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CONTEMPORARY ISSUES IN ECONOMICS, BUSINESS AND MANAGEMENT

Editors:
Violeta Domanović
Dejana Zlatanović

FACULTY OF ECONOMICS
UNIVERSITY OF KRAGUJEVAC

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Kragujevac, 2020

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FOREWORD

The Faculty of Economics, University of Kragujevac organized the Sixth biennial International Scientific Conference on *Contemporary Issues in Economics, Business and Management* (EBM 2020). Due to COVID-19 pandemic, the Conference was organized virtually. As in the previous years, this sixth conference was an opportunity for domestic and foreign researchers to present and confront different theoretical and empirical views, thus contributing to the deepening and spreading the current level of knowledge in economics, business and management. Taking into account the complexity and diversity of these contemporary issues, the papers covered the following fields: *Key Issues in Management and Marketing, Globalization and Regionalization, Accounting and Business Finance and Applied Informatics and Quantitative Methods in Economics and Management.* The Conference brought together about 100 young and experienced researchers, PhD students, post-doctoral researchers, and academicians from thirteen different countries, such as Norway, Belgium, Great Britain, Poland, Russia, Ukraine, Greece, China, India, Portugal, Slovenia, the Republic of Bosnia and Herzegovina, and the Republic of Serbia. EBM 2020 Conference included plenary session and four parallel sessions. The distinguished researchers in the specified fields of management and accounting were the keynote speakers as follows: Professor Nathalie Van Meurs, Midlesex University London, UK; Professor Frøystein Gjesdal, Norwegian School of Economics, Norway, and Professor Michael Frömmel, Ghent University, Belgium.

The Proceedings contains thirty seven positively reviewed papers. It is important to emphasize that several papers were selected for publishing in the journals which supported the Conference: Economic Horizons and Our Economy/Naše gospodarstvo. The authors of two papers decided to submit their papers to the journal *Our Economy*, and the author of one paper decided to submit the paper to the journal *Economic Horizons*. Therefore, the above-mentioned papers are not included in the Proceedings.

First section referring to *Key Issues in Management and Marketing* encompasses topics dealing with business conditions for tech startups in the Republic of Serbia, European innovation scoreboard, organizational communication during the emergency situations, various aspects of human capital assessment during the pandemic of COVID-19, information literacy competencies in small and medium-sized enterprises, digital competencies before and during the COVID-19 pandemic crisis, project portfolio management, consumer behaviour trends during the coronavirus pandemic, social responsibility and human selfishness, corporate social responsibility in the public sector, performance measurement in the public sector, continuity of perceptions of entrepreneurial opportunities and education of students in Bosnia and Herzegovina, as well as food health management system.

The section *Globalization and Regionalization* deals with innovation, export, CO2 emission and economic growth, world practice in state export support, Euro area and PPP club, social economy impact on rural areas development, the impact of coronavirus pandemic on pension insurance sector, European countries' population well-being, the impact of institutional quality on trade in Southeast European countries, the impact of COVID-19 pandemic on workers in the Republic of Serbia, international trade perspectives of Serbia after 2020 and the concept of financial resilience in turbulent times.

The section *Accounting and Business Finance* contains the papers related to controller responsibilities, situation approach to foreign currency translation, tracking tax haven ownership in Serbia, application of ABC in the information technology aiming to improve the quality service performance, and the relationship between net income and comprehensive income.

In the section dedicated to *Applied Informatics and Quantitative Methods in Economics and Management*, the papers consider the application of various relevant methods, models and approaches, such as, econometric and deep learning investigation of factors explaining the spread of COVID-19 across countries and Indian states, crypto-democracy and its implications of the blockchain technology on the democratic choice, business intelligence model based on data warehousing and machine learning, the significance of the artificial intelligence concept in research papers in economics, consensus protocols in permissionless blockchains and management information system in function of business process integration.

Due to 2020 being recognized as the pandemic year, the collection of the thirty seven papers is a good indicator of the Conference success. Taking all into consideration, it may be concluded that EBM 2020 conference fulfilled its purpose providing a good basis for further research and consideration in the academic community as well as the general professional community.

Editors

KEYNOTE SPEAKERS

Nathalie Van Meurs , Middlesex University London

"NAVIGATING UNCERTAIN TIMES: HOW ORGANISATIONS CAN STIMULATE AND STRENGHTEN INNOVATION AND COLLABORATION AMONG PEOPLE"

Frøystein Gjesdal, NHH Norwegian School of Economics, Norway

"CONCEPTUAL FRAMEWORKS OF ACCOUNTING"

Michael Frömmel, Ghent University, Belgium

"THE CRISIS ALPHA OF CTAS: WEATHERING FINANCIAL STORMS"

CONTENT

ACCOUNTING AND BUSINESS FINANCE

APPLIED INFORMATICS AND QUANTITATIVE METODS IN ECONOMICS AND MANAGEMENT

KEY ISSUES IN MANAGEMENT AND MARKETING

SOCIAL RESPONSIBILITY AND HUMAN SELFISHNESS

Matjaž Mulej⃰
Emeritus Professor, Dr., Dr., University of Maribor, Faculty of Economics and Business, and IRDO Institute for the Development of Social Responsibility; head of research, matjaz.mulej@um.si

Anita Hrast
M. S., General Manager, IRDO Institute for the Development of Social Responsibility, and Lecturer at Doba Faculty, Maribor, anita.hrast@irdo.si

Miro Mihec
B. S, Owner and Manager, Etika, d.o.o., Maribor, IRDO Institute for the Development of Social Responsibility member, Social Economy Slovenia, vice-head, Ph.D. student, miro.mihec@etika.si

Abstract: There are doubts whether the concept of corporate social responsibility can become reality due to dependence of the listed companies on the short-term and narrow criteria of success at Wall Street / stock exchange. The concept is briefed with ISO 26000, exposing all life practices (briefed in seven contents), stressing one's responsibility for one's influences on society (i.e. humans and nature), interdependence and holistic approach, and seven principles (which customer does not require accountability, transparency, ethical behavior, respect for stakeholders' interests, for the rule of law, for international norms, and for human rights?). ISO 26000 would not be necessary and suggested by humankind via its global bodies UNO and ISO as a way out from the current socio-economic crisis, if it was practiced generally and daily. The famous global management consultant Adizes is quoted here for his presentation of doubts about the feasibility of social responsibility. He triggers a brief analysis, leading to conclusion that customers' natural selfishness requires all suppliers (except illegal drug dealers, corrupt monopolists, etc.) to practice social responsibility or go bankrupt. Actually, every person and organization is a supplier and a customer. Two initiatives are offered for self-evaluation of one's social responsibility. Paper is concluded with two encouraging examples of a local and a global action: a clever farmer and a Nobel Prize for Peace winner. Altruistic charity is neither necessary nor enough for ISO 26000 to help human classification: s way to survival as an endangered species on Earth.

Keywords: corporate social responsibility, ISO 26000, selfishness, self-analysis, survival

JEL classification: D11; D21; D63; D64; D91; M14

⃰ Coresponding author

INTRODUCTION: WHERE IS THE USUAL HUMAN SELFISHNESS IN ISO 26000

For a decade a large very international team was working on ISO 26000, which was then passed in 2010, i.e. two years after the official outbreak of the current socio-economic global crisis. This crisis results from the neoliberal socio-economic practice with which the most influential humans and organizations monopolized the global market place; they destroyed the equality of all humans proclaimed by the concepts of democracy and free market (for details see Mulej et al., 2019). The well-known data say that a very small percent of humankind has thus become extremely rich, and the large majority – 85 % - live on less than six USD/day (ibid.). This is a sign that an extreme selfishness reigns and causes the crisis surfacing in 2008. ISO 26000 (ISO, 2011) was officially seen as the way out from the crisis by the current humankind's global bodies UNO and ISO. Why so?

A BRIEF SUMMARY OF THE ESSENCE OF ISO 26000

ISO 26000 (ISO, 2010) requires a *holistic approach* (based on *interdependence*) and includes seven content areas: (1) organization, management and governance, (2) human rights, (3) labor practices, (4) environment, (5) fair operating practices, (6) consumer issues, and (7) community involvement and development. This requirement is supported by the following 7 principles of human behavior: 1. accountability, 2. transparency, 3. ethical behavior, 4. respect for stakeholder interests, 5. respect for the rule of law, 6. respect for international norms of behavior, and 7. respect for human rights (ISO 2010: 10-14).

European Union (2011) defines social responsibility as one's responsibility for one's impact over society. EU suggests its member states and big enterprises to be role models of social responsibility as a way out from the current socio-economic crisis. All these contents are linked by two crucial terms from the (Dialectical) Systems Theory (Mulej et al, 2013): (1) interdependence, and (2) holism. They crucially change the prevailing current values, culture, ethics and norms (VCEN) in the current practices – toward responsibility.

Responsibility appears to replace the exaggerated selfishness (which is not worded).

ISO (2010) suggests in ISO 26000 (pp: 69-84) the following procedure to make social responsibility a normal practice: Step 1: The relationship of an organization's characteristics to social responsibility; Step 2:

Understanding the social responsibility of an organization; Step 3. Practices for integrating social responsibility throughout an organization; Step 4: Communication on social responsibility; Step 5: Enhancing credibility regarding social responsibility; Step 6: Reviewing and improving an organization's actions and practices related to social responsibility; and Step 7: Voluntary initiatives for social responsibility.

Obviously, an innovation of values by knowledge-cum-values management is demanded (Zlatanović, Mulej, 2016). It should be supported methodologically. We will not publish the methods here. We will only state another point: social responsibility reaches beyond law, but never replaces law (e.g. Zore, 2016, and references mentioned so far). Reality depends on decision makers.

THE JUSTIFIABLY FAMOUS MANAGEMENT GURU ADIZES OVERLOOKED SOMETINHIG THIS TIME: CUSTOMERS; WHAT ABOUT YOU?

We received a statement on the Internet, published on July 3, 2020 by Dr. Ichak Adizes: 'Why we are not socially responsible'. He rightly highlighted the stock market as the center of short-term and narrow measures of success, only very indirectly - with the share price - he mentioned customers. Businesses close when customers decide so. Example: who still buys films for photography, blood leak therapy,

computers with ordinary replaceable batteries, cars of obsolete brands, apartments without electricity and plumbing, etc.

CORONA VIRUS CRISIS: SOCIAL IRRESPONDIBILITY COSTS MUCH THAN SOCIAL RESPONSIBILITY

At the same time as Adizes's statement quoted below there is the global crisis, whose common health denominator is the new corona virus, and the economic closure of smaller and larger businesses that have lost customers. They are not socially responsible, as of all the stakeholders, they pay attention only to the owners - shareholders, as if they have customers automatically, as they forced them to feel that they really need their products and services, not just in the imagination.

Now one buys less cars, clothes, tourist services, air and other transport services, even dry cleaners and public laundries, very important cultural and sports events, professional and amateur, etc. are closed. There is a growing interest in existentially necessary matters, such as health care, even disease prevention, which is otherwise very neglected, food, etc. Thus, millions of hitherto normal jobs are disappearing and at the same time the need for jobs for which there are no qualified candidates is growing. Advice from the theory of JM Keynes and the practice of US President Roosevelt is returning to the practice of many governments that it is not true that it is necessary to privatize social services - education, health, culture, art, utilities, etc., because narrow and short-term interests do not suit them more than social responsibility. Therefore, business monopolies, not just state ones, need to be prevented. The 'Corona Crisis' has clearly shown that social irresponsibility costs much more than social responsibility, which strengthens interdependence, integrity/holistic approach and taking responsibility for decisions and actions. The daily media are full of messages proving this.

ADIZES'S QUOTE

At the World Economic Forum in Davos in February 2020, the founder and chairman of the forum criticized economic theory and business practices that see shareholders as clients of a business organization to whom that organization provides a return on investment. He believes this is an outdated theory. Organizations should meet others: the needs of the community, the well-being of workers and social responsibility should also be goals. This is not a new idea; people generally get the feeling that profit, exclusive profit growth is seen as evil. Organizations should act responsibly towards the environment and society, which could mean that they agree to limit the profits that a company makes if it benefits those interests. The existing power structure of the system will continue to steer behavior toward profit, albeit with some philanthropic contributions and nice words for social responsibility.

To change the direction of a motorboat, it is not enough to stand on deck, look at a map, and point in a new direction. Nothing will happen until you change the relative power of the left engine compared to the right engine. I believe that these new ecopolitical theories of social responsibility will remain on paper because the power structure - the dynamics of the economic system - has not changed.

I know a lot of CEOs who are truly socially responsible souls. They are worried about the environment. They are worried about what is happening to society and would like to see change. As executives of listed multinational companies, however, they must satisfy Wall Street or risk being replaced by their board of directors and shareholders.

Shareholders in the stock market are loyal only to the return on their investment. If earnings per share are lower than expected, the share price will fall. Shareholders will instantly sell their shares and buy a company that will show better earnings. So, even if the CEO intends to limit profits to be more socially

and environmentally responsible, he will not stay in power if the competitor is financially better. They will replace him.

In unlisted companies, pride plays an important role, especially in small businesses. They are part of the community. The founders will not take action by losing face in the community. Otherwise, the community will not support their business. As members of the community, they want to be valued and respected. They are therefore community-oriented, philanthropic and support their customers to make sure that the quality of the products they offer is not ashamed in their community.I don't think this applies to large multinational companies where the CEOs might live in Scottsdale, New York, but the companies they manage are in India, Australia, or scattered across the US. If the management of these companies pollutes, they do not pollute their own yard. They do not pollute the water, air and land where their children live. They pollute remote places where their sense of loyalty to the local community is questionable. I believe they feel no limit to striving for earnings per share and shining in the stock market. However, there is a trap. A director in India who suffers from the pollution of an American company may be polluting the living space of the community in Europe. A company based in Europe pollutes communities in Australia and Australian companies that pollute the US, etc.

