research*, *18*(1), 109-131. doi: 10.2307/2490395
[4] Li, J., Ragozar, R. (2012). Application of the Z -Score Model with Consideration of Total Assets Volatility in Predicting Corporate Financial Failures from 2000-2010. *Journal of Accounting and Finance*, *12*(2), 11-19.
[5] Alaka, H. A., Oyedele, L. O., Owolabi, H. A., Kumar, V., Ajayi, S. O., Akinade, O. O., & Bilal, M. (2018). Systematic review of bankruptcy prediction models: Towards a framework for tool selection. *Expert Systems with Applications*, *94*, 164-184. doi: 10.1016/j.eswa.2017.10.040
[6] Popescu, M. E., & Dragotă, V. (2018). What Do Post-Communist Countries Have in Common When Predicting Financial Distress? *Prague Economic Papers*, *27*(6), 637-653. doi: 10.18267/j.pep.664
[7] Gavurova, B., Janke, F., Packova, M., & Pridavok, M. (2017). Analysis of Impact of Using the Trend Variables on Bankruptcy Prediction Models Performance. *Ekonomicky casopis*, *65*(4), 370-383.
[8] Karas, M., & Režňáková, M. (2017). Predicting the Bankruptcy of Construction Companies: A CART-Based Model. *Engineering Economics*, *28*(2). doi: 10.5755/j01.ee.28.2.16353
[9] Hajdu, O., & Virág, M. (2001). A Hungarian Model for Predicting Financial Bankruptcy. *Society and Economy in Central and Eastern Europe*, *23*(1-2), 28-46.
[10] Virág, M., & Kristóf, T. (2005). Neural Networks in Bankruptcy Prediction - A Comparative Study on the Basis of the First Hungarian Bankruptcy Model. *Acta Oeconomica*, *55*(4), 403-426. doi: 10.1556/aoecon.55.2005.4.2
[11] Virág, M., & Nyitrai, T. (2014). Is there a trade-off between the predictive power and the interpretability of bankruptcy models? The case of the first Hungarian bankruptcy prediction model. *Acta Oeconomica*, *64*(4), 419-440. doi: 10.1556/aoecon.64.2014.4.2
[12] Ékes, K.S., & Koloszár, L. (2014). The Efficiency of Bankruptcy Forecast Models in the Hungarian SME Sector. *Journal of Competitiveness*, *6*(2): 56-73. doi: 10.7441/joc.2014.02.05
[13] Bauer, P, & Endrész, M. (2016). Modelling Bankruptcy Using Hungarian Firm-Level Data. *MNB Occasional Papers*, 122. Budapest: Magyar Nemzeti Bank.
[14] Hunger, J. D., Wheelen, T. L. (2007) *Essential of Strategic Management*, Prentice-Hall, Upper Saddle River, New Jersey, pp. 20-21.
[15] Podhorska, I., Misankova, M., & Valaskova, K. (2018). Searching for Key Factors in Enterprise Bankrupt Prediction: A Case Study in Slovak Republic. *Economics and Culture, 15,* 78-87. doi: 10.2478/jec-2018-0009
[16] Durica, M., Adamko, P., & Valaskova, K. (2018). MDA financial distress prediction model for selected Balkan countries. *Balkans Journal of Emerging Trends in Social Sciences*, 1(1), 85-93. doi: 10.31410/Balkans.JETSS.2018.1.1.85-93

DO CONVENTIAL DURATIOS WORK IN PRACTICE?

Bohumil Stádník[1]

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Abstract: *The Macaulay Duration could be roughly interpreted as the percentage change of a bond price if the shift of interest rate equals 1% along the whole zero-coupon curve; which is empirically very rare case. To deal with the prediction of short-term rates shifts and its consequences for the whole yield curve is more often praxis, thus it is useful to define a certain value which respects this fact and which is handled in the same way as Macaulay Duration. We name this measure as "Short Rate Shift Duration" and the main contribution of this study is to suggest a procedure which allows to find its values.*

Keywords: *Short Rate Shift Duration, conventional duration, Macaulay Duration, Short Rate Shift Duration of portfolio, zero-coupon yield curve.*

1. INTRODUCTION

Price of an asset with respect to the change of interest rates; and its price sensitivity measurement is a critical issue for an assessment of market risk in case of a portfolio of interest rate sensitive assets, such as bonds or loans.

The value of Macaulay Duration (one of the most popular quantification method for sensitivity issues) could be roughly financially interpreted as the change of a bond price if the shift of interest rate equals 1% along the whole zero-coupon curve (along the whole spectrum of maturities), when initial price of the bond is equaled to 100%. In this case we may conclude, that the ratio of average price changes of two assets should be approximately the same as the ratio of their Macaulay Durations. But in financial practice this duration is problematic as the parallel curve shift is very rare.

In the financial praxis we deal more often with the prediction of short-term rates shifts and its consequences for the whole yield curve. Movements in short-term interest rates, as dictated by a nation's central bank, will affect different bonds with different terms to maturity differently, depending on the market's expectations of future levels of inflation. For example, a change in short-term interest rates that does not affect long-term interest rates will have little effect on a long-term bond's price and yield. However, a change in short-term interest rates that affect long-term interest rates can greatly affect a long-term bond's price and yield. Put simply, changes in short-term interest rates have more of an effect on short-term bonds than long-term bonds, and changes in long-term interest rates have an effect on long-term bonds, but not on short-term bonds. Thus, it is useful to find a certain value which represents quantification of impact of short rate shifts to bond prices with respect to bond parameters.

The main contribution of this financial engineering study is to suggest a procedure which allows to find a certain measure which can be handled in the same way as conventional Macaulay Duration, for example: in the equation for the change of ΔP, ratio of volatility of two assets, or

[1] Financial Engineering, Department of Banking and Insurance, Faculty of Finance, University of Economics in Prague, W. Churchill sq.4, 140 00 Prague, Czech Republic

in the equation for the duration of portfolio. We also calculate its values for USD interest rate markets. We name this measure as "Short Rate Shift Duration".

This study belongs to a strand in the financial literature focused on basic bonds behaviour such as [1] - [5], bonds volatility [6] - [7], volatility of bonds' determinants [8], bond market price development over medium-run and long-run periods [9] - [13]; or behaviour of a bond portfolio [14].

There are many potential areas for application of our approach. One example being one certain bond life during which its term to maturity is decreasing and the price volatility is changing. One can ask a following question to be answered: How does the volatility development style depend on the time to maturity, coupon rate and on the level of interest rate (yield to maturity)? Because of similarities, another application is a straightforward extension, that being a portfolio of bonds with different maturities at a certain point of time.

Serious research in the area of volatility is provided in [15] - [17] for a practical portfolio management. This text introduced a definition of three different regimes of common bond clean price volatility and examines theoretical and practical repercussions of such phenomena as an extension to the existing literature. A way of determining values of switching points between these regimes with respect to the level of interest rates using numerical calculations are presented and explained. The text includes numerical solving for switching points for maturities from 1 up to 1200 years that show that the switching point 1 (between regime of the "typical" development and other regimes) is of lower value for higher maturities, which is also in accordance with [8]. We can also state that for higher maturities the "switching" point has its practical value within the meaning of today's very low levels or even negative interest rates. The switching point 2 (starting point of "inverse" volatility development) is not of value less than 50%. This value is given by switching point 1 between the lowest maturities for each coupon. If the clean price of a bond is developing inside the volatility envelopes, its sensitivity (volatility) increases/decreases according to the shown shape of the envelope.

For connected research see also [18] - [25].

2. METHODOLOGY

Methodology could be divided into following steps:

1. We take USD empirical zero-coupon curve rates on daily basis (figure1).
2. Based on the empirical data we calculate the daily change of price of fixed coupon bonds with maturities 1 to 30 years (equation 2b). The coupon is, for the demonstration, set to be 3% p.a. To keep the same maturity of the bond while we moving day-by-day along the time axis we consider concept of CMT (Constant Maturity Time) bonds.
3. Based on the daily price changes we calculate adequate daily Short Rate Shift Duration in the same way as the Macaulay Duration is calculated (equation 8).
4. We define and calculate Short Rate Shift Duration as mean of daily Short Rate Shift Durations.
5. We calculate the values of Short Rate Shift Duration for different coupons.

2.1. Basic Theory

$$P(YTM) = \left(1 + YTM\frac{l}{T}\right)^{-1}\left[c + \frac{c}{(1+YTM)} + \frac{c}{(1+YTM)^2} + \cdots + \frac{c+100}{(1+YTM)^{n-1}}\right] \quad (1)$$

where *P(YTM)* is the dirty price of a bond determined in the percentage of its face value on purchasing day, *c* is the coupon rate per the coupon period, *YTM is* the yield to maturity per the coupon period, *l* is the number of days to the next coupon payment, *n* is the number of coupon payments till the maturity and *T* is the number of days inside the coupon period.

In the special case when we purchase a bond on the day with zero accrued interest (could be for example an ex-coupon day) and the clean price equals to the dirty price we can use the formula (2a) for the approximation of the required clean price development.

$$P(YTM) = \frac{c}{(1+YTM)} + \frac{c}{(1+YTM)^2} + \cdots + \frac{c+100}{(1+YTM)^n} \quad (2a)$$

We may consider the total price also to be the sum of total prices of n zero-coupon bonds

$$P(i_{1,}i_{2,}\ldots i_{mat}) = \frac{c}{(1+i_1)} + \frac{c}{(1+i_2)^2} + \cdots + \frac{c+100}{(1+i_{mat})^n} \quad (2b)$$

where i_1, i_2,... i_{mat} are zero-coupon rates for maturities 1,2,….years and all other variables have the same interpretation as in equation (1).