The global expansion of business interests reduces the pressure on CEOs and their boards to be community-oriented and environmentally responsible, and the pressure on earnings is more tolerable. Even if CEOs intend to be accountable, they can't because they have to pay attention to Wall Street's expectations.

For socially responsible behavior to come to life, all companies should agree not to pollute each other's countries, and investors should change the reasons for buying shares in the market. If one insists that companies will be socially responsible, it will not work until we change the direction and rules by which companies operate - rules that show that share price and profitability are criteria for promotion and rewards.

It is true that there are investors who invest exclusively in companies called Impact Enterprises, which are socially responsible, but this is too little and too late to change anything. Climate change and the pollution of society will destroy our civilization as we know it. If we want to change a company's behavior to fit their declared purposes, and do so in a timely manner, we need to change the power structure of how capital is mobilized, used, and returned to investors.

We need to think about the role of Wall Street and the stock market. We need to think about the composition of boards of directors. Boards should not include exclusively representatives of the owners. For years, I have recommended that artists be placed on boards of directors because real artists are generally socially aware and not materialistic. They may represent the global interest of the community in which the company operates. I would put religious leaders and intellectuals on the board to balance the power structure that is currently favored exclusively by shareholders. This is just one example of what I mean when I say we need to change reward and power systems before we can change behavior.

Changing goals is okay, but it's not enough if the goal is like trying to lose weight without changing your eating habits.

BASED ON THE QUOTE: ADIZE'S NARROW CONCEPTION OF SOCIAL RESPONSIBILITY IN THE LIGHT OF ISO 26000

Adizes has been a global management guru for many decades, so he moves much more among CEOs than among other people, especially the less influential. Therefore, it is probable, as can be seen from the statement shown, that he conceives of social responsibility more under their influence than under the influence of the UN Charter and ISO 26000. Customers are not exposed, but they are essential: otherwise, marketing and public relations and advertisement would not matter as much as they do.

Now: who are customers that are mentioned in ISO 26000 and only indirectly, without attention, observed by Adizes?

In e.g. the case of toys, children are customers, their parents, grandparents etc. are buyers. Both of them tend to change their preferences, causing investors as shareholders to lose their rents and profits. Similar is the situation with other customers, consumers, and buyers. They are entitled to care for their interests and less so for interests of others, unless they reduce social responsibility to charity.

This reduction is not the central point, but only a marginal part of a socially responsible behavior. If ones' care for the other was not important and difficult to attain, it would not be included in ISO 26000 – as the respect for stakeholders' interest – and into moral advices in religious teaching (e.g. do not do to others, what you do not want them to do to you; solidarity with the poor ones, etc.). Shareholders are interested in their profits only, Adizes says with full right. They are customers of the corporations that they have invested their money in. Their profits depend on corporations' profits that depend on buyers, consumers and customers of corporations' products and services, which are accepted rather than neglected or refused.

Employees, including managers, are also customers of corporations that they have invested their knowledge and other capabilities in. Their salaries also depend on corporations' profits that depend on buyers, consumers and customers of corporations' products and services, which are accepted rather than neglected or refused. Suppliers are in a similar position as employees.

Their incomes depend on corporations' profits that depend on buyers, consumers and customers of corporations' products and services, which are accepted rather than neglected or refused. This includes suppliers of social services, such as education, health care, legal services, security, governmental services etc.

From such selected viewpoints everybody is both a supplier and customer and requires honest and reliable behavior instead of an abusing one, as customer. In other words, for very selfish reasons every person – both individually and as organization, region, country, international community – is interested in practice of social responsibility.

The weak point of Wall Street that Adizes in exposing is the favoring of the short term over the longer terms in criteria of decision making. But neither this is fully true: listed companies, like the unlisted ones, need to survive in a longer time, too. Business media are full of reports about bankruptcies – tackling actually those who do not meet expectations of their customers.

Supplier of illegal drugs might be an unfortunate exception. Therefore, they are subject to legal prosecution. So are donors and recipients of bribery.

Again, social responsibility upgrades law without replacing it. Hence, knowing the practices of ones' partners, i.e. all stakeholders, may help everybody to be on the safe side in any relations, since everybody is in one or another way interdependent with other humans and nature around humans.

GETTING INSIGHT INTO PRACTICE OF SOCIAL RESPONSIBILITY

The above summarized seven contents and seven principles from ISO 26000 can be presented in the Table 1.

We invite readers to evaluate which of the 7 x 7 fields Adizes considered, and then use the questionnaire for themselves, which we summarize below.

Table 1 Contents and principles of social responsibility according to ISO 26000 - possible links

Contents / Principles	Organizational governance	Human rights	Labor relations	Natural environment	Fair business practices	Consumer issues	Community involvement and development
accountability transparency							
ethical behavior							
respect for stakeholder interests							
respect for the rule of law							
respect for international norms of behavior							
respect for human rights							

Source: Author

Questionaire on how is our social responsibility

Let's check ourselves out before we are checked by others who may prefer to denigrate us than support us. We offer you a questionnaire that we received online from ExPoc Sintesis, which reports on social responsibility on a daily basis.

45 social responsibility audit questions

On 2 September 2019 Daniela Lazovska published 45 questions for the social responsibility audit, with which companies and other organizations (as well as all people) can check themselves to see if they are "fulfilling their obligations to society" (Lazovska, 2019). They can analyze their environmental impacts through audit questions. They can improve measures to improve the local community, volunteer programs, monitor energy consumption at all stages of business, assess responsibility to employees.

Condition analysis

1. Have you violated any of your social responsibilities (SR)?
2. If yes, why? What happened? Who else knows about these violations?
3. Have your suppliers violated your SR? What about customers? And direct competitors? Why?
4. What is your mission and how does it align with the responsibilities of the community and stakeholders? What are your business goals and values? Does your business plan reflect the results of this audit?

5. What do the community and stakeholders think about your company? What do they think of your industry? What do they think of your competition? What do your customers think of the company?
6. Are your findings positive or negative? What are the trends and direction?

Reference point

7. How would you describe or define ethical standards and norms in your industry?
8. Do you have a corporate code of conduct? How did you shape it?
9. How do you share and communicate a code of conduct with employees? How do you know they know it?
10. When was the last time you examined it? Need changes?
11. Does your competition have a corporate code of conduct?
12. What is your competition in social cause programs?
13. Which SR programs have worked in your industry? Why?
14. Which SR programs did not work in your company? Why not?
15. What does the future show, an analysis of trends in the industry?
16. What other important trends are shaping your industry? What about regulations that can affect the industry? How did they come about? What is its main cause?
17. How do companies in other industries meet their SRs similar to yours?

Brainstorming

18. Based on your previous findings and discoveries, what can you do differently to strategically differentiate your company from others?
19. What do you want to do better? What does your business need to improve?
20. What do you want to continue to do? What do you do better than the competition?
21. What area of your community or who in the community has the most impact on your business? In what way?
22. What community issues can affect your company and / or employees?
23. What role does your company want to play in the community?
24. What activities have you done in the past to help this relationship?
25. What are the interests of employees and what principles of SR do they practice?
26. Does your business plan and strategy fit well with what you have learned so far?
27. Does your business plan and business strategy need improvement?
28. What would be the plan to review your plan and strategy?
29. Who could help you with this process?

Evaluate other options

Consider each of these options: sponsorship, cobranding, licensing, new product promotion, philanthropic investments, product and service donations, and employee engagement.

30. Which option seems better for your analysis of the situation? Why?
31. What does your management team think?
32. How will you evaluate and measure the results of SR initiatives?
33. What resources are you willing to invest? For how long?
34. How will you know you are doing well? Who will decide for this?
35. How will you motivate employees to support the choice?
36. How will you choose the different options? Who will help you choose?

Create an action plan

37. What are the key points of conversation in the audit that you find necessary to communicate at this time?
38. Do you think you are going / should go on the "offensive" or "on defense"? Why?
39. Which initiative for social reasons seems to be the best answer to your situation? Why?
40. What are your deadlines you need to start? How fast should we act?
41. How do you think your competition will react when you start your SR initiative or program?
42. With whom should you share your audit? How will you report? What do you expect from those who will read your review?
43. What should you share with internal stakeholders, directors, employees, investors, etc.? When? With external stakeholders, suppliers, consumers, local communities and the media?
44. Who can help you prepare a summary of the DO audit?
45. Who will be responsible for creating and launching a new initiative for DO practice?

TWO CASES AS CONCLUSIONS

A smart farmer looks as holisicalz as possible

A smart farmer distributed his best grain for sowing to his neighbors. He explained this decision, which others considered insane selfless generosity in favor of competitors, as follows: "The wind carries pollen and therefore the influence of grain from their fields also on mine and benefits me if it brings good, not bad grain." if you do good, good comes back to you; if you do evil, evil returns to you. Social responsibility benefits everyone.

The nobel peace priye 2020 goes to hunger fighters to reward socially responsible action

We are summarizing the daily Večer (Maribor), which reports on this award on 10 October 2020 (on pages 1, 2 and 5). "It is given to the World Food Organization (WFP), which is part of the UN system, for its efforts to fight hunger, for its contribution to improving the conditions for peace in conflict areas and for its efforts to prevent the use of hunger as a weapon. Last year, they provided assistance to almost one hundred million people in 88 countries who are victims of hunger and food insecurity. "

"According to the UN, one in nine earthlings does not have enough food. Donor countries, including Slovenia, contribute a good seven billion dollars every year. Don't get fed up. The global arms industry turned an incredible $ 1,822 billion in 2018 alone, according to the Stockholm Institute for Peace Research (SIPRI). The wealth of the three richest earthlings - Jeff Bezos (Amazon), Bill Gates (Microsoft) and Elon Musk (Tesla, SpaceX) - is about $ 280 billion, or somewhere in the 40-year budget of the WFP. We can have endless concerns about the WFP… But still, the WFP is the only global organization that deals with the problem of hunger. The problem of hunger in a world where one percent of people control 99 percent of wealth will not go away, but will deepen. If we add to this the devastating consequences of environmental change, the current covid-19 pandemic and, of course, the never-ending war, we can only hope that the Nobel Prize will also mean greater awareness of the world community. - Of course, it would be best if the world food program did not exist at all. Because it wouldn't be needed. Because there would be no famine." (Bercko, 2020)

Social irresponsibility is much more expensive than social responsibility (e.g. Dragan, Mulej, 2018, 2019a, b, 2020; Hrast et al., editors, 2006 – 2020; Mihec, 2020). Social irresponsibility gains its most powerful support from monopolists and lobbies (Ashby, 2020); beware of them, they are ruining democracy and market based on honest competition (Lendvai, 2020; Vitali, Glattfelder & Battiston,

2011). Hence, humans, organization, governmental and other social bodies must/may pay serious attention to social responsibility (Mulej, O'Sullivan & Štrukelj, ed., 2020a, b; Piciga, Schieffer, Lessem, ed., 2016; Mulej, Merhar, Žakelj, ed. 2019; Žakelj, 2018), education included (Mulej, M., Hrast, Mulej, N., a, b, in printing) – for very selfish reasons.

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CONTINUITY OF PERCEPTIONS OF ENTREPRENEURIAL OPPORTUNITIES AND EDUCATION OF STUDENTS IN BOSNIA AND HERZEGOVINA

Dino Arnaut

Faculty of Economics, University of Zenica, Bosnia and Herzegovina, arnaut.dino@gmail.com

Abstract: The development of entrepreneurial talent is important to maintain a competitive advantage, and thus, promotion of entrepreneurial culture among young people it is crucial to know more about their attitudes, awareness, and aspirations towards entrepreneurial career. The aim of the paper is to analyse and compare perceptions of the opportunity of young people in 4-year period to start a business and their perception of their own business as a way of solving their unemployment problem in Bosnia and Herzegovina. Perceptions towards entrepreneurship as a desirable career choice and analysis of the education sector in the field of entrepreneurship are also analysed in this period. The target population of this research were young people in Bosnia and Herzegovina, primarily students, between 18 and 30 years of age. Data were collected using a structured questionnaire which was distributed online and in print form in 2014, and again in 2018. The research results show that young people in Bosnia and Herzegovina do not perceive good opportunities for starting a business and they did not change their perception in analysed period. Entrepreneurship is continually ceasing to be a desirable career choice for young people because the society does not value and does not promote entrepreneurship. Development of entrepreneurial skills and abilities is almost non-existent, and universities are also failing to provide the necessary knowledge. Entrepreneurial path is paved with insecurities that are increased with lack of education and support from the environment. All of this prevents young people in Bosnia and Herzegovina from starting their own business.

Keywords: Entrepreneurial Perceptions, Entrepreneurial Opportunities, Entrepreneurial Education, Environment, Bosnia and Herzegovina.

JEL Classification: L26, I23, O44.

INTRODUCTION

Changes in population demographics, technological modifications, and a fluctuating economy have transformed society like never before, bringing new challenges, in addition to opportunities, to the forefront. According to experts, young individuals have poor access to formal education, training, and entrepreneurial opportunities.

Among the responses to those everyday shifting forces is an actual increase in stress on entrepreneurship by governments, organizations, and the general public. Entrepreneurship cannot be a panacea for it all, but it can surely be part of the answer since growth for growth's sake alone isn't enough. Therefore, economic growth through entrepreneurship desires to address issues of inclusiveness and guarantee these efforts advance societal well-being.

In order to accelerate job creation especially in developing countries, it is crucial to include support for high growth enterprises in development plans and strategies, with respect to innovativeness and international orientation criteria, which represent relevant factors of competitiveness and strengthening business market position, which provides sustainable business growth. The entrepreneurial revolution has impacted the world of business across the globe. Young generations of the 21st century are becoming the more and more entrepreneurial and are actively trying to start their own business.