Based on the Taylor's theorem for a real-valued function differentiable at the point, there is a polynomial approximation of a higher degree (quadratic, cubic, quartic…) at the fixed-point. Taylor´s theorem provides this approximation in a sufficiently small neighbourhood () of the fixed-point *a*:

$$f(a+h) = f(a) + f'(a)h + \frac{f''(a)h^2}{2!} + \frac{f'''(a)h^3}{3!} + \cdots + R \quad (3)$$

where formula (3) is applied to formula (2a) and with the substitution: *h for* Δi and *f(a)* for *P*. Consequently, it can be shown that, the expression (4) holds:

$$\Delta P(YTM) = P'(YTM)\Delta YTM + \frac{P''(YTM)\Delta YTM^2}{2!} + \frac{P'''(YTM)\Delta YTM^3}{3!} + \cdots + R \quad (4)$$

where is the remainder of the series and is the change in the market interest rate.

Using the formula (4) for ΔP (as percentage of its face value) as the general measure of volatility and only up to the second order approximation:

$$\Delta P(YTM) \cong -DUR_{MAC}\frac{P(YTM)}{(1+YTM)}\Delta YTM + \frac{1}{2}P(YTM)CONV\Delta YTM^2 \quad (5)$$

where DUR_{MAC} is the Macaulay Duration and the term *CONV* stands for the convexity of the bond. Macaulay Duration can be specified using the following shorthand notation:

$$DUR_{MAC} = \frac{\sum_{k=1}^{n}\left[\frac{kc}{(1+YTM)^k}\right] + \frac{100n}{(1+YTM)^n}}{P} \quad (6)$$

2.2. Short Rate Shift Duration on Daily Basis

Using empirical data (figure1) we may calculate Short Rate Shift Duration on daily basis using the first term of the right side of the equation (5)

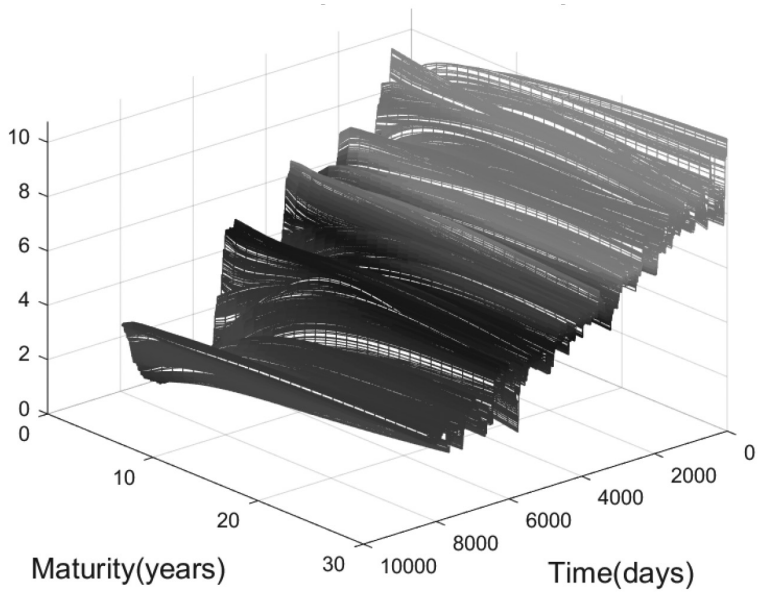

Figure 1: USD zero coupon yield curve development

$$DUR_{SRS_d}(mat, d, YTM) \cong -\frac{YTM}{P_{mat,d}} \frac{\Delta P_{mat,d}}{\Delta YTM} \tag{7}$$

where

DUR_{SRS_d} *(mat,d,YTM)*	Short Rate Shift Duration on daily basis as function of maturity, day, yield to maturity (Figure 1)
YTM	yield to maturity
ΔYTM	change of *YTM* of the short term rate (1 year)
$P_{(mat,d,)}$	price of bond with respect to its time to maturity and the structure of zero coupon curve on day *d*
$\Delta P_{(mat,d,)}$	change of price between *d* and *d-1* (according to Figure 1)
d	number of days (from the beginning of time series, Figure1)

2.3. Short Rate Shift Duration Definition

Let's define Short Rate Shift Duration like mean value with respect of *d*

$$DUR_{SRS} = E\left[DUR_{SRS\_d}(mat, d, YTM)\right] \tag{8}$$

2.4. Short Rate Shift Duration of Portfolio

With Short Rate Shift Duration we may deal in the same way as with Macaulay Duration and express Short Rate Shift Duration of portfolio:

$$DUR_{SRS\_PORTF} = \sum_{j=1}^{n} w_j DUR_{SRS\ j} \tag{9}$$

Where w_j is the weight of jth asset in the portfolio.

3. RESULTS

We may observe many cases, by the way of example in the figure2, of inverse shifts along zero-coupon yield curve which could decrease the change of price in case of typical coupon bond in comparison to our estimation using Macaulay Duration, which use the same shift along the whole curve.

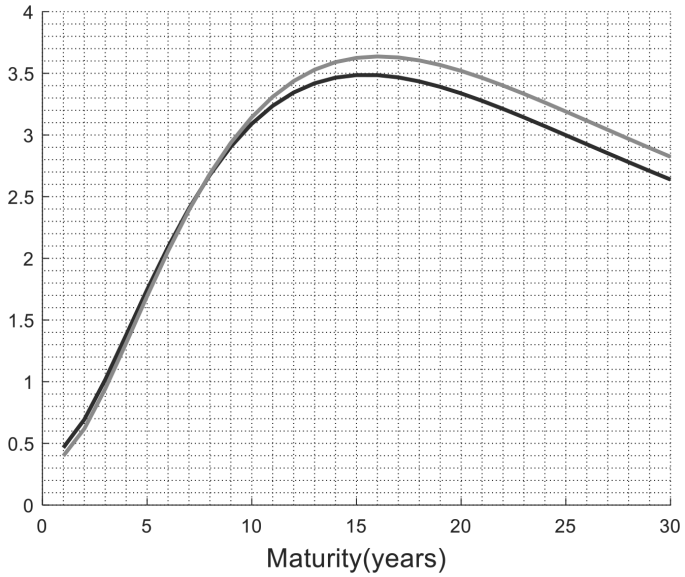

Figure 2: Inverse interest rate shift example

Day to day price shifts (30- and 1-year maturities) according to figure 1 we may observe in the figure 3.

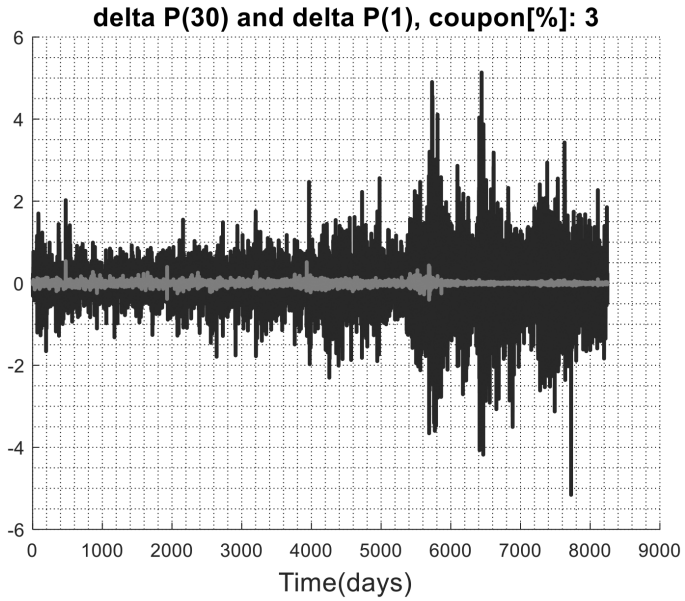

Figure 3: 30 and 1 maturities bond price shifts

The average ratio of day to day price change is in the figure 4. According to Macaulay Duration, the ratio of price changes should be approximately equaled to the ratio of Macaulay Durations. From the figure is clear that beginning maturity higher than 5such idea does not work.

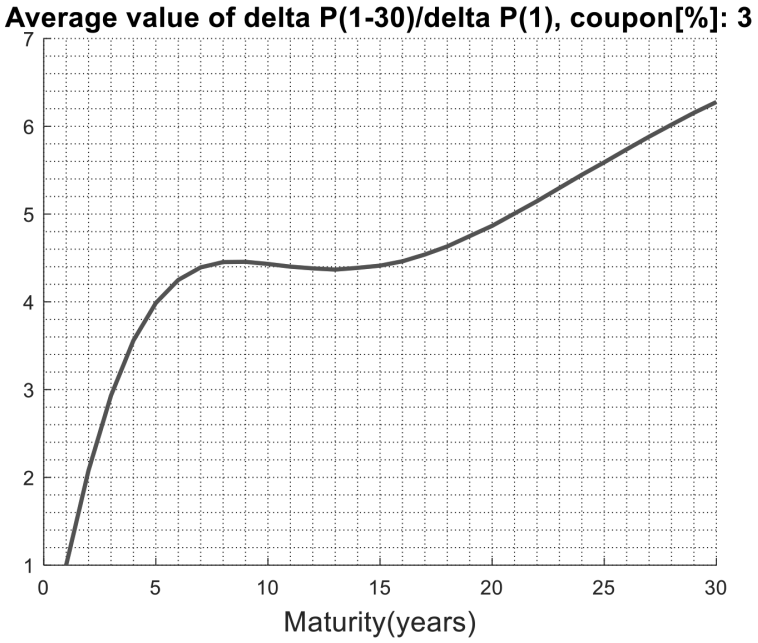

Figure 4: Average value of ratio of prices shifts

Ratio of inverse price shifts over all the shifts is in the figure 5. From the figure it is clear that approximately in 30% cases the change of price of long fixed coupon bond (longer than 10 years) goes in the opposite direction than the price movement of on year bond.