The development of entrepreneurial talent is important for maintaining a competitive advantage in today's world economy driven by innovation. The role of quality entrepreneurship education and training in identifying and nurturing entrepreneurial potential among young people is becoming apparent to students, politicians, and educators. Entrepreneurial activity of young people in Bosnia and Herzegovina is basically motivated by need. Only a few self-initiated young people learn how to develop business activities, mainly through their experience instead of through the education system.

In order to promote an entrepreneurial culture among young people, it is crucial to know more about the attitudes of young people themselves, their awareness, and aspirations towards entrepreneurship as a career.

LITERATURE REVIEW

According to Stevenson and Lundström (2001), promoting an entrepreneurial culture is one of the least developed strategic areas of entrepreneurship development in the world. Entrepreneurial education has rapidly expanded into higher education institutions around the world (Fretschner and Weber 2013). This expansion has been driven by the promise of entrepreneurship as a means to promote economic recovery and growth (Greene and Saridakis 2008).

As confirmed by the literature (Kwon and Arenius, 2010), social values play a key role in determining whether individuals behave entrepreneurially or not. One of the dimensions of the examination of social values is the analysis of the perception of entrepreneurship as a desirable career choice.

As part of potential efforts and strategies to strengthen employment and create new jobs for young people, entrepreneurship is increasingly accepted as an important tool and a useful alternative for generating income for young people (Ryan, 2003). As traditional lifelong careers become less common, youth entrepreneurship is seen as a means of integrating young people into the labour market and overcoming poverty. Mueller (2016) highlights that there are additional factors that are within the

environment such social environment or family background that serve as influencing factors that facilitate the cultivation of entrepreneurship (Chen and He, 2010).

Chigunta (2002) summarizes several reasons that emphasize the importance of promoting youth entrepreneurship:

- creating employment opportunities for self-employed young people, as well as other young people they employ,
- promoting youth innovation,
- take advantage of young entrepreneurs to be particularly responsive to new economic opportunities and trends,
- returning alienated and marginalized youth back to economic flows, giving them a sense of meaning and belonging,
- helping to solve some socio-psychological problems and delinquencies arising from unemployment,
- help in developing new skills and experiences of young people which can then be applied to other challenges in life.

Entrepreneurship and self-employment can be a source of new jobs and economic dynamics in developed countries. They can also improve the lives and economic independence of young people in developing countries. For young people in the gray economy, micro-entrepreneurship represents progress towards generating income, building self-confidence, as well as a new innovative way to earn a living and take care of themselves (Maxwel, 2002). According to GEM reports (2017/18 and 2014), there is a continuous decline in the indicators of perceived opportunities in Bosnia and Herzegovina. Also, the population of Bosnia and Herzegovina shows positive perceptions of entrepreneurship as a desirable career choice, although these perceptions have decreased from as much as 78.1 percent (GEM 2014) to 62.7 (GEM 2017/18) adults, aged between 18 and 64 years. There has also been a decline in adults, aged between 18 and 64, who do not agree that starting a business is a desirable career choice in Bosnia and Herzegovina by as much as 20% over a period of four years (2017/18 and 2014).

Entrepreneurial knowledge is there to cover the various ideas, skills, and mentality which the entrepreneurs explore or should explore (Al Mamun and Ekpe, 2016). Therefore, educating young people about entrepreneurship and entrepreneurship is seen as a highly valuable preparation for the constant changes in the labour market and in the economy within which young people have to work (Gallaway et al., 2005).

Current studies recount a clear linkage between the perceived importance of education curriculum and students' entrepreneurial intentions (Ahmad et al., 2018; Iwu et al., 2016; Ramadani et al., 2017). In many countries, especially in developing and transition countries, education about starting your own business simply does not exist or is not sufficiently accepted (Haftendorn and Salzano, 2003). Entrepreneurship education is crucial in helping young people to develop entrepreneurial skills, attributes, and behaviours, as well as to develop an awareness of entrepreneurship, to understand and embrace entrepreneurship as a career option. Research on the complexity of learning in higher education emphasizes that little attention is paid to what, how and from whom students acquire skills and knowledge for their future employment (Jackson 2015).

METHODOLOGY

Research was conducted in two different periods, one during 2014, and other during 2018. Probability-based (random) sampling was used, based on mixed-mode surveys using internet-based and traditional media. Participants were young people, students between 18 and 30 years of age from Bosnia and Herzegovina. Initial sample size was 1000 students for survey in 2014. Data were collected using a structured questionnaire that was presented to respondents in the online and printed form. Questions were formed on the principle of Likert scale from 1 to 5. Value 5 defines full agreement with statement (strongly agree), while a value of 1 indicates complete disagreement with it (strongly disagree). Data were retained for analysis from the 1472 participants who fully completed the questionnaires. Data analysis was performed using SPSS.

The target population of research conducted in 2018, were also young people, primarily students between 18 and 30 years of age. Data were collected using a structured questionnaire presented to respondents in online and printed form as well.

For this research, the questionnaire consisted of nine questions in 2018 in order to check changes regarding research topic. Two introductory questions are demographic in nature; one question is on the principle of multiple choices, while the other six questions are formed on the principle of Likert scale from 1 to 5. A value of 5 defines complete agreement with a given statement, while a value of 1 shows complete disagreement with it. The target population were young people, primarily students, and aged 18 to 30 from the territory of Bosnia and Herzegovina. During second survey in 2018, 490 fully completed questionnaires out of 550 distributed were successfully collected. Descriptive data analysis was performed using the SPSS program.

Table 1 Age of respondents

2014	N	Minimum	Maximum	Mean	Standard deviation
Age	1472	18.0	30.0	21.690	1.6364
Valid N	1472				
2018	N	Minimum	Maximum	Mean	Standard deviation
Age	490	18.0	30.0	21.505	1.4554
Valid N	490				

Source: Author

Table 1 shows that the average age was 22, while the standard deviation shows that the majority of respondents are between 20 and 23 years old in both surveys which gives validity for comparing these two surveys.

Table 2 Gender

2014		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Male	790	53.7	53.7	53.7
	Female	682	46.3	46.3	100.0
	Total	1472	100.0	100.0	
2018		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Male	236	51.8	51.8	51.8
	Female	254	48.2	48.2	100.0
	Total	490	100.0	100.0	

Source: Author

Table 2 shows the equal representation of the male and female populations of the respondents in both survey, which reduces the possibility of the influence of gender inequality on the research results, and thus making these two surveys comparable.

RESULTS AND DISCUSSION

In this section we will see the differences in perception regarding entrepreneurial opportunities and education in 4-year period and their comparability with GEM reports.

Table 3 and 4 shows the perception of business start-up opportunities by young people on a Likert scale from 1 to 5. A value of 5 defines full agreement with the statement that young people perceive good business start-up opportunities, while a value of 1 shows a complete disagreement, that is, claim of young people that there are no good opportunities to start a business.

Mean of 1.37 shows us that young people did not perceive good opportunities to start a business in Bosnia and Herzegovina during 2014, and therefore did not see their own business as a way to solve the problem of unemployment. The standard deviation (only 0.7) shows that this attitude dominates.

Table 1 Perception of opportunities (2014)

	N	Minimum	Maximum	Mean	Standard deviation
I see good opportunities to start a business	1472	1.0	5.0	1.372	.7072
Valid N	1472				

Source: Author

Almost identical situation remained during 2018, as we see that mean of 1.43 shows us that young people still do not perceive good opportunities to start a business in Bosnia and Herzegovina, and therefore do not see their own business as a way to solve the problem of unemployment. The standard deviation (only 0.7) shows that this attitude also dominates.

Table 2 Perception of opportunities (2018)

	N	Minimum	Maximum	Mean	Standard deviation
I see good opportunities to start a business	490	1.0	5.0	1.431	.7103
Valid N	490				

Source: Author

According to GEM reports, in Bosnia and Herzegovina there is a continuous decline in the number of perceived opportunities and in 2014 it amounted to 19.6 percent of adults, aged between 18 and 64, who see good opportunities to start a business in the area where they live (GEM 2014 Global Report). Comparing these results with the surveyed young population with an average of 22 years, we see that the dominant reduced perception of the observed opportunities is precisely among the younger population in 2014 survey.

In Bosnia and Herzegovina, according to last GEM report that included Bosnia and Herzegovina, GEM 2017/18 Global Report, there is a continuous decline in indicators of perceived opportunities and in 2017 and it amounts to 13.4 percent of adults, aged between 18 and 64, who see good opportunities to start a business in the area where they live (GEM 2017/18 Global Report). Comparing these results with the surveyed young population in 2018, with an average of 22 years,

we see that the dominant reduced perception of the observed opportunities is still among the younger population.

According to the GEM report, the population of Bosnia and Herzegovina shows positive perceptions of entrepreneurship as a desirable career choice. However, those perceptions have decreased from as much as 78.1 percent (GEM 2014) to 62.7 (GEM 2017/18) adults, aged between 18 and 64, who agree with the statement that in their country most people consider starting a business desirable career choice.

Table 5. Entrepreneurship perception (2014)

	N	Minimum	Maximum	Mean	Standard deviation
In my country, starting a business is considered a good career choice	1472	1.0	5.0	2.049	.9424
Entrepreneurship is not sufficiently valued and promoted by society	1472	1.0	5.0	4.203	.7567
Valid	1472				

Source: Author

However, Table 5 shows that on the Likert scale of 1 to 5, the mean for the young population's claim that starting a business is a desirable career choice is 2, with a standard deviation of 0.94. This means that the youth population in Bosnia and Herzegovina does not agree with the data from the GEM report, which includes the population of adults between the ages of 18 and 64. We can conclude that young people aged 18 to 30 are more in the 20 percent of adults, aged between 18 and 64, who disagree with the statement that in their country most people consider starting a business as a desirable career choice during 2014.

Table 6 Entrepreneurship perception (2018)

	N	Minimum	Maximum	Mean	Standard deviation
In my country, starting a business is considered a good career choice	490	1.0	5.0	2.095	.8135
Entrepreneurship is not sufficiently valued and promoted by society	490	1.0	5.0	4.429	.7977
Valid	490				

Source: Author

Also, Table 6 shows that on the Likert scale from 1 to 5 the mean for the young population's claim that starting a business is a desirable career choice is 2, with a standard deviation of 0.81 which is in line with a decline of 15.4% according to the GEM report in the last four years. However, the youth population in Bosnia and Herzegovina does not agree with the data even from the last GEM report, which includes the adult population between the ages of 18 and 64. We can conclude that young people between the ages of 18 and 30 are more in the 40 percent of adults, aged between 18 and 64, who disagree with the statement that in their country most people consider starting a business as a desirable career choice.

This is also in line with the attitude of young people that entrepreneurship is not sufficiently valued and promoted by society, which can be seen according to the mean of 4.2 and the standard deviation of 0.76 (Table 5) in 2014, and also in 2018 according to the mean of 4.4 and the standard deviation of 0.79 (Table 6). Therefore, if, according to the perception of young people, society itself does not value

and promote entrepreneurship automatically, entrepreneurship ceases to be a desirable career choice for young people. We see that this aversion toward entrepreneurial career increased in 4-year period by mean of 0.2. From Table 7 we see that universities failed to provide the necessary knowledge in the field of entrepreneurship (mean 1.54) according to the respondents in 2014. The development of entrepreneurial skills and abilities is almost non-existent according to the respondents (mean 1.27).

Table 7. Perception of entrepreneurship education (2014)

	N	Minimum	Maximum	Mean	Standard deviation
University education encourages me to develop creative ideas for creating my own business	1472	1.0	5.0	1.412	.8354
My university provides the necessary knowledge about entrepreneurship	1472	1.0	5.0	1.536	.7430
My university is developing my entrepreneurial skills and abilities	1472	1.0	5.0	1.268	.7076
Valid N	1472				

Source: Author

The analysis of the education sector in 2018 also shows an obvious lack of education in the field of entrepreneurship. From Table 8 we see that universities still fail to provide the necessary knowledge in the field of entrepreneurship (mean 1.64), and the development of entrepreneurial skills and abilities is still almost non-existent according to the respondents (mean 1.33).

Table 8 Perception of entrepreneurship education (2018)

	N	Minimum	Maximum	Mean	Standard deviation
University education encourages me to develop creative ideas for creating my own business	490	1.0	5.0	1.582	.7541
My university provides the necessary knowledge about entrepreneurship	490	1.0	5.0	1.641	.7110
My university is developing my entrepreneurial skills and abilities	490	1.0	5.0	1.327	.6232
Valid N	490				

Source: Author

Mean of 1.41 (2014) and 1.58 (2018) shows us that universities in Bosnia and Herzegovina do not encourage or encourage students to develop creative ideas and start their own businesses.

Table 9 Perception of environment impact (2014)

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Encouraging	15	1.0	1.0	1.0
	Neutral	478	32.5	32.5	33.5
	Discouraging	979	66.5	66.5	100.00
	Total	1472	100.00	100.00	

Source: Author

Given that in many countries, especially in developing and transition countries, education about starting your own business simply does not exist or is not sufficiently accepted (Haftendorn and Salzano, 2003) these results are not surprising.

The general perception of the environment on entrepreneurial activity can be seen in Table 9 and 10. In 2014 (Table 9) we can see that youngest people perceive that environment is discouraging (66.5%) and that only 1% of young people consider their environment encouraging to start their own business.

The perception of the impact of the environment by young people in 2018 is visible in Table 10. The table shows that for most young people the environment is still discouraging (now 68%) and that only 2% of young people consider their environment encouraging to start their own business.

Table 10 Perception of environment impact (2018)

		Frequency	Percentage	Valid percentage	Cumulative percentage
Valid	Encouraging	10	2.04	2.04	2.04
	Neutral	147	30.00	30.00	32.04
	Discouraging	333	67.96	67.96	100.00
	Total	490	100.00	100.00	

Source: Author

We see that no significant changes occurred in this 4-year period, and that young people still do not consider pursuing entrepreneurial career since their environment is discouraging.

CONCLUSIONS AND RECOMMENDATIONS

Young people in Bosnia and Herzegovina do not perceive good opportunities to start a business and do not see their own business as a way to solve the problem of unemployment. In Bosnia and Herzegovina, there is a continuous decline in the indicators of perceived opportunities and the results of the surveyed population indicate a dominant reduced perception of perceived opportunities among the younger population. Although the population of Bosnia and Herzegovina, according to the GEM reports, still shows positive perceptions of entrepreneurship as a desirable career choice, the survey results show that the youth population in Bosnia and Herzegovina disagrees with the statement that most people in their country consider starting a business as a desirable career choice. Entrepreneurship ceases to be a desirable career choice for young people because according to their perception, society itself does not value and promote entrepreneurship.

Still, GEM reports in four-year period showed significant continuous decline in indicators of perceived opportunities and conducted research showed unrealistic perceived opportunities in 2014 especially when considering young people. We can also see that this aversion toward entrepreneurial career increased in this period.

The education sector shows an obvious lack of entrepreneurship education. The results of the research indicate the fact that universities fail to provide the necessary knowledge in the field of entrepreneurship, and the development of entrepreneurial skills and abilities is almost non-existent. Universities in Bosnia and Herzegovina do not encourage students to develop creative ideas and start their own businesses.

Education is failing to provide the necessary knowledge in the field of entrepreneurship and development of entrepreneurial skills and abilities is almost non-existent. To improve and promote entrepreneurship and the concept of one's own business as a desirable career choice, it is primarily

necessary to change the curriculum. Educating young people about entrepreneurial action and entrepreneurship is a highly valuable preparation for constant changes in the labour market. Entrepreneurship education is key in helping young people to develop entrepreneurial skills, attributes, and behaviours, as well as to accept entrepreneurship as a career option.

Entrepreneurial path is paved with insecurities that are increased with lack of education and support from the environment. All of this prevent young people in Bosnia and Herzegovina from starting their own business. Government should start to address these problems to promote entrepreneurship as desirable career choice and as an option of solving high unemployment rate.

This research considers impact entrepreneurship education and perception of entrepreneurial opportunities when making decision to start a business, but future research should consider additional factors such as fear of failure. This research was geographically limited to Bosnia and Herzegovina and GEM Reports available were for the period of 2017/2018. Since Bosnian environment is not dynamic and political and structural system are extremely specific, the future research should include neighbouring countries with similar specifics to do a comparative study.

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ORGANIZATIONAL COMMUNICATION DURING THE EMERGENCY SITUATIONS

Snežana Živković

University of Niš, Faculty of Occupational Safety, snezana.zivkovic@znrfak.ni.ac.rs

Vesna Stojanović-Aleksić

University of Kragujevac, Faculty of Economics, vesnasa@kg.ac.rs

Aleksandra Bošković*

University of Kragujevac, Faculty of Economics, aboskovic@kg.ac.rs

Abstract: *Communication is the basis of human interactions and refers to the transmission and understanding of messages. It is not uncommon for people to talk a lot and understand each other a little, which causes different problems and misconceptions. Therefore, organizational communication must be properly managed both in regular conditions, but especially in emergency situations, when there is a high degree of uncertainty and danger. In such circumstances, panic among people and instability of an organizational system may easily develop, which causes misunderstandings. Thus, it is neccessary to establish clear channels of all forms of communication in order to maintain stability, get out of danger and return to normal as soon as possible. The paper points out the importance of capacity building for communication before, during and after emergency situations. It points out the crucial role of planning and preparation activities that take place in regular conditions and can facilitate communication in the case of an emergency. Some of the key phases and activities of emergency management are highlighted, as well as other specific features of communication in emergency situations.*

Keywords: *Communication management, Organizational communication, Emergency situations, Emergency management*

JEL Classification: *H12, M12*

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* Coresponding author

INTRODUCTION

Throughout history, in certain time intervals, different types of emergency situations have followed the human community and brought great changes in society, culture, work, production and life in general. An *emergency situation* is a situation when risks, threats or consequences are devastating, including extraordinary events and other dangers to the population, environment and material goods of great volume and intensity (Law on Emergency Situations of the Republic of Serbia). The examples are: war, major floods or other major natural disasters, pandemics of viruses and other diseases, etc. Despite the fact that human knowledge and skills are at an ever higher level, which has led to a huge development of science and technology, the adoption of a large number of laws and bylaws in this area, emergencies and communication during them, still pose challenges for organizations and society in general.

Effective organizational communication affects various processes, their overall performance and business sucess in regular conditions. However, during the emergency situations, which require high responsiveness and agility, communication is one of the most important links in the entire value chain. It is necessary to manage the communication, both inside the organization and between the organization and its environment, before, during and after the emergency situation.

Previous research has shown that during emergency situations, there is a deviation from the normal mode of work, and in most cases, the communication processes are the first to be hit (Simon, Goldberg & Adini, 2015). If the communication is adequately managed, in certain cases it can prevent further negative development of the situation. In other cases, problems in communication might cause the occurrence of great material and non-material damage to the organization. Communication disorders during the emergency usually occurs due to the unknown nature of the new situation and information discrepancies that arise as a result of the inability to collect and process all relevant data in real time (Živković, 2013).

Information flows can be too narrow and, in that case, the information does not reach all members, *or* they can be too wide which prolongs the message transmission time and reduces the time to react and make decisions. In addition, organizational members may have doubts and problems regarding the transmission and the flow of information in emergency situations. Each individual reacts differently to uncertainty, there is fear and panic (Živković, 2009) and possibly struggle to preserve one's position or even to maintain life and health.

This paper aims to point out the importance of communication system in the organization, with special reference to emergency situations. The goal is to indicate the need to constantly encourage organizational members to always work on improving communication. Thus, the benefits should be achieved both in regular situations, in terms of more efficient processes and activities - leading to higher performance, as well as in emergency situations, in order to preserve human health, save lives and reduce tangible and intangible costs.

THE IMPORTANCE AND FORMS OF ORGANIZATIONL COMMUNICATION

Business communication is the process of exchanging messages between employees and creating meaning (Petković et al. 2014; Gudykunst, 1998). It is realized in two ways: within the organization, where all employees are involved in the communication process, and outside the organization, where only some of the employees are involved in the communication process. Both the internal and external business communication affect business success and it would be impossible to conduct almost any operation in the organization without communication (Živković, 2012).

The importance of good communication in the organization has been recognized in the literature for a long time, and all the benefits stand out especially in crisis situations, such as emergencies. Some of the benefits are:

- Constructive communication positively influences the transfer of knowledge and ideas (e.g. van den Hooff, B., & de Ridder, 2004).
- Effective communication in a team, with the right timing and content of the messages, may improve task performance (Dunn, Lewandowsky & Kirsner, 2002).
- Good communication may also contribute to the improvement of business relationships with partners which in a long run contributes to better performace (costs, quality, flexibility, responsiveness etc.) (Paulraj, Lado & Chen, 2008).
- Since an emergency mainly poses a threat to reputation, good communication aligned with all relevant situational factors can protect reputational assets (Coombs, 2007).
- Finally, clear and well managed communication in times of crisis facilitates rapid risk detection, preparation and response, as well as effective recovery.

Regardless of the activity, size and other organizational characteristics, the basic forms of communication that are used are mostly the same. These are: verbal (oral, written) and non-verbal communication (Mandić, 2001).

Oral communication is the most common type of communication in the organization and represents all variants in which the main type of communication is words pronouncing. It is realized through a face-to-face conversation or through a phone/video call etc. Employees usually spend 50%–80% of the workday in communicating, two-thirds of that in talking (Klemmer & Snyder, 1972) both related to work and private topics. Conversation helps them do their job efficiently, but they also socialize and connect with other people, thus satisfying some of the essential psychological and social needs.

The advantage of oral communication in the organization is that the mutual understanding or misunderstanding can be assessed immediately and it is possible to receive feedback right away and continue with further activities. In particular, face-to-face conversation enables the interlocutors to concentrate on non-verbal and symbolic parts of communication and to conclude on that basis whether the other person can be trusted, whether there are any "hidden messages" etc. One of the disadvantages of oral communication is that it does not leave much time for a person to think about the message being sent or received. There may be some disturbing factors, the so-called "noise" when, for example, the interlocutor speaks quietly, when the telephone line is interrupted, when the message is transmitted to several people, when the word has multiple meanings and other reasons. Oral communication is usually not recorded anywhere and the details must be remembered. Therefore, after a while, subconscious changes in the meaning of messages and forgetting of some details or whole messages may occur. There is also a possible discomfort and nervousness when some information needs to be presented to a large number of people, which might cause negative effects, such as transmitting incomplete information or confusion among those who receive the message.

Written communication in the organization is realized by using words or symbols in written form. This type of communication includes various documents, official acts, written sentences, words or symbols that are further transmitted through letters, e-mails, notes, reports, minutes and all other forms by which a written word or symbol can convey a message. Written communication is practically indispensable in every organization. This form of communication requires clear and precise expression, so that the message it wants to convey is comprehensible to everyone in the organization. The written message should be of optimal size, not too short, that is incomplete, and still not too long in order not to create a misunderstanding or lack of concentration and attention Its optimal size depends on the purpose, content and other situational factors, so the message should always be shaped in connection to the specific context (Cooren, Vaara, Langley, Tsukas, 2014). Employees can, and usually do, spend more time thinking about what to write than what to say, mostly because the written word remains as a permanent record. The advantage of this form of communication is that there is time to think through the message, the messages can be read multiple times, while some of the most important disadvantages of this communication form are longer waiting for feedback and less social interactions.

Nonverbal communication encompasses all intentional and unintentional signs and behaviors, except words, which convey messages and make implicit communication, as opposed to explicit, verbal communication (Mehrabian, 1972). Non-verbal communication is considered to be facial expression during communication, gaze, body position, hand holding, certain gestures, appearance and outfit of the interlocutor, distance between interlocutors, tone of the voice and similar. Regardless of the fact that this type of communication does not imply the use of words, it is very important in the organization, because in that way, people can draw (additional) messages and conclusions about the situations, relationships, attitudes and other issues. A person can, for example, read a message or a report from a meeting, but they cannot know exactly what happened at that same meeting. Often a facial expression can tell that the other person is being honest or not thinking what they are saying. That is why it is very important, during social interactions, to pay attention to the *way* a message is communicated to us (Hogan & Stubbs, 2013).

Communication can also differ according to style, and most common distinction is made between directness and indirectness. *Direct communication* is mainly based on verbal forms of communication (mostly oral), in which a person says what he or she really thinks, clearly, honestly and concisely. *Indirect communication* style relies on nonverbal behavior (e.g., adjusting tone, pauses, gestures) to convey a message in an implicit form (Ting-Toomey, 1999). Indirect style is most often used to put kindness before honesty, avoid conflicts and maintain harmony. In intercultural environments, it can be noticed that the style of communication varies depending on the cultural background, which is especially pronounced in conflict management. For example, it is common that people use direct style in individualistic cultures, while collectivistic cultures encourage indirect communication in order to maintain good group relations (Van Meurs, 2003).

COMMUNICATION DURING EMERGENCY SITUATIONS

Emergency of any type represents an unpleasant situation for each individual. The ways in which an organization responds, deals with all the challenges and repairs the damages, as well as the way the communication in managed during the emergency, might affect the reactions of all internal and external stakeholders. Thus, communication during emergencies must be well designed, in order for an organization to maintain stability, keep good relations with the environment, preserve its reputation and ensure effective human resource management (Nikolić, 2019).

Managing communication in emergency situations

Emergency management is a complex system that includes a set of activities: (a) before the emergency, in order to be prepared, (b) during the emergency, in order to react in the right way, and (c) after an emergency, in order to enable fast and easy return to a stable state. Every organization, regardless of its size and activity, should approach communication planning proactively (Coombs, 2015), both in regular and unusual conditions (such as crises or emergencies). The biggest problem with emergencies is that they arise suddenly and require a quick response. Due to the specifics of each situation, it is not possible to prepare a precise plan of operational activities in advance. However, it is possible to make *general guidelines for dealing with emergency situations*. Guidelines may include: appointment of individuals/groups for emergency communication management, plans for informing internal stakeholders, plans for informing external stakeholders, standardized phraseology, evacuation plan. Sometimes, the guidelines include plans to repair specific damages, provide assistance to the injured, and other issues which usually occur in most emergencies. This way of acting and preparing the organization for the emergencies, is still something new for many organizations and takes time until it becomes a priority. It is necessary to raise awareness and knowledge regarding the importance of emergency communication planning.

An important prerequisite for successful preparation for an emergency situation is the building and constant improvement of the *information and communication system* in the organization. Modern technology is changing rapidly and therefore it is very important to follow trends and develop the technological capacity of the organization, including appropriate knowledge and skills to work with software, since much of communication in modern conditions, especially in crisis, takes place remotely and with use of technology. From the perspective of organizational design, it is essential to align the information and communication technology (ICT) system with the other organizational components (e.g. structure, processes) in regular business, in order for it to provide benefits during the emergencies (Hu & Kapucu, 2016). It should be borne in mind that investments in technology can be high, which is a particular financial challenge for organizations. In addition, the information literacy and digital competence of employees (Slavković & Simić, 2019) vary depending on psychological, demographic and other factors (Yu, Lin & Liao, 2017).

Hence, the continuous *training* of managers and employees, both in terms of understanding communication plans and using ICT, is crucial for effective emergency communication. Employee training is a planned process of acquiring new knowledge, habits, skills and developing psychological and physical properties that make them prepared to work in conditions before, during and after emergencies. Training takes place in two phases. The first is *capacity building*, when employees acquire new knowledge and skills, and the second is *specialization*, which involves the application of what has been learned, upgrading and expanding knowledge and skills. Employees who are well trained to behave in emergency situations will be more willing to communicate effectively if such situation occurs.