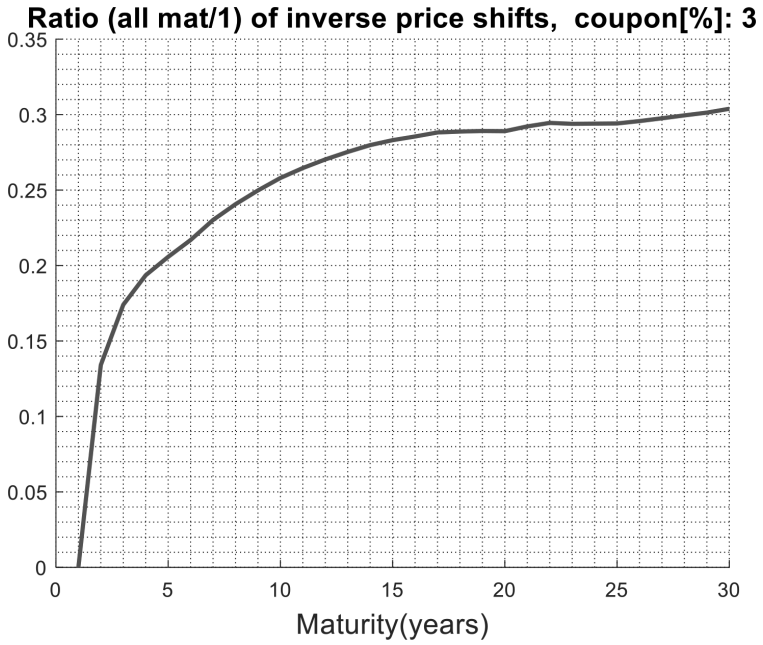

Figure 5: Ratio of inverse price shifts

This is also the reason of the degressive shape of the curve in the figure 4. In the figure 6 there is ratio of change of price for different maturities. Values of Short Rate Shift Duration in comparison to Macaulay Duration is in the figure 7.

Dependence of Short Rate Shift Duration on coupon rate and maturity is in the figure 8. With higher coupon the value is lower. The same feature we observe in case of Macaulay Duration. Exact values are in the table 1.

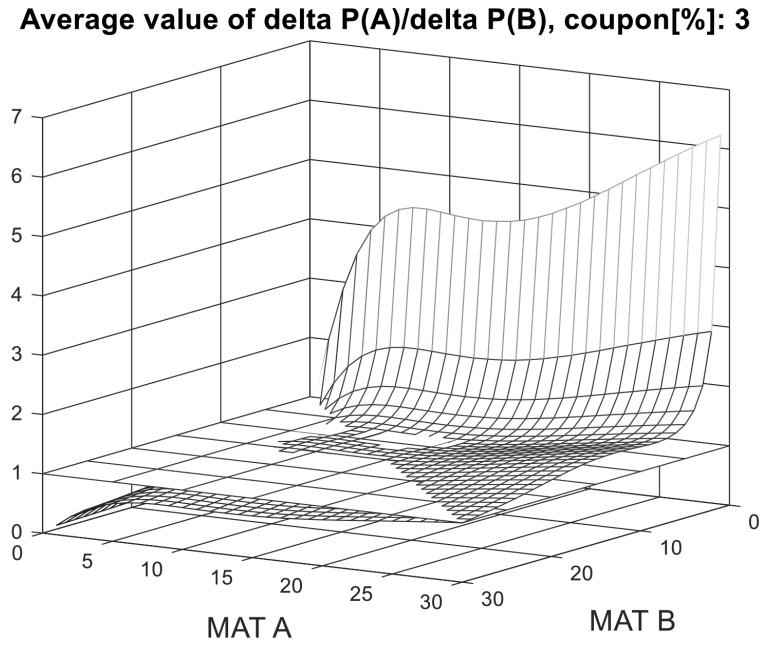

Figure 6: Ratio of inverse price shifts

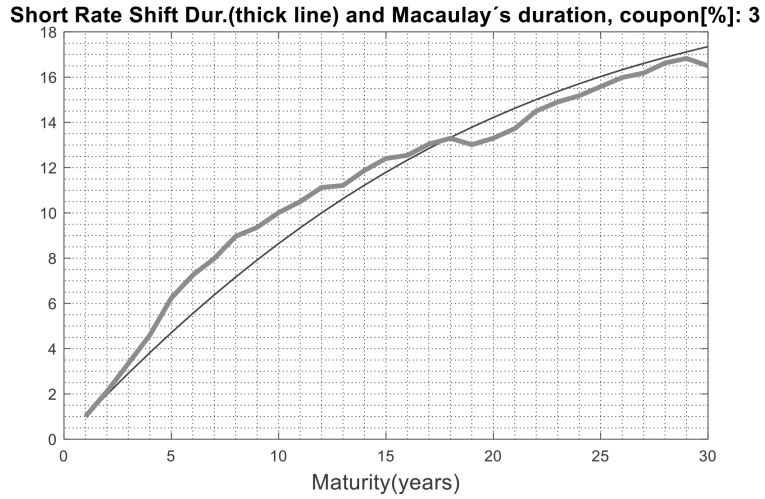

Figure 7: Empirical and Macaulay Duration (coupon=3)

Table 1: Short Rate Shift Duration, USD

MAT\COUPON	1	2	3	4	5	6	7
1	1	1	1	1	1	1	1
2	1,99	1,98	1,97	1,96	1,95	1,94	1,94
3	2,97	2,94	2,91	2,89	2,86	2,84	2,82
4	3,94	3,88	3,82	3,77	3,73	3,68	3,64
5	4,89	4,79	4,71	4,63	4,55	4,49	4,42
6	5,83	5,69	5,56	5,44	5,34	5,24	5,16
7	6,76	6,56	6,38	6,22	6,08	5,96	5,85
8	7,67	7,4	7,17	6,97	6,79	6,64	6,51
9	8,57	8,22	7,92	7,68	7,47	7,28	7,12
10	9,45	9,01	8,65	8,35	8,1	7,89	7,7
11	10,3	9,77	9,34	8,99	8,7	8,46	8,25
12	11,14	10,5	10	9,6	9,28	9	8,77
13	11,96	11,2	10,63	10,18	9,81	9,52	9,26
14	12,75	11,88	11,23	10,72	10,32	10	9,73

MAT\COUPON	1	2	3	4	5	6	7
15	13,52	12,52	11,79	11,24	10,81	10,46	10,17
16	14,27	13,13	12,33	11,73	11,26	10,89	10,59
17	14,99	13,72	12,84	12,19	11,7	11,3	10,98
18	15,69	14,28	13,32	12,63	12,1	11,69	11,36
19	16,36	14,81	13,78	13,04	12,49	12,06	11,72
20	17,01	15,31	14,21	13,43	12,86	12,41	12,06
21	17,62	15,78	14,61	13,8	13,2	12,75	12,38
22	18,22	16,23	15	14,15	13,53	13,06	12,69
23	18,78	16,66	15,36	14,48	13,85	13,37	12,99
24	19,32	17,05	15,7	14,79	14,14	13,65	13,27
25	19,84	17,43	16,02	15,09	14,43	13,93	13,54
26	20,32	17,79	16,33	15,37	14,7	14,19	13,8
27	20,79	18,12	16,61	15,64	14,95	14,45	14,05
28	21,22	18,43	16,88	15,89	15,2	14,69	14,29
29	21,64	18,73	17,14	16,13	15,43	14,92	14,52
30	22,03	19,01	17,38	16,36	15,65	15,14	14,75

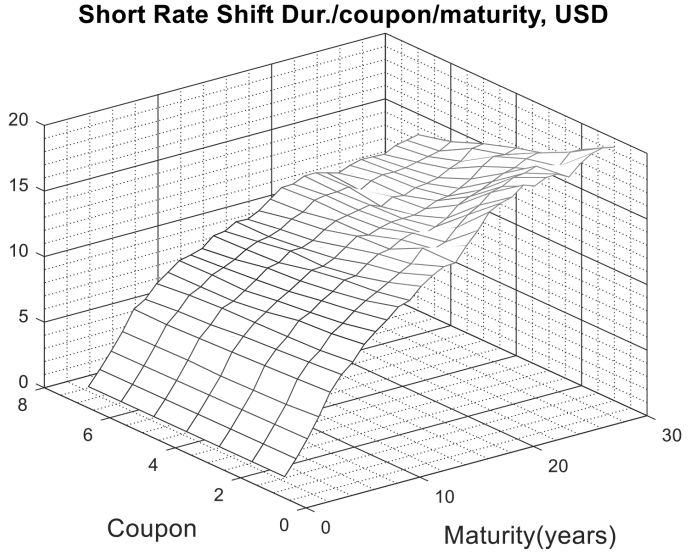

Figure 8: Short Rate Shift Duration/coupon/maturity

The comparison of zero coupon-bond Short Rate Shift Duration and of Macaulay Duration, which is straight line, is in the figure 9.

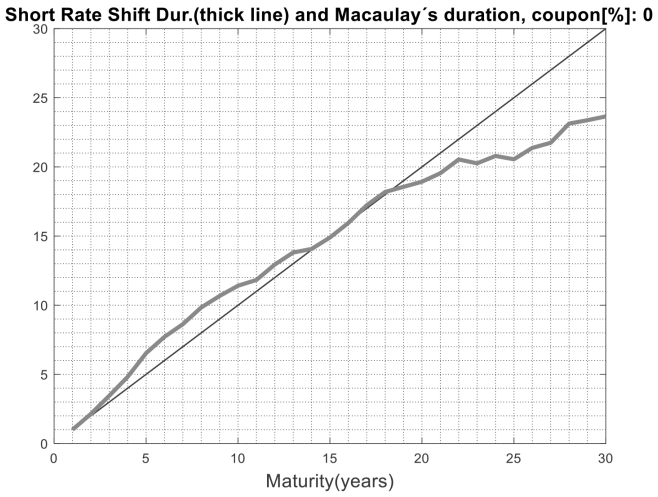

Figure 9: Zero coupon-bond Short Rate Shift Duration and its Macaulay Duration

4. CONCLUSION

We may conclude that the question formulated in the title has negative answer. Typical one, among conventional durations, is Macaulay Duration. Its main problem is, that it assumes the parallel zero-coupon curve shifts along the whole curve which is not realistic presumption.

In this research we have defined and also quantified (for USD zero-coupon rates) a new duration – Short Rate Shift Duration which is based on the empirical development of zero-coupon curve. Short Rate Shift Duration is a certain measure which can be handled in the same way as conventional Macaulay Duration, by the way of example: in the equation for the change of ΔP, ratio of volatilities of two bonds, or in the equation for duration of a portfolio.

As the curve movements are in approximately in 30% of all the cases inverse, we expect the price volatility of fixed coupon bonds with long maturities to be lower than it should be according Macaulay Duration. Values of Short Rate Shift Duration, which is basically quantification of such effect, have supported these expectations. The value of Short Rate Shift Duration also decreases with higher coupon and increases with longer term to maturity as in the case of Macaulay Duration.

Based on the reasons above we may conclude that long bonds (over 20 years to maturity) are not as risky as it is considered to be based on Macaulay Duration, in comparison to the short bonds. On the other hand, based on figure 9 or 7 it is possible to conclude that bonds within the maturity up to 15 years are more sensitive to the change of short rate in comparison to Macaulay Duration concept.

The values of Short Rate Shift Duration are based on empirical data of zero-coupon rates for certain currency.

ACKNOWLEDGEMENT

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REFERENCES

[1] Fabozzi, F., J. 1993. Fixed Income Mathematics, Chicago: Probus, Publishing Company.
[2] Fabozzi, F. J., Fabozzi, T., D.1995. The Handbook of Fixed Income Securities (Fourth Edition). Irwin, Professional Publishing, 1995.
[3] Fabozzi F., J. 2010. Bond Markets, Analysis and Strategies (seventh edition). Prentice Hall.
[4] Smit, L. A., Swart, B. B. 2006. Calculating the price of bond convexity. Journal of Portfolio Management, Volume 32, Issue 2, pp. 99–106.
[5] Málek, J., Radová, J., Štěrba, F. 2007. Yield curve construction using government bonds in the Czech Republic. Politická ekonomie, vol. LV, 2007, iss. 6, pp. 792–808.
[6] Litterman, R., Scheinkman, J. 1991. Common factors affecting bond returns. The Journal of Fixed Income, vol. 1, June 1991, no. 1, pp. 54–61.
[7] Litterman, R., Scheinkman, J., Weiss, L. 1991. Volatility and the yield curve. The Journal of Fixed Income, vol. 1, June 1991, no. 1, pp. 49–53.
[8] Fuller, R. J., Settle, J. W. 1984. Determinants of Duration and Bond Volatility. Journal of Portfolio Management, Vol. 10, No. 4, pp. 66–72.

[9] Chance, D. M., Jordan, J. V. 1966. Duration, convexity, and time as components of bond returns. The Journal of Fixed Income, vol. 6, September 1966, no. 2, pp. 88–96.
[10] Kang, J. C., Chen, A. H. 2002. Evidence on theta and convexity in treasury returns. The Journal of Fixed Income, vol. 12, June 2002, no. 1, pp. 41–50.
[11] Tvaronavičienea, M., Michailova, J. 2006. Factors affecting securities prices: Theoretical versus practical approach. Journal of Business Economics and Management, Volume 7, Issue 4, pp. 213–222.
[12] Křepelova, M., Jablonský, J. 2013. Analýza státních dluhopisů jako indikátoru pro akciový trh. Politická ekonomie, vol. LXI, no. 5, pp. 605–622.
[13] Visokavičienė, B. 2008. Money Supply and Assets Value. Business: Theory and Practice/ Verslas: Teorija ir Praktika, Volume 9, No 3, pp. 210–214.
[14] Dzikevičius, A., Vetrov, V. 2013. Investment Portfolio Management Using the Business Cycle Approach. Business: Theory and Practice/Verslas: Teorija ir Praktika, Vol 14, No 1, pp. 57–63.
[15] Stádník, B. 2012. Theory and Praxis of Bonds I. Oeconomica, University of Economics, Prague.
[16] Stádník, B. 2014. The Volatility Puzzle of bonds. 8th International Scientific Conference: Business and Management 2014, May 15–16, 2014, Vilnius.
[17] Stádník, B., Žďárek, V.2017.Volatility 'Strangeness' of Bonds - How to Define and What Does it Bring? Prague Economic Papers Vol. 26 No. 5
[18] Steeley, J. M. 2006. Volatility transmission between stock and bond markets, Journal of International Financial Markets, Institutions and Money, Volume 16, Issue 1:71–86, Aston Business School, Aston University, Birmingham B4 7ET, United Kingdom.
[19] Janda, K., Rausser, G., Svárovská, B. 2014. Can Investment in Microfinance Funds Improve Risk-Return Characteristics of a Portfolio? Technological and Economic Development of Economy, 2014, Volume 20, Issue 4, pp. 673–695.
[20] Janda, K., Svárovská, B. 2010. Investing into microfinance. Journal of Business Economics and Management, Volume 11, Issue 3, pp. 483–510.
[21] Ortobelli, S., Tichý, T. 2015. On the impact of semidefinite positive correlation measures in portfolio theory. Annals of Operations Research 235: 625−652, 2015. ISSN 0254-5330. 10.1007/s10479-015-1962-x.
[22] Giacometti, R., Ortobelli, S., Tichý, T. 2015. Portfolio selection with uncertainty measures consistent with additive shifts. Prague Economic Papers 24 (1): 3-16, 2015. ISSN 1210-0455
[23] Blahová, N. 2015. Analysis of the Relation between Macroprudential and Microprudential Policy. European Financial and Accounting Journal, vol. 10, 2015, no. 1, pp. 33–47.
[24] Brůna, K., Blahová, N. 2016. Systemic Liquidity Shocks and Banking Sector Liquidity Characteristics on the Eve of Liquidity Coverage Ratio Application – The Case of the Czech Republic. Journal of Central Banking Theory and Practice [online], vol. 5, 2016, no. 1, pp. 159–184. DOI: 10.1515/jcbtp-2016-0008.
[25] Webb, M. S. 2015. Negative yields are all around us. The Financial Times, FTMoney, Saturday 31 January 2015, p. 8.

THE PROFITABILITY OF GENERATION ENERGY COMPANIES DURING NINE YEARS

Felicetta Iovino[1]

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Abstract: *The global financial crisis has affected all countries from 2008. Generation Energy companies play a strategic role in the economy of each country and determine the sustainability of the related resources involved. It is therefore interesting to analyze the profitability of generation energy companies, operating in particular during the generation phase, during the period of the crisis. The aim of this paper is to analyze the profitability of the aforementioned companies, to check whether they have suffered the effects of the global crisis. To this end, data from the AIDA database relating to Italian companies in the sector were used. The profitability of these companies has been analyzed using the main profitability, ROA and ROE ratios. An analysis of the trends of these indices was carried out for the period 2008-2017. In this way, it has been verified whether the global crisis has affected the profitability of generation energy companies in Italy.*

Keywords: *Crisis, Energy, ROA, ROE, Profitability, Performance, Ratio.*

1. INTRODUCTION

This paper analyses the profitability situation in Italy with specific reference to generation energy companies. In particular, it aims to analyse the profitability structure of Italian generation energy companies during and after the 2008 crisis, with regards to the three Italian geographic zones and the two business energy markets, electricity and gas. To this end, three key research questions have been posed:

1. What is the present situation and what the trend has been from 2008-2017 in the three Italian geographic zones and in the analysed business markets?
2. Are there differences among the analysed business markets or geographic zones?
3. Are these eventual differences significant from a statistical point of view?

The hypotheses are that (H_1) the global economic crisis did not significantly affect the profitability structure of generation energy companies, by means of its resilience ([1] – [2] – [3] – [4] – [5]); (H_2) there are differences among groups that are belonging to diverse business markets or geographic zones; (H_3) the above differences are statistically significant. For that aim, the profitability structure is assessed using two indices: ROA (operating income /total assets) and ROE (net income/equity); the years considered are ten, that is from 2008 to 2017; a trend analysis and ANOVA (one way) have been carried out.

In the following paragraphs literature notes on energy companies are presented. Then the methodology, results and implications are illustrated.

2. LITERATURE NOTES

The resilience of energy companies has been subject of analysis for different authors ([6] – [7] - [8]).

[1] University of Sannio, Benevento, Italy

[6] provides useful insights to new US government that can consent to achieve various energy's goals, in particular to include stability and resilience in the US energy policy. Among those recommendations policy correction and not a total change move US energy companies towards certainty and more predictable investment climate.

[7]'s study highlights the use of microgrids to give resilience to all energy systems. Positive impacts on demand reduction and costs of energy companies are the main reasons of its employ.

[8] suggest a distributed energy management algorithm to improve the resilience of the energy companies. In fact, that algorithm protects against malicious cyber-attacks and its negative results on the economic balancing of energy system.

[9] proposes a model by the UK's wind capabilities. It highlights financial evidences that can increase resilience of energy system.

[10] provide a framework for an e-voucher mechanism that gives economic advantages for customers, but also for energy companies by means of decreasing costs and increasing its resilience.