Effective communication in emergency situations requires the formation and the active role of the *emergency management team,* which should gather professionals from multiple disciplines, such as managers, communication experts (as for example a PR) and other experts in the field of emergency if possible (for example, safety management experts). Emergency management team members should be educated, trained and ready to respond in the moment before, during and after emergency (Ninković & Kešetović, 2019). Thier expertise in manifested through communication in an emergency situation (Treem & Leonardi, 2016).

According to situational crisis communication theory (SCCT), which can be applied in conditions of emergency, the first task of management is to assess situational factors, such as the crisis type, crisis history and previous relationships. Assessing these situational factors allows an appropriate response

strategy to be formulated, which will later enable the organization to preserve its reputation (Coombs, 2007). The roles of emergency management are related to: risk detection, risk interpretation, risk communication within and outside the organization, and building the organizational plan and ability to provide an adequate response to the new situation (Comfort, 2007). When it comes to communication, there are two main roles: instructing information role, related to providing instructions for solving problems and telling people how to protect themselves, and compassion role, related to providing social support through communication (Coombs, 2007).

There are several phases of effective emergency management (Godschalk & Brower, 1985, Godschalk, 2007, Coombs, 2015):

- *Mitigation* includes risk detection and efforts to prevent the danger. The communication between emergency management and others in the organization is aimed at informing and educating employees about how they can protect themselves, while doing their jobs, how to avoid major material damage and what are the potential risks and dangers. Other stakeholders must also be informed if the crisis can affect them and how to protect themselves. During this period, it is necessary to enable the most efficient communication and reduce potential barriers. Important activities are related to data collection and ensuring clear communication channels.

- *Preparation* includes different forms of planning and developing the concrete actions. Once the plans have been made, it is necessary to acquaint all members of the organization with potential courses of action. These two phases take place before the crisis began to develop.

- *Response* phase starts right after the triggering event and includes all the activities directed towards minimization of potential human and property losses. The risk of potential communication errors or misunderstandings is on the highest level in this stage. It is necessary to act quickly and gather information about the causes of the problem and possible ways to solve it. Therefore, honest and open communication among the members of the organization, as well as intensive interactions, must be ensured. Good response might even make and improved organization.

- The *recovery* phase starts from the moment when the source of danger or risk is brought under control. It includes all the activities carried out to return to the normal or even safer situation. In this phase of communication, the emergency management should organize a system of help and support in order to repair potential damage by providing first aid to the injured, informing the environment and the public about what happened. Emergency management often gives statements, interviews, writes reports, with the aims of preventing the same or similar situations in the future of their organization and informing others who mind find themselves in similar emergency.

- The *revision* includes an evaluation of the organizational reaction in an emergency. Communication is mainly based on feedback and all parts of the organization must be networked in order to provide and evaluate all relevant information about the previously resolved situation. The communication that is realized in this phase contributes to the construction of a kind of organizational memory that serves as an example for any new emergency situation and builds organizational capacity for dealing with similar issues in future. Thus, the focus is on learning.

Throughout all phases, managers must adhere to the five basic principles, namely: compliance with laws and procedures, use of information communication technology, periodic performance evaluation, development of an organizational culture that promotes good communication and encouragement of employees to communicate effectively and constructively (Mladjan, 2015). What makes emergency situations even more challenging is that employees have to talk about the emergency, but at the same time perform their regular tasks, which requires a balanced exchange of information. Thus, the emergency

management communication, throughout phases, should be based on a cyclic shift of high and low intensity communication, in order to achieve optimal results (Dunn, Lewandowsky & Kirsner, 2002).

However, it is wrong to consider organizational communication only as a mean of conveying task-related ideas, information and messages. It also has an important informal component, which refers to expressing empathy, providing support, building sense of belonging and increasing the degree of organizational identification. For this reason, one of the roles of emergency management is to create a positive atmosphere among employees by working on ensuring organizational justice, building mutual trust and understanding, which can help with overcoming the emergency with minimal material and human losses. In addition, managerial support is extremely important in these situations, because employees often need help in order to cope with fear, panic, uncertainty and stress. Leadership skills can have a major impact on the social component of emergency communication, because good leaders are able to influence and motivate people even in dangerous times.

Specific features of communication in emergency situations

Research has shown that the intensity of *interactions* is one of the most important factors in the emergency communication (Hamra, Hossain, Owen, Abbasi, 2012). Since most of the employees are mutually dependent, their interactions and intensive exchange of information is necessary in order to jointly find the best way to respond to the danger, such as for example identification of the safest way of evacuation and rescue. The interactions based on sharing (of information, mutual support, empathy) contribute to easier adaptation to a situation, as well as accepting and understanding new facts that the situation brings. Although decision-making in these situations is usually moved from an individual to the organizational level, feedback from all levels is necessary and useful, so the role of developed interactions is therefore even more significant (Simon, Goldberg & Adini, 2015).

Effective organizational communication in general, and even in emergency situations, requires compliance with certain rules, of which the most important are the following (Kotter, 1996):

- simplicity,
- use of metaphors, analogies and examples,
- using different communication media,
- frequent repetition,
- setting the example,
- explaining what is not clear enough and
- maintaining two-way communication.

One of the essential factors of effective two-way communication is the ability to actively *listen and observe* (Stojanović-Aleksić, 2007). There is a widespread belief that in modern companies the most important information comes from lower organizational levels (bottom up), and therefore, *effective listening* is considered an important component of good communication management (Floyd, 1985; Bentley, 1997; Pearce, 1998). It implies the ability to understand and interpret the original and essential meaning of the message and requires attention, energy and specific abilities, such as concentration, cognition, curiosity and a high level of responsiveness. Active and effective listening encourages the development of mutual trust, affirms respect and common perception, which contributes to a better understanding of the problem and faster solution, which is of special importance in emergency situations.

In stressful situations and those characterized by a high degree of uncertainty or risk, which include emergencies, *implicit or nonverbal communication* plays a key role (Mehrabian, 1972, 12). In these situations, people tend to hide information, intentions and / or emotions, so the real meaning of

certain messages can be "revealed" through non-verbal behavior, such as e.g. movements that show nervousness or insecurity.

In the context of communication in emergency situations, the important role of *social media* is especially emphasized in the last decade, because a significant part of communication in emergency situations often takes place in a *digital environment*. In usual situations, in addition to socializing, social media are also used for personal affirmation, presentation of certain products and services, transmission of information of various contents. In the process of training and encouraging employees during emergencies, social media play a major role. They provide easier access to timely information and helps with keeping stable information dissemination pathways when other channels are overwhelmed (Simon, Goldberg & Adini, 2015). Also, social media enable communication aimed at providing support and help for all employees that the vulnerable. Social media are of great importance for providing social support, assistance, answers to many ambiguities and questions and, in general, a large system through which emergencies are managed with as little stress as possible. Stress, as one of the most common factors during any deviation from the normal regime of work and life, leads individuals to socially connect with others, which is one of the causes of the huge popularity of various social media. The downside of social media is the danger of spreading false news and unverified information, which, in case of uncertainty, can produce panic and lead to counterproductive effects.

It is important to emphasize that *corporate social responsibility* should not be neglected in emergency management. Moreover, the need for responsible behavior is even more pronounced in such circumstances, in order to minimize the negative effects on people and the environment, but also to preserve a good reputation.

CONCLUSION

Without good communication, almost no activity in the organization can be done. It is impossible to plan, set goals, define strategies, organize, lead or control. Emergencies create special challenges in the processes of organizational communication, and if they are not well managed, it is possible for the whole system to collapse. Therefore, the paper is motivated by the urge to point out the importance of various forms of communication in the organization and to highlight the need for permanent work on the development of emergency communication management system. The management should be prepared for an emergency that can occur at any time, without notice and anticipation. The role of emergency management is to train employees, educate, inform, motivate and support them to work in such changed circumstances. The paper points out the basic communication roles that emergency management has to fulfill in different phases of an emergency situation, from its occurrence to eliminating the causes and returning to normal business. The importance of constant work on preparation developing the capacity of management and employees for effective communication in crisis conditions was especially highlighted, as well as crisis-based learning activities and preparation for possible future situations of the similar kind. If a positive atmosphere and readiness for unhindered communication is created in regular situations (before and after an emergency), it will facilitate communication in case of an emergency situation of any kind and scope.

The paper points out specifics of communication in emergency conditions. First of all, the importance of interactions, two-way communication and active listening is emphasized. In addition, the role of nonverbal communication in discovering the true meaning of indirect messages, which are common in stressful conditions, is indicated. Finally, the role of social media in facilitating the transmission of messages and informing employees in uncertain circumstances is briefly pointed out.

The paper provides an overview of basic information on forms of communication in the organization and summarizes some of the key findings on communication in emergencies, which can serve as a framework for further, theoretical and empirical research. This information may also be useful as a guideline for managers to communicate in emergency situations, to better understand their roles and structure activities at different stages of this process. Only a brief overview of significant knowledge in this area is presented in the paper, which is its limitation, while a detailed elaboration can be developed in future research.

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THE SPECIFICS OF PERFORMANCE MEASUREMENT IN THE PUBLIC SECTOR: EMPIRICAL EVIDENCE FROM THE REPUBLIC OF SERBIA

Violeta Domanović

University of Kragujevac, Faculty of Economics, vterzic@kg.ac.rs

Abstract: *Performance measurement plays not only a key role in public sector reform, but it goes beyond the reform itself. It plays a significant role in public management and public policy as well and could be considered as a segment of the whole performance management process. Performance management is a management style that includes information about performance in the decision-making process. Public organizations have certain specifics: process measures can also be output measures because they provide intangible products, i.e. services. Outcome assesses the impact of a product or service on the defined goals of the production process. Outcome can be long-term or short-term. Efficiency measures estimate the output level for a given input level. Effectiveness measures assess the level of outcome for a given level of input. Growing awareness of climate change and human capital issues has been shifting companies' attention to aspects other than traditional financial performance measures. Increasing attention is being paid to issues of sustainability and thus the availability of environmental, social and governance (ESG) indicators encourage investors to make socially responsible investment decisions. Hence, the paper is focused on the specifics of measuring performance in the public sector. The purpose of the research is to highlight the relevant performance measures in the public enterprises in the sector of energetics in the Republic of Serbia and to examine whether the application of the ESG indicators implicit implies better financial performance. The results show that the public enterprises in the sector of energetics in the Republic of Serbia report on traditional financial measures in their annual financial statements. One of them applies all ESG indicators and the others partially. However, there could not be found the positive correlation between ESG indicators and financial performance measures.*

Keywords: *performance measurements, public sector, sustainability, ESG indicators, financial performance measures.*

JEL classification: *M10, M21*

INTRODUCTION

The term 'performance' might have different meanings depending on the discipline being considered. For example, psychology, social sciences, and managerial sciences use different definitions depending on individual, social, or organizational and systemic performance. The notion of performance is related to intentional behaviour, which can be individual or organizational. In the public sector, performance can have different dimensions: outputs, efficiency, service outcomes, responsiveness and democratic outcomes. The performance of public organizations can be viewed from different perspectives: performance as production, performance as competencies/capacity, performance as good results and performance as sustainable results. In order for public organizations to function better, it is important to evaluate and analyse performance. Performance appraisal explains the extent to which public organizations and programs further influence the public interest; whether public services are offered in an efficient and effective manner; whether the selected performance measures guarantee the functioning of the public sector even in the conditions of catastrophic events and the like. Performance measurement plays a key role in public sector reform, but it goes beyond the reform itself. It plays a significant role in public management and public policy and is a segment of the performance management process. Performance management is a management style that includes information about performance in the decision-making process. Performance measurement is critical not only for strategic planning, but also for the overall strategic management process. Measuring the performance of public organizations has certain specifics: process measures can also be output measures because they provide intangible products, i.e. services. Outcome assesses the impact of a product or service on the defined goals of the production process. Outcome can be long-term or short-term. Efficiency measures estimate the output level for a given input level. Effectiveness measures assess the level of outcome for a given level of input. Growing awareness of climate change and human capital issues has been shifting companies' attention to aspects other than traditional financial performance measures. Increasing attention is being paid to issues of sustainability and thus the availability of environmental, social and governance (ESG) indicators encourages investors to make socially responsible investment decisions.

Hence, the paper is focused on the specifics of measuring performance in the public sector. The purpose of the research is to highlight certain specifics of performance measures in public organizations, with special reference to the obligation of non-financial reporting, i.e. the application of ESG indicators in annual financial statements. The paper starts from the following hypothesis:

H1: The application of sustainability indicators also implies better financial performance measures.

In order to test the hypothesis, a qualitative methodology was applied, based on the study and descriptive analysis of the research problem. In addition, base and chain indices are used to monitor the dynamics of financial performance measures. Accordingly, the paper first provides a theoretical overview of measuring performance in the public sector and the correlation between sustainability indicators and financial performance. Then, there are carried out an empirical analysis of the performance of public enterprises in the sector of energetics in the Republic of Serbia from 2017 to 2019, after which relevant conclusions are drawn and future directions of research defined.

LITERATURE REVIEW

Performance measurement in public organizations

The concept of performance is multidimensional and broader than the effectiveness and efficiency of the company. It can refer to the intended behaviour of an individual or an organization, and in that

sense it is possible to talk about individual or organizational performance. Organizational performance can be defined as the value that an organization creates by using productive assets compared to the value that owners expect to derive from it (Verweire & Van Den Berghe, 2004). It is wrong to identify performance only with company results. Results in qualitative and quantitative terms are the performance of resource use. In addition, the concept of resource use performance encompasses a complex and broad complex of other economic performance, including performance of resource efficiency and effectiveness. Since it is possible to analyse performance from different aspects, thus it is obviously why the notion of performance could be considered as a broader than the notion of effectiveness and efficiency. Namely, it is possible to define them in financial terms (for example, market value, profitability), operational (efficiency, effectiveness, number of outputs, quality of products or services, etc.), marketing (for example, customer satisfaction, number of customers retained during a certain period) and others (Verweire & Van Den Berghe, 2004). Such an understanding of the concept of performance is characteristic for the manufacturing sector. The question arises as to how it is possible to explain the notion of performance in the public sector. Table 1 shows different perspectives on understanding the concept of performance in the public sector (Dubnick, 2005).