[11] suggest useful highlights in relation to energy price inflation as an index for assessing macro-financial effects on energy companies.

[12]'s study (2017) proposes a price-forecasting model that has economic and financial positive effects for both energy system and customers.

[1] – [2] – [3] and ([13] – [14] – [15] – [16] – [17] – [18] – [19]) provide interesting insights about energy companies' performance. Those studies suggest the main role of relationships with customers and sizes to raise companies' performance.

[20] proposes a multi-factor asset pricing model to evaluate the grow rates of renewable energy companies.

[21] analyses the central variables that affect energy companies' performance. That paper focuses in particular on Russian and US companies. That study finds that regional variables and financial indices have an important impact for both Russian and US companies' performance.

[22] suggests useful highlights about the implementation of a program of efficient lamps on energy companies' costs. In fact, the study finds that it has a more important impact than the price of electricity on financial performance.

[23]'s study (2015) analyses a relation among financial development, economic growth and Co2 emissions. The main findings are that trade openness and financial development are interrelated.

3. RESEARCH METHODOLOGY

3.1. Data collection and sample characteristics

Secondary data have been collected from AIDA database. To assess the profitability structure, two ratios, ROA (operating income/ total assets) and ROE (net income/equity), have been selected. The last ten years after liberalization, i.e. 2008-2017 had been chosen. The final sample

was composed of the generation energy companies, that is 426 generation energy firms. Then, various groups have been made using two discriminating variables, the geographic zone and the belonging business market. Three clusters have been identified in relation to the different geographic areas: north, centre and south, following the conventional classification of Italian regions. According the geographical area, the sample was distributed as following: 67% in the North group, 16% in the Centre and 17% in the South ones. The belonging market has been identified using a specific section for every energy company using the statistical classification of economic activities in Italy (*ATECO codes*). In this way, two groups have been found: gas market and electricity market.

Following the second variable, the sample was made up of 98% energy generation in electricity market and 2% energy companies belonging to gas market.

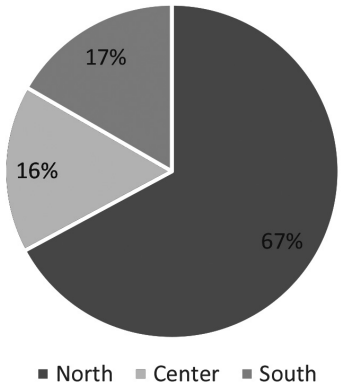

Figure 1: Geographic localization of Italian generation companies**,** source: our elaboration

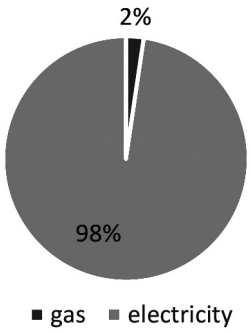

Figure 2: market distribution of Italian generation companies**,** source: our elaboration

3.2. Method

First of a trend analysis has been performed for the period 2008/2017 for every index and group. Therefore, analysis of variance (ANOVA one-way) has been employed to evaluate the differences of means among groups and the response variable means at the different variable levels. The null hypothesis states that all population means (factor level means) are equal while the alternative hypothesis states that at least one is different. For our analysis, the independent variables were the various geographic localization and the different business market while the dependent variables were the indices. ANOVA one-way type has been chosen because the two variables were analysed separately.

4. RESULTS AND DISCUSSION

4.1. Trend analysis

ROA (operating income / total assets) expresses the extent to which the total investments made in all types of management of the company are renumbered by the operating activity, i.e. the core of the business. It is evident that this profitability index should be evaluated together with other profitability indexes to verify if the company is profitable or not precisely in terms of profitability. In this sense, once the value of this index is higher, it is the income situation of the company. During the 10 years analyzed, this index assumes values between -0.07 and 10.13 if geographical location is taken into account and instead between 2.683 and 8.745 if the belonging business is taken into consideration. Figures n. 3 and n. 4 show how the value of this index tends to grow over the 10 years taking on very positive values. This occurs in every geographical location analyzed and also in both businesses in which the energy business is distinguished. The ROA takes on the highest value in 2017 if we refer to the geographical location, when the crisis is now far away. During the previous years there was a substantial growth trend in all geographical areas. However, companies in the north experienced a decrease between 2014 and 2016. In the same sense, the companies of the center recorded a decrease starting from 2013. The most profitable companies appeared the northern companies, although outdated by companies from 2015 of the South. From a business point of view, electricity companies appear to be the most profitable in the 2008-2015 period. Starting from this last year they are outdated by the gas companies.

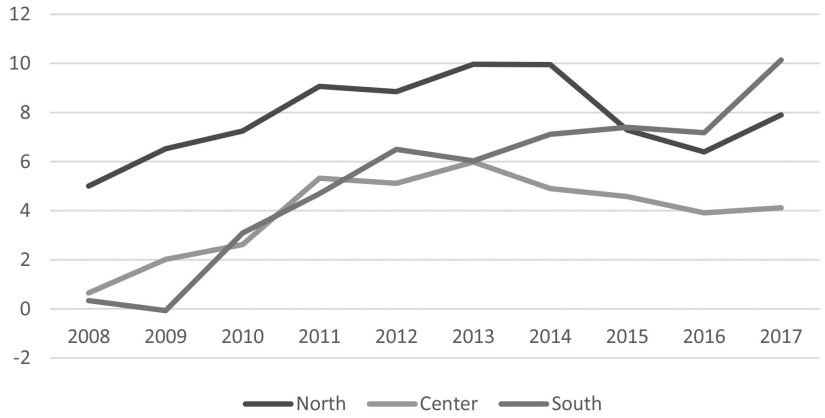

Figure 3: Trend of *ROA* according to geographic localization**,** Source: our elaboration

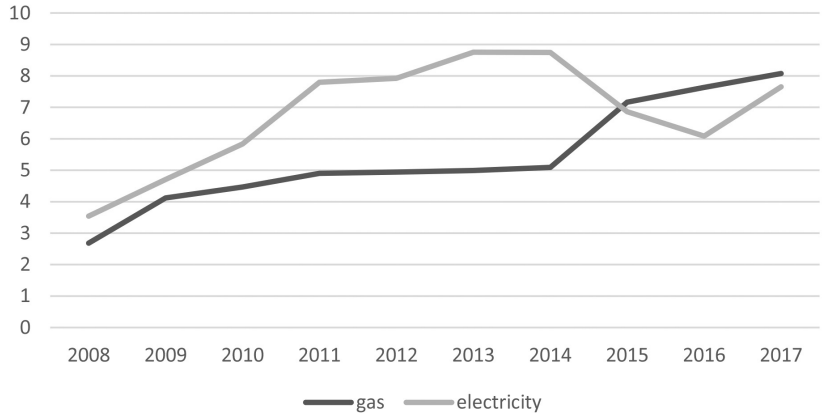

Figure 4: Trend of *ROA* according to market, Source: our elaboration

ROE (net income / equity) is the profitability index that expresses the overall profitability of the company. It is therefore the profitability that is produced by the company taking into account all the revenues and income and costs and charges deriving from all the management of the company. It is therefore a summary indicator that is very important also for the shareholders, because on the basis of the net profitability the dividend assigned to them will be determined. In order to verify the company as the ROA it is necessary to analyze it together with other profitability indexes, but also other financial indexes including leverage. In fact, in the latter case, the possibility of procedures for the stipulation of further loans that may allow the company to expand further while maintaining a profitability of positive equity is verified. As with all profitability ratios, it is appropriate that this value takes positive values and as high as possible. Over the years, the profitability of equity appears to be quite variable. If we consider the geographical location the ROE assumes a negative value in 2009, equal to -3.06 in the southern regions, while it assumes the maximum value in 2012 equal to 20.98. The trends appear to be increasing in all regions up to 2011, except for a decrease in the south in 2009. Starting in 2001 in all regions there was a new decrease until 2015. After that date, the ROE values rose again in two of the Italian geographical areas (fig. 5).

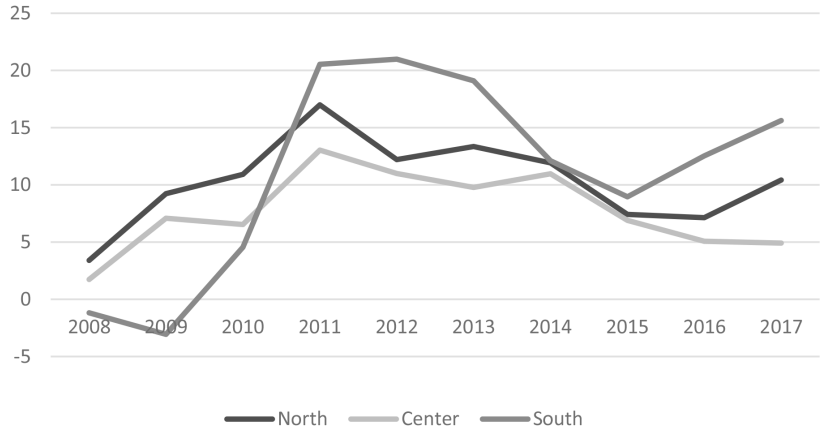

Figure 5: Trend of *ROE* according to geographic localization, Source: our elaboration

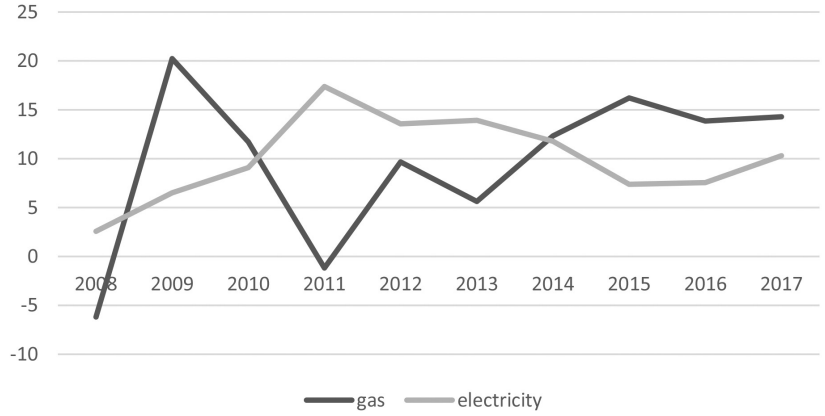

Figure 6: Trend of *ROE* according to market, Source: our elaboration

If we consider the geographical location (fig. 6) the ROE trend appears to be very variable over time for the gas business, while it is more stable for the electricity business. The minimum value is reached in 2008 and is equal to -6.18, while the maximum value is reached in 2009 and is equal to 20.35. After a very low value in 2008, the gas business recorded a considerable increase in 2009 and then decreased significantly in 2011. In the following years the general trend was increasing. Even the electricity business is growing until 2011 and then decreasing until 2015

and growing again in the following two years. The profitability of own capital although some rather critical value appears to be good over the ten years analyzed. The trend in ROA both from a geographical point of view and from a business point of view over the 10 years analyzed appears to be increasing. Therefore, this index is not affected by the crisis. The ROE trend appears much more variable both with reference to the different geographical areas and with reference to the two businesses. The gas trend appears more variable in this index and therefore more affected in its overall profitability. This is probably due to the greater infrastructural weight that characterizes the gas business. In fact, they affect the determination of the net income measure. Therefore, we can affirm that the H1 hypothesis is confirmed, because companies have not been conditioned by the crisis. The H2 hypothesis appears to be substantially validated, because there are differences between the different geographical areas and the two different businesses.

4.2. Analysis of variance

About ROA, Table 1 highlights the results of the analysis having the geographic location as the discriminating variable. There is a statistically significant difference between groups ($F(2,27) = 7.350661$, $p = 0.002827$), in fact F > F *crit* (p value < 0.05).

Table 1: *ROA* - Analysis of variance with geographical localization as independent variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	78.62691	2	39.31346	7.350661	0.002827	3.354131
Within Groups	144.4038	27	5.348289			
Total	223.0307	29				

Significant level at 0,05

The null hypothesis must therefore be rejected and the alternative hypotheses acetate. There is therefore at least one value different from the others within the analyzed sample. If, on the other hand, we consider the business of belonging as a discriminating factor (Table 2) there is instead no statistically significant difference. The null hypothesis must be accepted and those alternatives rejected. In fact, F(1,18)= 3.254333, p=0.087997, in fact F<F crit, p value > 0.05).

Table 2: *ROA* - Analysis of variance with belonging sector as independent variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	9.560466	1	9.560466	3.254333	0.087997	4.413873419
Within Groups	52.87978	18	2.937766			
Total	62.44025	19				

Significant level at 0,05

The ANOVA (one-way) applied to the ROE shows that there is no significant difference when the geographical location is considered as a discriminating variable. The null hypothesis must be accepted and the alternative hypotheses rejected (table n. 3). The same applies to the case as the discriminating business is considered as a variable. Also, in this case (table n. 4) there is no statistically significant difference between the values of the two businesses analyzed.

Table 3: ROE- Analysis of variance with geographical localization as independent variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	60.74579	2	30.37289	0.902983	0.417252	3.354131
Within Groups	908.1772	27	33.63619			
Total	968.923	29				

Significant level at 0,05

Table 4: ROE - Analysis of variance with belonging market as independent variable

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.606727	1	0.606727	0.014433	0.905705	4.413873
Within Groups	756.6657	18	42.03698			
Total	757.2724	19				

Significant level at 0,05

The results of the ANOVA (one-way) show therefore that the H3 hypothesis is not substantially verified. The existing differences are not statistically significant. This applies both to the geographical location and to the business in question in the case of ROE. However, in the case of ROA this is valid only in the case of the business to which it belongs. In fact, in the case of geographical location, significant differences are evidenced from a statistical point of view.

5. CONCLUSION

In conclusion we can say that the hypotheses could have been almost confirmed. In fact, with regard to ROA, the trend appears to be growing both for the businesses analyzed and for the different geographical areas. Therefore, it does not appear to be conditioned by the crisis. Furthermore, there are differences in the trend both from the point of view of geographical location and for businesses. However, these differences are statistically significant only from the geographical point of view. From ROE point of view, gas companies appear to be affected by the crisis compared to electricity companies. ROE does not appear affected by the crisis instead, if we refer to the geographical location. In addition, from the statistical point of view the differences highlighted in the trend especially with regard to the distinction between the two businesses do not appear to be statistically significant. The results therefore highlight the limits of the study. In fact, there is only the analysis of the companies that survived the crisis and therefore the most profitable ones over time. Furthermore, only two profitability ratios were considered. Therefore, for an overall analysis it is opportune to take into consideration a plurality of indices, including financial ones, in order to be able to give a broader and overall judgment on this type of company. These are therefore the future research lines. Added to these is the opportunity to carry out comparisons between energy production companies at least with reference to European countries ([4] – [5] – [16]).

REFERENCES

[1] Iovino, F. (2012) Le *scelte delle politiche di marketing delle imprese energetiche*, Management delle utilities, 4, 23-35.

[2] Iovino, F. (2014) *L'internet marketing nelle imprese energetiche: il caso di un'impresa elettrica romana*, Mercati e competitività, 3, 141-161.

[3] Iovino, F. (2015) *Relationship marketing by Energy companies*, Review of International comparative management, 16(5), 558-573.

[4] Iovino, F., (in press, a) *The profitability of water companies during ten years*, in Conference Proceedings: 3rd International Scientific Conference on Economics and Management -EMAN 2019: Economics & Management: How to Cope With Disrupted Times, Ljubljana, Slovenia, March 28th, Printed by: All in One Print Center, Belgrade.

[5] Iovino, F., Migliaccio, G. (2019) *Energy companies and sizes: An opportunity? Some empirical evidences*, Energy Policy, Vol. 128, May 2019, DOI: 10.1016/j.enpol.2019.01.027, 431-439.

[6] Gattie, D.K. (2017) *Incorporating stability and resilience in energy policy for the U.S. power sector: recommendations for the Trump administration*, The Electricity Journal, Vol. 30, No.1, pp. 47-54.
[7] Xiaonan L., Jianhui W. and Liping, G. (2016) *Using microgrids to enhance energy security and resilience*, The Electricity journal, Vol. 29, No. 10, pp. 8-15.
[8] Zeng, W., Zhang, Y. and Chow, M. (2017) *Resilient distributed energy management subject to unexpected misbehaving generation units*, IEE transaction on industrial informatics, Vol. 13, No.1, pp. 208-216.
[9] Hdidouan, D. and Staffell, I. (2017) *The impact of climate change on the levelised cost of wind energy,* Renewable energy, Vol. 101, pp. 575-592.
[10] Chen, T., Pourbabak, H., Liang, Z. and Wencong, S. (2017) *An integrated evoucher mechanism for flexible loads in real time retail electricity market,* IEE ACCESS, Vol. 5, pp. 2101-2110.
[11] Breiteinfeller, A., Crespo Cuaresma, J. and Mayer, P. (2015) *Energy inflation and house price corrections*, Energy economics, Vol. 48, pp. 109-116.
[12] Neupane, B., Woon, W. and Aung, Z. (2017) *Ensemble prediction model with expert selection for electricity prices forecasting,* Energies, Vol. 10, No. 1, pp. 77.
[13] Iovino, F., Migliaccio, G. (2016) E-*marketing by energy companies. 9th Annual Conference of the Euromed Academy of Business*, "Innovation, Entrepreneurship and Digital Ecosystems", 14-16 September 2016, Warsaw, Poland, Book of Conference Proceedings, Euromed Press, 1036-1048.
[14] Iovino, F., Migliaccio, G. (2018a) Profitability *dynamics of tourism companies during the crisis period (2007-2015),* in Vrontis D., Weber Y., Tsoukatos E. (Eds), Conference readings book proceedings, 11th Annual Conference of the EuroMed: Research Advancements in National and Global Business. Theory and Practice, Valletta, Malta,September 12th-14th, EuroMed Press: Cyprus, 663-677.
[15] Iovino, F., Migliaccio, G. (2018b) *Financial dynamics of tourism companies, travel agencies and tour operators, during the crisis period*, in Conference Proceedings: 2nd International Scientific Conference on Economics and Management -EMAN 2018: Economics & Management: How to Cope With Disrupted Times, Ljubljana, Slovenia, March 22th, Printed by: All in One Print Center, Belgrade, 693-702.
[16] Iovino, F., Migliaccio, G. (2019, b) *Financial Dynamics of Energy Companies During Global Economic Crisis*, International Journal of Business and Globalisation, Vol. 22, n. 4, pp. 541-554. (doi: 10.1504/IJBG.2019.10011698).
[17] Iovino, F., Migliaccio, G., (in press, a) *Mobile marketing and strategy by energy companies*, International journal of Public Sector and Performance Management.
[18] Iovino, F., and Migliaccio, G., (2019) *E-marketing and strategies by energy companies*, in Weber, Y., Vrontis, D., Shams, R., Manos, R., "The Cross-disciplinary perspectives of Management Ambidexterity: Challenges and Opportunities", Cross-disciplinary Management Perspectives: Applications, challenges and opportunities Series, Vol. 1, Emerald Publishing, ISBN: 9781838672508.
[19] Iovino, F., (2019), *The Financial Sustainability of Water Companies: The Italian Case*, 42nd International Scientific Conference on Economic and Social Development, ESD 2019, London, UK, 12-13 June, 2019, in Book of Proceedings, Editors: Dukic, G., Clifford, J., Atkinson, D., ESD 2019, London, UK, 12-13 June, 2019, Varazdin Development an Entrepreneurship Agency, Varazdin, Croatia/Pearson College London, London, /UK/ University North, Koprivnica, Croatia/ Faculty of Management University of Warsaw, Warsaw, Poland/ Faculty of Law, Economics and Social Sciences Sale – Mohammed V University in Rabat, Morocco, ISSN: 1849-6903.