Table 1 Perspectives of understanding the concept of performance

Focus on the action quality	Focus on the achievement quality	
	Low	High
Low	Performance as a production (P1)	Performance as good results (P3)
High	Performance as a competence/capacity (P2)	Performance as sustainable results (P4)

Source: Dubnick, M. (2005). Accountability and the Promise of Performance: In Search of Mechanisms, *Public Performance and Management Review, 28*(3)*:* 392.

The first perspective (P1) includes all actions that are performed. The focus is not on the quality of the actions, nor on the quality of the achievements. For example, actions such as police patrols, vaccination campaigns, medical treatment, lectures, litigation, and the like, are just some examples of performance from this perspective, regardless of whether those actions were successfully implemented or not. In this sense, performance is the intended behaviour of actors in the public sector. By its nature, this conceptualization is relatively neutral, but very broad. *The second dimension* of performance contains an assessment of the value of one performance. Performance can have quality, which can be high or low. If it is about the quality of actions, but not the quality of achievements, then performance is seen as a competence or capacity (P2). Assuming that a highly competent performer is likely to generate higher and better output quality, then performance becomes related to public institution competencies (Dubnick, 2005, 392). Viewed from the *third perspective,* performance is related to the quality of achievement, but not to the quality of actions, and in that case performance can be identified with results (P3). Finally, the *fourth perspective* implies high quality of actions and high quality of achievements, i.e. performance represents sustainable results.

Boyne (2002, 19) lists 16 different possible dimensions of performance in the public sector: outputs (quantity and quality), efficiency, service outcomes (formal effectiveness, impact, capital, cost per unit of service outcome), responsiveness (consumer satisfaction, citizen satisfaction, employee satisfaction, cost per unit of responsiveness) and democratic outcomes (honesty, participation, accountability, cost per unit of democratic outcome).

The value and performance seek answers to different questions about the same thing. Performance appraisal will analyse the extent to which public organizations and programs further influence the public

interest, whether public services are offered in an efficient and effective way, whether sufficient performance measures guarantee the functioning of the public sector even in the face of catastrophic events and so on. Valuation will seek an answer to the question of values that prevail, whether they are conflicting or complementary. Performance measurement encompasses several activities: defining the measurement object, defining performance indicators, data collection, data analysis, and reporting (Van Dooren, Bouckaert & Halligan, 2015, 32). Ouchi (1977) believes that output control is possible only in those organizations that have measurable outputs. If this is not the case, behavioural or clan control is more appropriate. The performance measurement model for the production process has the following form: *input measures - process measures - output measures - outcome measures.* Public organizations have certain specifics: process measures can also be output measures because they provide invisible products, i.e. services. For example, the number of police patrols is both a measure of output and a measure of process; the percentage of students who did all the activities on the course during the year are both a measure of the process and a measure of output. Outcome assesses the impact of a product or service on the defined goals of the production process. For example, students' grade on the exam may be a measure of output; the crime rate is the outcome measure for a police patrol aimed at ensuring the safety of citizens. Outcome can be long-term, such as career development, annual income growth after five years of graduation, or short-term, such as a student's grade on an exam. Efficiency measures estimate the output level for a given input level. Effectiveness measures assess the level of outcome (impact, success) for a given level of input (Wang, 2010, 38-41).

Performance measurement plays a key role in public sector reform. In general, the countries of Continental Europe do not use performance indicators with the same intensity as the Anglo-Saxon countries. Nevertheless, there are significant variations among countries. In Germany, the New Steering Model highlighted the importance of performance indicators; in France, a form of performance budgeting has been introduced; in Sweden, which has a highly decentralized public sector, performance measures play a role in agency management; in Norway, the management system by means of goals and results is widely accepted, although after transformation and translation by agencies (Van Dooren, Bouckaert & Halligan, 2015, 8).

The country with the strongest tradition in measuring performance in Continental Europe is the Netherlands. The first initiatives were taken in the 1970s and by the 1980s several local governments had implemented a national performance audit. Bouckaert & Peters (2002) consider performance measurement to be the "Achilles heel" in the public sector reform process. The availability of information is necessary but insufficient for the success of many initiatives. Measuring performance goes beyond public sector reform itself. Performance measurement plays a significant role in public management and public policy. Also, it is a segment of the performance management process.

Performance management is a management style that includes information about performance in the decision-making process. Performance measurement is critical not only for strategic planning, but also for the overall strategic management process. Table 2 shows three possible applications of performance information.

Table 2 Performance information use

	To learn	To steer & control	To give account
Key issue	How to improve the policy or management?	How to command the activities?	How to communicate the performance?
Orientation	Change/future	Control/The present	Survival/The past

Source: Van Dooren, W., Bouckaert, G. & Halligan, J. (2015). *Performance Management in the Public Sector.* Second edition. Routledge: 120.

Performance analysis is needed for strategic planning, budgeting and day-to-day management. In the process of strategic planning, performance analysis is helpful in understanding the strategic goals of performance and what is necessary to achieve those goals. In the budgeting process, performance analysis can show the effectiveness of resource use in order to make funding decisions. Nevertheless, performance analysis is most needed when an organization achieves below-average performance and is expected to improve in the future. Performance analysis helps managers understand performance levels, track performance trends, discover the causes of below-average declines, and assess the effectiveness of future performance improvement efforts. Performance analysis may be related to assessing employee performance to see the extent to which individuals contribute to improving organizational performance. Table 3 shows the unique aspects of performance analysis in public organizations. Effective performance measurement systems help public enterprises make better decisions, improve performance, and demand and ensure overall accountability. When designed and implemented effectively, performance measures focus on goals and objectives, provide feedback on significant aspects of the organization or program performance, and motivate managers and employees to work harder and smarter to improve performance. In addition, they can be helpful in redirecting resources more effectively, assessing the effectiveness of alternative approaches, and gaining greater control over business, even with greater flexibility at the operational level. Performance measurement systems are very important tools for results-oriented management and the data they produce are used in planning, resource allocation, project management and performance reporting (Poister, 2003, 17-18).

Table 3 Performance analysis in the public organizations

Aspect	Definition
Multiple interests	Performance analysis serves the stakeholders who often have different, inconsistent and conflicting interests.
Short-term funding and management	Performance analysis should be completed within a period of one year, which is actually the funding cycle of the most public organizations.
Intangible and nonfinancial outputs	Many public services are not the tangible commodity that could be exchanged in the market, so their output levels cannot be measured easily.
Service delivery monopoly	Only one or a limited number of the providers are available in the region.

Source: Adapted from Wang, X. (2010). Performance Analysis for Public and Non-profit Organizations. Jones and Bartlett Publishers: 14.

Lapsley & Wright (2004) study the diffusion of innovation in performance management in the public sector. The authors point out that key performance indicators are used in a high percentage in the public sector, namely 100% of local authorities, 94% of government agencies and 77% of health care institutions. The Balanced scorecard model, as the most prominent model of strategic management and management accounting, is less used for reporting in 26% of local governments and government agencies. It is similar with budgeting techniques, which are applied by 34% of public sector organizations. The health sector applies zero-based budgeting techniques (ZBB) and activity-based management. The authors conclude that activity-based costing is applied to a significant extent, while strategic cost management is used in a small number of health organizations, while the target cost has very little application in reporting.

In public enterprises, performance measurement systems serve as a catalyst for improved service quality, greater program effectiveness, greater customer responsiveness, or more efficient operations. However,

measuring performance is not a panacea for all problems and challenges. Many problems of public companies are not visible, at first glance they do not have simple solutions and they do not have enough resources to effectively address the problems. In addition, strategic decisions, priorities, goals and tasks are often made in difficult politicized contexts characterized by competing interests at different levels, strong personalities and abandonment of principles for the sake of compromise.

SUSTAINABILITY INDICATORS AND FINANCIAL PERFORMANCES

Growing awareness of climate change and human capital issues is shifting companies 'attention to aspects other than traditional financial performance measures. Increasing attention is being paid to issues of sustainability and the availability of environmental, social and governance (ESG) indicators encourage investors to make socially responsible investment decisions (De Lucia, Pazienza & Bartlett, 2020). De Lucia, Pazienza & Bartlett (2020) investigated the accuracy of major financial indicators such as return on equity (ROE) and return on assets (ROA) of public enterprises in Europe based on ESG indicators and other economic metrics, as well as whether ESG initiatives affect the financial performance of European public companies and how ESG factors can contribute to advancing the ongoing debate on CSR policies and practices in Europe. The main conclusions indicate that there is a positive relationship between ESG practices and financial indicators. This becomes more apparent when companies also invest in eco-innovation, employee productivity and diversification, and equal opportunities policies.

The sustainability strategy is based on the concept of sustainable development such as social vision, economic efficiency and environmental protection in everyday practices. The social, economic and environmental spheres are interconnected so as to create a circular value chain of supply in the company. With this integrated strategy, companies are increasingly achieving a sustainable competitive advantage in the global market (Zhao, Meng, He & Gu, 2019). Hence, companies that practice business sustainability can survive longer than traditional companies and can achieve greater market power (Cantele, Moggi & Campedelli, 2020). Buallay (2020) makes a comparison between the manufacturing and banking sectors in terms of the level of sustainability reporting and the impact of sustainability reporting on financial and market performance. The author concludes that ESG indicators have a positive impact on operational, financial and market performance in the manufacturing sector, but negatively in the banking sector.

There are several models for sustainability reporting: the General Reporting Initiative (GRI since 1997), the International Integrated Reporting Council (IIRC since 2013) and the Accounting Standards Committee's Sustainability Directive. (Sustainability Accounting Standards Board - SASB since 2010, and concretized in 2013). Each model differs in its orientation: GRI focuses on stakeholders - a multi-stakeholder approach, IIRC focuses on value creation, and SASB on investors (Landrum & Ohsowski, 2018, 129). GRI is the most commonly used framework for sustainability reporting. Basically, GRI is equivalent to GAAP for financial performance reporting and includes three categories of sustainability indicators - economic, environmental and social, as well as four social subcategories: human rights, work practices, product and social responsibility (Paun, 2018, 927). The SASB was created in 2011 to define a full set of industry-specific non-financial issues and related performance indicators for U.S. companies. GRI and IIRC have introduced international models for sustainability reporting to a wider range of stakeholders. SASB and the Institute of Management Accountants (IMA) have published a new memorandum of understanding on how to improve the management and disclosure of non-financial information in corporate reports. In 2016, SASB and GRI published significant documents related to the improvement and comparability of sustainability reporting. The basic principles from which SASB is

based are: applicability to investors, relevance to industry, potential for value creation, benefits that exceed costs, encouraging companies to take action and reflecting the views of all stakeholders (Shoaf, Jermakowicz & Epstein, 2018, 8).

Non-financial reporting has become a business reality for companies across the European Union after the transposition of EU Directive 2014/95 / EU into national legislation, which has made the practice of publishing environmental, social and management issues mandatory for a number of large and public interest companies. With the entry into force of the new Law on Accounting of the Republic of Serbia on January 1, 2020, the obligation of non-financial reporting was introduced, which is in line with the Sustainable Development Goals, which imply that countries should encourage large and transnational companies to integrate sustainable practice in business and include sustainability information in their reporting (Responsible Business Forum, https://odgovornoposlovanje.rs/vesti/fop/obaveza-nefinansijkog-izvestavanja-uskoro-i-za-kompanije-u-srbiji, Access date 03.11.2020 . years).

The new Law on Accounting is in line with EU directives, provides in Articles 37 and 38 (Law on Accounting, 2019) the introduction of non-financial reporting obligations for large legal entities that are public interest entities and which at the balance sheet date exceed the average number of 500 employees. The new Accounting Law also takes over the key provisions of the Directive and defines the content of the report, but omits several provisions which, as a result of the existing practice in non-financial reporting, are envisaged by the Directive itself. The obligation of non-financial reporting should be fulfilled if the taxpayer issues a non-financial report as a separate document issued with the annual financial report, i.e. within a period not longer than 6 months from the balance sheet date, as provided by the Directive. This requirement is directly related to the existing practice, both in Europe and in the world, according to which this type of report is most often issued as a separate Sustainability Report or Corporate Social Responsibility Report (CSR).

 Also, when compiling the report, it must be stated which known national, European or international frameworks the taxpayer relies on when compiling the report, all in order to ensure quality in non-financial reporting, as the Directive itself leaves flexibility in choosing the methodology, but requires its indication. . The Forum for Responsible Business, together with its members, has been promoting non-financial reporting since its establishment, despite the fact that there was no legal framework in Serbia that required companies to do so. Most member companies have accepted, due to its practicality, comprehensiveness and approach in determining material issues, the internationally recognized methodology of GRI (Global Reporting Initiative, Global Reporting Initiative) (Forum for Responsible Business, fop / obligation-of-non-financial-reporting-soon-and-for-companies-in-serbia, Access date 03.11.2020).

According to the Law on Accounting of the Republic of Serbia (2019, Article 37), a legal entity includes in the annual business report a non-financial report containing information necessary to understand the development, business results and position of the legal entity, as well as the results of its activities related to environmental protection. , social and personnel issues, respect for human rights, the fight against corruption and bribery issues. Legal entities in the group include in their consolidated annual business report consolidated non-financial reporting that contains information necessary to understand the development, business results, position of the group, as well as the results of their activities related to the minimum environmental protection, social and human resources, rights, fight against corruption and issues related to bribery (Law on Accounting of the Republic of Serbia, 2019, Article 38).