[20] Inchauspe, J., Ripple, R.D. and Trueck, S. (2015) *The dynamics of returns on renewable energy companies: A state-space approach,* Energy economics, Vol. 48, pp. 325-335.
[21] Meltenisove, E. (2013) *Power generation companies' performance in liberalized electricity market: cross country analysis*, in Filipovic, D. and Urnaut, A.G., 2nd International Scientific Conference on Economic and Social Development (ESD), Paris, France, pp. 1132-1141.
[22] Mills, E. (1993) *Efficient lighting programs in Europe - cost-effectiveness, consumer response, and market dynamics*, Energy, Vol. 18, No. 2, pp. 131-144.
[23] Omri A., Daly S., Rault C. and Chaibi A. (2015) *Financial development, environmental quality, trade and economic growth: what causes what in MENA countries*, Energy economics, Vol. 48, pp. 242-252.

EXCHANGE RATE RISK IN ALBANIA – CALCULATING VaR USING MONTE CARLO SIMULATION

Teuta Xhindi[1]
Ermela Kripa[2]

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Abstract: *Risk management is one of the most important processes of all agents operating in the financial and non-financial markets. It is the combination of three steps: risk assessment, emission and exposure control and risk monitoring. As of the assessment step, the VaR model is the most common approach used to measure the market value at risk.*

The aim of this paper is to evaluate the performance of the VaR model, in measuring the relative risk in the Albanian foreign exchange market, where future prices in foreign exchange market are calculated using the Monte Carlo simulation. In our analysis, we have considered the coefficient of variation a good tool in measuring relative risk. The utilized data is taken from the official website of the Bank of Albania, corresponding to the daily rates of exchange in the Albanian foreign exchange market of January 3, 2018 to January 3, 2019. The instrument used is the simple linear regression, where the dependent variable is VaR and the independent variable is the coefficient of variation.

The result of the study is: The VaR Model isn't a good instrument to measure the exchange rate risk in our case.

Keywords: *Value at Risk, Coefficient of Variation, Monte Carlo simulation, Simple Linear Regression.*

1. INTRODUCTION

Measuring the financial risk has become one of the main objectives of the vast majority of actors operating in the market. It is very important to identify and measure different categories of risks that characterize companies and various transactions in the financial market, and not only. Many transactions are characterized by market risks. An example of that is the exchange rate risk, which is one of the most important market risks. Measurement and risk assessment models are numerous and have evolved over time. Although the corresponding models are numerous, in this paper we will use the VaR model to measure the exchange rate risk.

But what is the definition of the Value at Risk?

When making investment decisions, an investor has to seek a balance between risk and return. The theory of portfolio selection dates back to Markowitz's theory in 1952 [1] and continues with modern theories. In his theory, Markowitz took the variance of his portfolio into a single period as a measure of risk. This indicator has its own limitations as the variance is a symmetrical measure and does not take into consideration the direction of the movements. To address this problem, alternative risk measures such as Value at Risk and Conditional Value at Risk have been introduced to replace the variance.

[1] European University of Tirana, Bulevardi „Gjergj Fishta", Nd.70, H.1, Tiranë, Albania
[2] European University of Tirana, Bulevardi „Gjergj Fishta", Nd.70, H.1, Tiranë, Albania

The mathematics that underlie VaR were largely developed in the context of portfolio theory by Harry Markowitz and others, though their efforts were directed towards a different end – devising optimal portfolios for equity investors. In particular, the focus on market risks and the effects of the co - movements in these risks are central to how the VaR is computed.

Below, some definitions for the VaR given by different authors are presented.

Value at risk (VaR) summarizes the worst loss of a portfolio over a given period with a given level of confidence [2]. Hull [3, p. 477] defines VaR as 'a loss that will not be exceeded at some specified confidence level'. Many researchers and financial agents usually use VaR by numerical approximations since the VaR portfolios analyze is not easy mathematically [4]. Based on several approaches, we can say that VaR is a risk sensitive indicator based on percentiles and is one of the standard criteria used in asset management.

VaR has become widely used by financial institutions, corporations and asset managers [5]. The Basle Committee on Banking Supervision (BIS) and other central bank regulators also use VaR as a benchmark risk measure to determine the minimum amount of capital a bank is required to maintain as reserve against market risk [6]. There are some methods to calculate option portfolio VaR. The most widely used is the Delta normal method.

The historical simulation method uses data on daily returns to determine a VaR value and this model makes no assumptions regarding the statistical distributions of these returns. The method used in this paper for measuring VaR is the Monte-Carlo Simulation.

For the calculation of VaR, in addition to the historical simulation method, the Monte Carlo simulation is used. In this case, the future values series of the foreign currency-to- Albanian lek exchange rate are generated based on this equation:

$$\text{Today value of exchange rate} = \text{Yesterday value of exchange rate} \times e^{X}$$

Where, X is the random variable with theoretical normal distribution.

This formula was proposed and applied for the first time by the French mathematician Louis Bachelier, the first to model the stochastic process called the Brownian motion.

On the other hand, nonetheless all the debates, the coefficient of variation is mainly used as a relative risk measure, in comparative cases when we have to choose between different opportunities for investing.

Mathematically, the coefficient of variation is calculated through the formula:

$$CV = \sigma/\mu \times 100\%$$

Where: σ is the standard deviation of all observations and μ is their mean.

The coefficient of variation is a measure of volatility in the exchange rate market. Sometimes it is more preferable than the standard deviation (or variance), especially in cases when is important to identify the quickly changing periods of exchange rates.

In this paper we want to test whether the VaR, calculated with the Monte Carlo simulation, is a good method for measuring risk in the foreign exchange market in Albania, assuming that the coefficient of variation is.

In order to investigate the goodness of using VaR, calculated with the Monte-Carlo simulation, in the foreign exchange market in Albania, we will make the simple linear regression in which as the independent variable we will use the coefficient values of the variation for the 13 currencies, the exchange rates of which are available on the official website of the Bank of Albania, and as a dependent variable we will use VaR data for these currencies. The confidence level used in this paper is 95%.

2. THE OBJECTIVE, THE RESEARCH QUESTION AND HYPOTHESIS

The objective of this paper is to test for the goodness of using VaR, calculated with Monte Carlo simulation, for measuring the risk in the foreign exchange market in Albania.

The research question:

Is VAR calculated with Monte-Carlo simulation a good instrument to measure risk in the Albanian exchange market when we accept that the coefficient of variation is?

Hypothesis:

There isn't a statistically significant relationship between the coefficient of variation and VaR calculated with Monte Carlo simulation.

3. THE METHODOLOGY AND DATA COLLECTION

The currencies taken into consideration are: US Dollar, Euro, Great Britain Pound, Swiss Franc, Japanese Yen (100), Australian Dollar, Canadian Dollars, Swedish Krona, Norwegian Krone, Denmark Krone, Special Drawing Rights, Gold (OZ 1), Silver (OZ 1).

The utilized data is taken from the official website of the Bank of Albania.

Based on the daily rates of exchange data for 13 foreign currencies - lek over a year from January 3, 2018 to January 3 2019, we calculate:

- The daily periodic return, based on formula $X = \ln (P_1/P_0)$, where P_0 and P_1 are respectively rates of exchange in two consecutive days.
- The mean, variance and standard deviation for values of daily periodic return.

We rely on the following equation to generate with Monte Carlo simulation the future values for exchange rates for every currency:

Today value of exchange rate = Yesterday value of exchange rate $\times e^X$, where X is the daily periodic return.

The Monte Carlo simulation generates the future theoretical values of X, that is a random variable with theoretical normal distribution. To model the motion and to determine the probable future values of random variable X, we have used an equation that models the random motion.

This equation was proposed and used for the first time a hundred years ago from Louis Bachelier, the first mathematician to model the stock prices similarly with the Brownian motion. The stochastic process named Brownian motion assumes that there are two parts on the amount of change in the exchange rate:

- The deterministic part,
- The random part or random stochastic variable.

The daily periodic return *X* can be modeled as follows:

$$X = \ln (P_1/P_0) = \mu + \sigma z_t$$

Where:

μ- the deterministic part, the expected periodic return daily value,
σ - the random part, random shock.

From the sample data, we have calculated the mean and variance of periodic daily return for one-year exchange rate data as estimators of μ and σ^2.

The calculation of the random part $z_t\sigma$, is done by multiplying the standard deviation of periodic daily return for one-year exchange rate data with normal standard values, generated from random selection of different probability levels.

After calculation of *X*, the formula below is used:

Today's value of exchange rate = Yesterday value of exchange rate × e^X, to generate the future price values in the foreign exchange market.

We have generated the future values from 04th January 2019 till 30th September 2019.

In figures 1 and 2, the histograms of frequency distribution for daily return for two main currencies in the Albanian foreign exchange market: euro and dollar are given.