METHODOLOGY

In order to test the starting hypothesis, a sample of four large Serbian companies in the energetics sector was used. Only companies with over 500 employees were taken. Data was collected on the web site of the Agency for Business Registers of the Republic of Serbia. Table 4 shows the list of large companies in the field of energetics in the Republic of Serbia. Public companies in the field of energetics have been singled out in relation to the definition of energetics activity (Law on Energetics (2018), https://www. paragraf.rs/propisi/zakon_o_energetici.html. Date of access 03.11.2020).

Table 4 List of public companies in the field of energetics in the Republic of Serbia

Ordinal	Public enterprises in the sector of energetics
	JP "Elektroprivreda Srbije" Beograd
	"Elektromreža Srbije" a.d. Beograd
	JP "Srbija Gas" Novi Sad
	JP PEU "Resavica" Resavica

Source: Author, based on the Law on Energetics (2019)

Based on annual financial statements, non-financial reporting of public companies in the Republic of Serbia is monitored, i.e. whether companies invest in environmental protection (environmental indicator - E), social protection and professional development of employees (social indicator - S), as well as whether they implement activities directed to faster and more consistent implementation of corporate governance (governmental indicator - G). In order to have a better tabular overview, the companies are numbered as follows: JP "Elektroprivreda Srbije" - 1, "Elektromreža Srbije" - 2, JP " Srbija Gas " - 3 and JP PEU "Resavica " - 4. Relevant financial performance indicators were calculated on the basis of data from official correct financial statements published on the website of the Business Registers Agency (Business Registers Agency, https://www.apr.gov.rs). The observation period is three years, i.e. from 2017 to 2019. The dynamics of selected financial indicators is graphically illustrated, based on the base and chain indices. The financial performance indicators are the rate of return on the average assets value (ROA), the rate of return on the average equity value (ROE) and the economy ratio. ROA is calculated as the ratio between net profit and average assets value. ROE is calculated as the ratio between net profit and average equity value. In some companies there was no possibility to calculate ROE due to the fact that these companies in the observed years had a loss above the amount of capital due to a large loss from previous years and/or loss in the current year. The economy ratio is calculated as the ratio between total income and total expenses. The economy ratio threshold is 1.

RESULTS AND DISCUSSION

Table 5 shows the representation of ESG indicators in the annual financial statements of the observed companies.

Table 5 ESG indicators in annual financial statements

ESG indicators	2017				2018				2019			
	1	2	3	4	1	2	3	4	1	2	3	4
Environmental	+	+	+	+	+	+	+	+	+	+	+	+
Social			+	+			+	+			+	+
Governance		/	+	/		+	+	/		+	+	/

Source: Author, based on the Annual financial statements

Based on the data from Table 6, it can be concluded that all observed large public companies invest certain funds in environmental protection in all observed years. The company JP "Srbija Gas" and JP PEU "Resavica" pay special attention to social issues. Not all companies take action to improve public sector governance. "Elektromreža Srbije" undertook corporate governance activities in 2018 and 2019, and JP "Serbia Gas" undertakes the same in all observed years. Only JP "Srbija Gas" report on all ESG indicators in all years of the observed period.

Table 6 shows the financial performance indicators of the company JP "Elektroprivreda Srbije" from 2017 to 2019.

Table 6 Financial performance indicators of the company JP "Elektroprivreda Srbije"in 000 dinars

Financial performance	2017	2018	2019
Total income	271.283.230	276.705.270	288.482.395
Total expenses	254.931.592	269.613.265	276.635.188
Profit before tax	4.678.630	3.284.723	5.468.160
Net profit	3.396.385	1.588.784	3.662.141
Average assets value	996.077.610	984.687.721	977.805.509
Average equity value	689.461.475	682.736.703	676.122.584,5
ROA (%)	**0,34**	**0,16**	**0,37**
ROE (%)	**0,49**	**0,23**	**0,54**
Economy ratio	**1,06**	**1,03**	**1,04**

Source: Author, based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020.

Figure 1 Financial performance dynamics for JP "Elektroprivreda Srbije"

Source: Author, based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

Table 7 and Graph 1 show the dynamics of financial performance for the company "Elektroprivreda Srbije" from 2017 to 2019. It can be noticed that in 2018, all observed indicators decreased. In 2019, ROA increased by about 9% and ROE by about 10% compared to 2017. It is important to point out that in 2019, there was a noticeable increase in ROA and ROE, by as much as 131, or 135%, respectively, compared to the previous 2018. It is important to point out here that the observed company in its Annual financial statements reports on the environmental indicator, i.e. investment in environmental protection, but not on social and governance indicators.

Table 8 shows the financial performance indicators of the company "Elektromreža Srbije" from 2017 to 2019.

Table 7 Financial performance dynamics for JP "Elektroprivreda Srbije"in the period 2017-2019

Years	ROA		ROE		Economy ratio	
	Base indices	Chain indices	Base indices	Chain indices	Base indices	Chain indices
2017	100	/	100	/	100	/
2018	47	47	47	47	97	97
2019	109	231	110	235	98	101

Source: Author's calculation

Table 8. Financial performance indicators of the company "Elektromreža Srbije" in 000 dinars

Financial performance	2017	2018	2019
Total income	25.660.421	25.633.299	25.204.196
Total expenses	21.944.300	22.608.959	24.015.855
Profit before tax	3.716.121	3.024.340	1.188.341
Net profit	3.024.346	2.535.127	1.092.542
Average assets value	90.855.577	90.638.661,5	90.975.072,5
Average equity value	59.288.082,5	60.666.143,5	61.529.519
ROA (%)	**3,33**	**2,8**	**1,2**
ROE (%)	**5,10**	**4,18**	**1,78**
Economy ratio	**1,17**	**1,13**	**1,05**

Source: based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

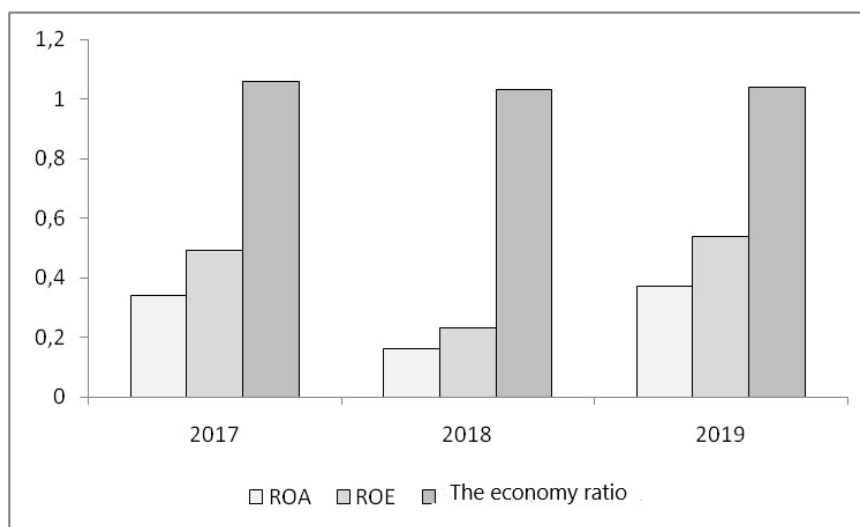*Figure 2 Financial performance dynamics for JP "Elektromreža Srbije"*

Source: based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

Table 9 and Graph 2 show the dynamics of financial performance of the company "Elektromreža Srbije" from 2017 to 2019. There is a decline in all indicators in all observed years, both in relation to the base year (2017) and in relation to the previous year (chain indices). The biggest drop is in 2019 in ROA and ROE compared to 2018. A slightly smaller decline is noticeable in the economy ratio. The observed company in its Annual financial statements has environmental and governance performance indicators, i.e. reports on investment in environmental protection and development of corporate governance, which did not have effects on improving financial performance in a given period.

Table 9 Financial performance dynamics for JP "Elektromreža Srbije" from 2017 to 2019

Years	ROA		ROE		Economy ratio	
	Base indices	Chain indices	Base indices	Chain indices	Base indices	Chain indices
2017.	100	/	100	/	100	/
2018.	84	84	82	82	97	97
2019.	36	43	35	43	90	93

Source: Author's calculation

Table 10 shows financial performance indicators for JP "Srbija Gas" from 2017 to 2019.

Table 10 Financial performance indicators for JP "Srbija Gas" in 000 dinars

Financial performance	2017	2018	2019
Total income	88.129.179	86.520.993	95.309.437
Total expenes	61.418.917	74.042.635	86.888.294
Profit before tax	16.544.673	4.987.909	4.579.804
Net profit	16.723.376	5.812.655	4.771.689
Average asset value	131.821.149	152.061.366	186.025.570
Average equity value	Loss above the equity	Loss above the equity	118.796.637
ROA (%)	**12,67**	**3,82**	**2,57**
ROE (%)	*	*	**4,02**
Economy ratio	**1,43**	**1,17**	**1,10**

Source: based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

*Note: Considering that the company has a capital of 0 in 2017 and 2018 because it made a loss above the amount of capital, therefore the rate of return on capital (ROE) was not calculated.

Table 11 Financial performance dynamics for JP "Srbija Gas" in the period 2017-2019

Years	ROA		ROE		Economy ratio	
	Base indices	Chain indices	Base indices	Chain indices	Base indices	Chain indices
2017	100	/	100	/	100	/
2018	30	30	*	*	82	82
2019	20	67	*	*	77	94

Source: Author's calculation

Table 11 and Graph 3 show the dynamics of financial performance of the company JP "Serbia Gas" from 2017 to 2019. There is a decline in the observed indicators in all years of the observed period. A drastic decline is noticeable in ROA, by 70% compared to the base year and by 80% in 2019 compared to 2018.

Due to the realized loss above the amount of capital in 2017 and 2018, it was not possible to calculate the ROE and monitor its dynamics. The economy ratio has declined, but not as drastically as ROA, but in a slightly smaller percentage. Namely, in all years, the company is above the threshold of economy, that is, it operated economically, but that economy is getting smaller and smaller. It is important to point out that the observed company in its Annual financial statements report on all ESG indicators, but also, a positive link cannot be made between ESG indicators and financial performance.
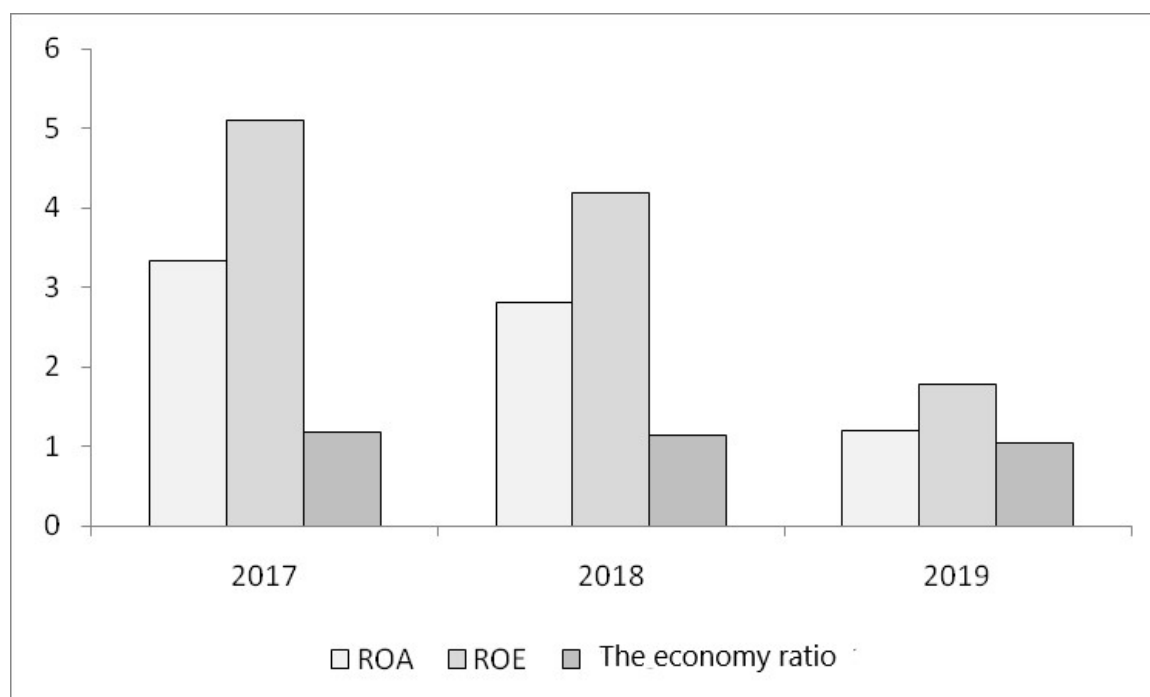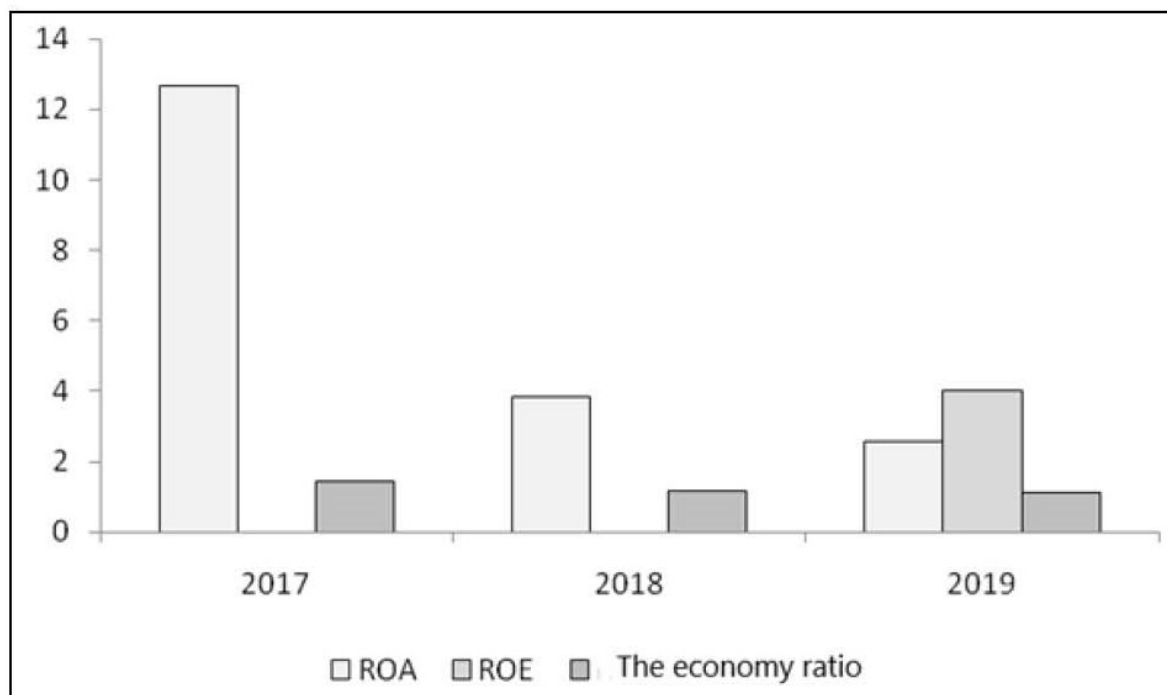

Figure 3 Financial performance dynamics for JP "Srbija Gas"

Source: based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

Table 12 shows financial performance indicators for JP PEU "Resavica" from 2017 to 2019.