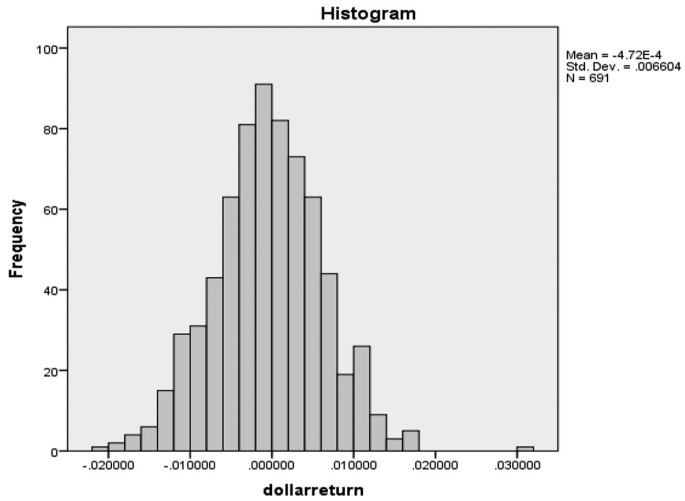

Figure 1: Histogram of frequency distribution for daily return data for dollar/lek

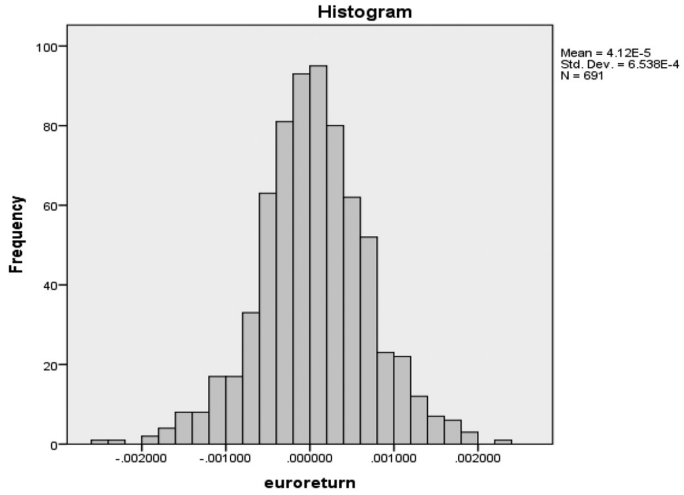

Figure 2: Histogram of frequency distribution for daily return data for euro/lek

After the data were generated, for every exchange rate foreign currency series, the periodic daily return and coefficient of variation were calculated (the later by formula CV = σ/μ).

Also, from these data, after ranking the return value series from smallest to largest, the VaR was calculated as a 5% percentile of the daily return values * 1.000.000.000 ALL (since we chose the 95 % confidence level).

The results from these calculations are presented in the table below:

Table 1: The values mean, standard deviation, coefficient of variation and VaR/million for all data

Currencies	Mean	Standard Deviation	CV	VaR Monte-Carlo/ million
US Dollar	-0.00047	0.0066	-13.98579	-11398968.19
Euro	4.11687E-05	0.00065	15.87036	-1034217.789
Great Britain Pound	0.00016	0.00535	32.59422	-8854421.252
Suisse Franc	0.00022	0.01032	46.59688	-14695155.23
Japanese Yen (100)	-0.00021	0.00615	-28.71541	-10058024.92
Australian Dollar	0.00020	0.00707	35.61717	-11310054.55
Canadian Dollar	0.00027	0.00699	25.87578	-11085364.55
Swedish Krona	4.88632E-05	0.00485	99.32108	-7968257.484
Norwegian Krone	9.48651E-05	0.00728	76.73549	-11649793.76
Denmark Krone	2.20002E-05	0.00100	45.49423	-1602136.981
Special Drawing Rights	-0.00017	0.00713	-42.58421	-12326599.71
Gold (OZ 1)	-0.00051	0.00900	-17.53719	-15521462.73
Silver (OZ 1)	0.00051	0.01493	29.24483	-23641977.1

Below, a summary of the steps for calculation of variables before performing regression analysis:

1. Download the prices of exchange rates for a one-year period,
2. Calculate the daily periodic return by formula: $X = \ln(P_1/P_0)$**,** where P_0 and P_1 are the prices in two consecutive days,
3. Calculate the mean, variance and standard deviation of daily periodic returns,
4. Model the return values X by equation: $X = \mu + \sigma \times$ normsinv(rand( )),
5. Calculate the future values of exchange rates by equation:
   Today value of exchange rate = Yesterday value of exchange rate $\times e^r$,
6. Calculate the values of coefficient of variation and VaR for each currency.

From these calculations, we obtain the values for the dependent variable VaR and for the independent variable CV, necessary for the regression analysis.

4. THE INTERPRETATION OF RESULTS

We set the null and alternative hypothesis:

H_0: There is not a significant relationship between VaR and the coefficient of variation
H_a: There is a significant relationship between VaR and the coefficient of variation

The tables below are obtained from the output of IBM SPSS Statistics 20:

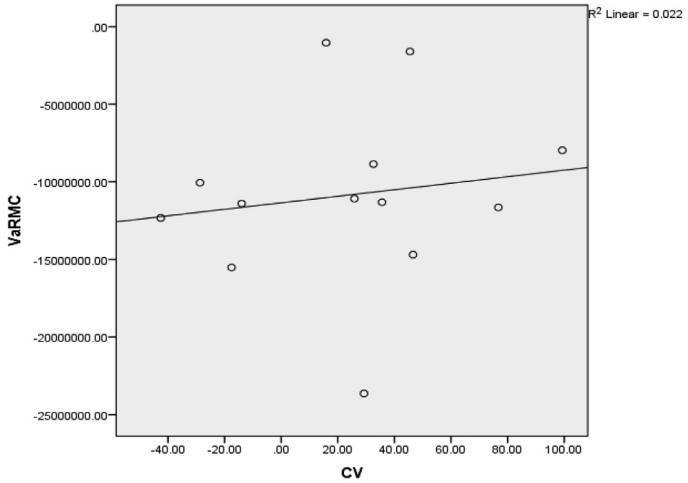

Figure 3: The scatterplot for the linear relationship between VaR and coefficient of variation

Below are the results of Kolmogorov – Smirnov and Shapiro – Wilk normality tests for both variables.

H_{01}: The values of Coefficient of Variation are normally distributed,
H_{02}: The values of VaR are normally distributed.

Table 4: The normality tests for the variables VaR and CV

Results of Tests of Normality						
Variables	Kolmogorov - Smirmov			Shapiro - Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
CV	0.139	13	0.2	0.964	13	0.82
VaRMC	0.169	13	0.2	0.92	13	0.254

As the p values in both cases are greater than $\alpha = 5\%$, we conclude that the two variables are normally distributed.

The table below presents some statistics from the output of simple linear regression with dependent variable VaR calculated with Monte Carlo simulation and independent variable coefficient of variation.

Table 5: Some statistics from the output of the regression analysis

Correlation	R-square	Durbin-Watson	Test statistic	p-value
0.149	0.022	1.406	0.501	0.626

From the output, as the p-value = 0.626 > α = 0.05, we can't reject the null hypothesis.

At $\alpha = 0.05$ level, we conclude that there isn't significance relationship between the coefficient of variation and VaR calculated with the Monte-Carlo simulation. This means that the VaR model is not a valid methodology for risk calculation in the Albanian exchange market, assuming the coefficient of variation is.

5. CONCLUSION

In this paper, using the regression analysis we have proved that the VaR model is not a good instrument to measure the relative risk in the Albanian exchange market, when we assume that the coefficient of variation is. The VaR was calculated from simulated exchange rate values, using the prices of exchange rate for one-year period and the formula:

Today value of exchange rate = Yesterday value of exchange rate $\times e^{r}$

REFERENCES

[1] Markowitz, H. (1952), "Portfolio Selection", The Journal of Finance, Vol. 7, No. 1. (Mar., 1952), pp. 77-91, taken in: https://www.math.ust.hk/~maykwok/courses/ma362/07F/markowitz_JF.pdf
[2] Jorion, P. (2000). "Value at Risk", 2 editions, McGraw-Hill, New York at al.
[3] Hull, J.C. (2007). Risk management and financial institutions. Upper Saddle River, NJ: Pearson Prentice Hall.
[4] Julijana, A. (2013). Managing market risk with VaR (Value at Risk). Management, 18(2): 81-96.
[5] Morgan, J. (1996), "Risk Metrics", Technical document, Morgan Guaranty Trust Company
[6] Pallota, M. & Zenti, R. (2000), "Risk analysis for asset managers: Historical simulation, the bootstrap approach and value at risk calculation", working paper, RAS Asset Management.

ADDITIONAL READINGS

Berkowitz, J., (2002), "How Accurate are Value-at-Risk Models at Commercial Banks?", The Journal of Finance, Volume 57 Issue 3, p. 1093–1111.
Brief R.P. & Joel O., (1969), "A note on Earnings Risk and the Coefficient of Variation", Journal of Finance, Volume 24, issue 5, fq. 901-904, American Finance Association.
Cassidy, C. & Gizycki, M. (1997). "Measuring traded market risk: value-at-risk and backtesting techniques". Research Discussion Paper 9708, Bank Supervision Department Reserve Bank of Australia.
Dewitt R. & Charles dhe Edna N.R., (1970), "Exact Determination of Earnings Risk by the Coefficient of Variation", Journal of Finance, volume 25, issue 5, fq.1161-1165, American Finance Association.
Gitman L.J., (1990), "Fundamentals of Investing", Boston: Pearson Education.
Gitman L.J., (2007), "Principles of managerial finance", Boston: Pearson Education.
Jorion, P. (2000). "Value at Risk", two editions, McGraw-Hill, New York at al.
Jorion, P. (2006). Value at risk: The new benchmark for managing financial risk. New York: McGraw-Hill.
Perez, P., G., & Murphy, D. (2015), "Filtered historical simulation Value-at-Risk models and their competitors", Working Paper No. 525, Bank of England.
Sironi, A., (2006), "Rischio e Valore nelle Banche: Risk Management e Capital Allocation, Egea", Prima Ristampa, p.103-109.

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