Table 12 Financial performance indicators for JP PEU "Resavica" in 000 dinars

Financial performance	2017.	2018.	2019.
Total income	6.740.328	6.718.353	6.750.736
Total expenses	9.004.738	8.859.723	8.191.338
Loss before tax	-2.2456.00	-2.1569.27	-1.440.602
Net loss	-2.210.940	-2.125.733	-1.452.706
Average assets value	8.406.717,5	7.442.113,5	7.322.432
Average equity value	Loss above the equity	Loss above the equity	Loss above the equity
ROA (%)	*	*	*
ROE (%)	*	*	*
Economy ratio	**0,75**	**0,75**	**0,82**

Source: based on data from public correct financial statements available on the website of the

***Note:** Considering that the company has a capital of 0 in 2017 and 2018 because it made a loss above the amount of capital, therefore the rate of return on capital (ROE) was not calculated.

Table 13 and Graph 4 show the dynamics of financial performance for the company PE PEU "Resavica" from 2017 to 2019.

Due to the realized net loss and loss above the amount of capital, it was not possible to calculate and monitor the dynamics of ROA and ROE. It is noticed that the ratio of economy is below the threshold of economy (that is, below 1), which means that the company did not operate economically, but economy has an upward trend.
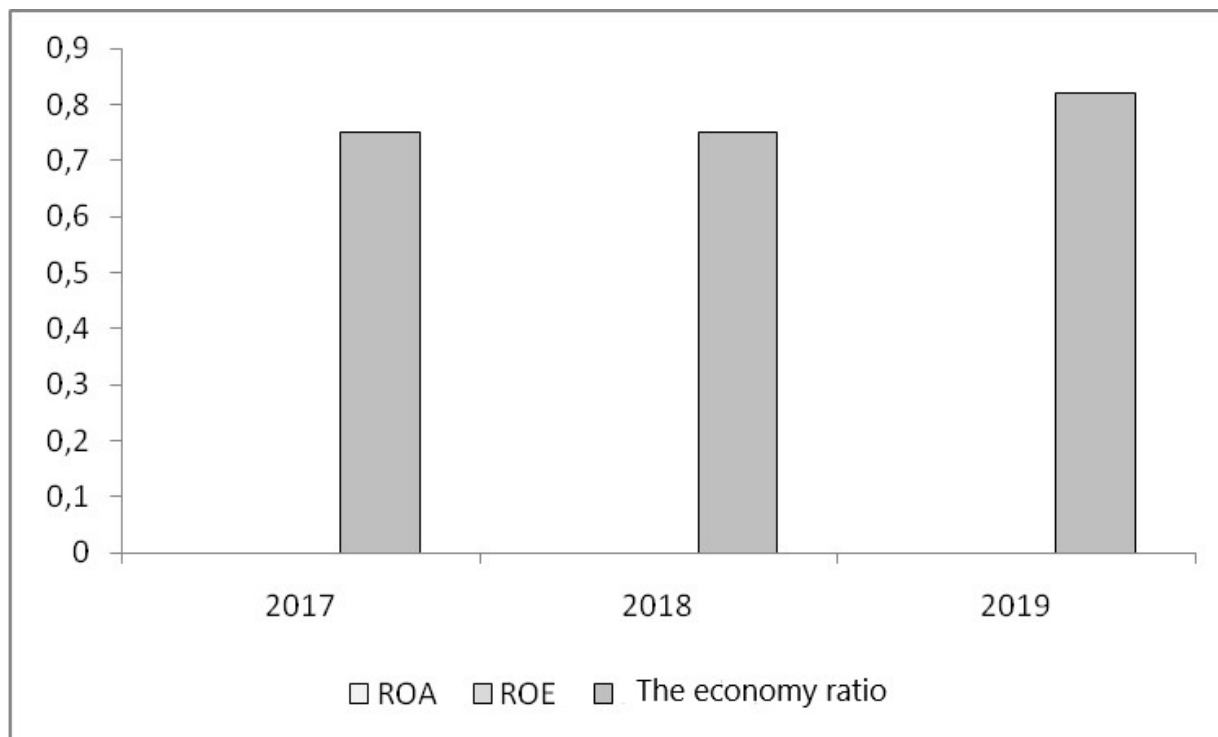
Figure 4 Dynamics of financial performances for JP PEU "Resavica"

Source: based on data from public correct financial statements available on the website of the Business Registers Agency, https://www.apr.gov.rs, Date of access 03.11.2020

In 2019, there was an increase of 14% compared to 2017, and in 2019 by 9% compared to 2018. The observed company reports on environmental and social indicators, which had no effect on financial performance.

Table 13 Financial performance indicators for JP PEU "Resavica" from 2017 to 2019

Years	ROA		ROE		Economy ratio	
	Base indices	Chain indices	Base indices	Chain indices	Base indices	Chain indices
2017	100	/	100	/	100	/
2018	*	*	*	*	100	100
2019	*	*	*	*	114	109

Source: Author's calculation

Table 14 shows the linkage between implementation of ESG indicators and financial performance.

Table 14 ESG indicators and financial performance

1. Elektroprivreda Srbije

ESG INDICATORS			ROA (%)			ROE (%)			Economy ratio		
E	S	G	2017.	2018.	2019.	2017.	2018.	2019.	2017.	2018.	2019.
+	/	/	0,34	0,16	0,37	0,49	0,23	0,54	1,00	1,03	1,04

Source: Author's calculation

2. Elektromreža Srbije

ESG INDICATORS			ROA (%)			ROE (%)			Economy ratio		
E	S	G	2017.	2018.	2019.	2017.	2018.	2019.	2017.	2018.	2019.
+	/	+	3,33	2,8	1,2	5,10	4,18	1,78	1,17	1,13	1,05

Source: Author's calculation

3. Srbija Gas

ESG INDICATORS			ROA (%)			ROE (%)			Economy ratio		
E	S	G	2017.	2018.	2019.	2017.	2018.	2019.	2017.	2018.	2019.
+	+	+	12,67	3,82	2,57	*	*	4,02	1,43	1,17	1,10

Source: Author's calculation

4. JP PEU Resavica

ESG INDICATORS			ROA (%)			ROE (%)			Economy ratio		
E	S	G	2017.	2018.	2019.	2017.	2018.	2019.	2017.	2018.	2019.
+	+	/	*	*	*	*	*	*	0,75	0,75	0,82

Source: Author's calculation

CONCLUSIONS AND RECOMMENDATIONS

In public enterprises, performance measurement systems serve as a catalyst for improved service quality, greater program effectiveness, greater customer responsiveness, or more efficient operations. However, measuring performance is not a panacea for all problems and challenges. Many problems of public companies are not visible, at first glance they do not have simple solutions and they do not have enough resources to effectively address the problems. In addition, strategic decisions, priorities, goals and tasks are often made in difficult politicized contexts characterized by competing interests at different levels, strong personalities and abandonment of principles for the sake of some compromise. The social, economic and environmental spheres are interconnected so as to create a circular value chain of supply in the company. With this integrated strategy, companies are increasingly gaining a sustainable competitive advantage in the global market. Hence, companies that practice business sustainability can survive longer than traditional companies and can achieve greater market power.

The results of the research show that in public companies, which have full or partial reporting on ESG indicators, there is no direct and positive correlation between the application of ESG indicators and financial performance. Given the strategic importance of public companies on the efficiency of the entire macroeconomy, an important question is how to balance the level and dynamics between investments in environmental protection, social welfare of employees and development of corporate governance, on the one hand, and financial performance, on the other. This is aimed at long-term micro and macroeconomic stability.

Research has certain limitations. *First,* there is a small sample to draw valid conclusions and it is difficult to present general views regarding the correlation of ESG indicators and financial performance of companies. *Secondly*, the new Law on Accounting is in force in the Republic of Serbia from January 1, 2020, which envisages the obligation of non-financial reporting for public companies as well, so that the effects on financial performance would be observed in the future. *Third*, only certain measures of economy and profitability are selected here, but there are also indicators of liquidity and activity of the company and the like.

Therefore, in the future it would be good to increase the sample and after the next three-year period to monitor financial performance and application of ESG indicators, after which it will be possible to draw more concrete conclusions and propose measures to improve micro and macroeconomic efficiency.

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BEYOND THE EUROPEAN INNOVATION SCOREBOARD: HIGH TECHNOLOGY INNOVATION ACTIVITY IN SOUTHEAST EUROPE

Nebojša Radojević

Shenzhen Technology University, School of Business, Shenzhen, China,
nebojsa.radojevic@sztu.edu.cn, nebojsa.radojevic@hec.ca

Abstract: *According to the European Innovation Scoreboard (EIS), Southeast-European countries are either modest or moderate innovators, with innovation performance below 50% of the EU average, respectively between 50 and 95% thereof. However, the EIS misleadingly merges actual innovation activity of firms and country-level indicators such as new doctorate graduates, venture capital expenditures and broadband penetration. Besides, although particularly important for international competitiveness, innovation performance of high technology industries remains entirely unassessed. Consequently, the aim of this paper is to explore the innovation performance of high and medium-high technology industries in Southeast Europe. Drawing on Eurostat data from four most recent Community Innovation Surveys, the paper compiles and analyzes data panels on innovation performance in Southeast Europe, from which a differentiated picture emerges. Bulgarian innovation activity has been gradually increasing and is currently at or above 75% of the EU average. In exactly the opposite way, innovation activity in Romania has been gradually decreasing to fall below a third of the EU average. In Croatia, pharmaceuticals and manufacturing of electrical equipment have meanwhile surpassed the EU average, while manufacturing of other transport equipment is lagging. Serbian pharmaceuticals and manufacturing of motor vehicles have been keeping up with the EU, while computers and electronics is falling behind. Turkish high and medium-high tech industries consistently innovate at or above the EU average. In North Macedonia, pharmaceuticals and manufacturing of machinery innovate at the EU level, while chemical industry is staying far behind. The paper concludes by discussing these results and their implications.*

Keywords: *Innovation metrics; high technology; medium-high technology; Southeast Europe*

JEL Classification: O32, O38, O39, O52

INTRODUCTION

In March 2000, the European Council set for the European Union (EU) the goal "to become the most competitive and dynamic knowledge-based economy in the world" within a decade (Lisbon Strategy; EP, 2000). As one of the tools to track the implementation of the Lisbon Strategy, the European Innovation Scoreboard (EIS) has been introduced, the first edition of which was published already in 2001. While the Lisbon Strategy has meanwhile failed (Copeland, 2012) and has been succeeded by the "Europe 2020 Strategy" (EC, 2010), the EIS continues to exist and provide annual comparative analyses of innovation performance of the EU members, several non-EU European countries, and so called global competitors of the EU like the USA and China. In its most recent 2020 edition, the EIS covers 27 EU members, 9 non-EU European countries and 10 global competitors. Innovation is a multidimensional phenomenon which can signify either the process or its outcome, and which may occur at several levels, from a single firm to the whole world (OECD & Eurostat, 2018); note however that this paper exclusively takes the process perspective towards innovation. Innovation metrics typically employ either bottom-up or top-down approaches. Bottom-up metrics collect data about innovation at the firm level and aggregate them to the national or industry level. Top-down metrics capture elements of the national innovation systems (OECD, 1997) such as institutional strength, R&D spending, and infrastructural conditions, all of which serve as enabler of, or inputs to, the innovation activity at the firm level. The EIS merges both approaches into a single composite indicator, the summary innovation index.

According to the summary innovation index, Southeast-European countries have been consistently performing below the EU average (e.g. EIS, 2018, 2019, 2020). In 2019 for example, Bulgaria, Montenegro, North Macedonia, and Romania achieved an innovation performance below 50% of the EU average and are categorized as "modest innovators". Croatia, Serbia, and Turkey performed somewhat better, reaching between 50 and 95% of the EU average; these countries are categorized as "moderate innovators" (EIS, 2020). Given that innovation is commonly considered the key driver of economic development and growth (Hassan & Tucci, 2010; Maradana et al., 2017), the summary innovation index basically implies that Southeast Europe has been economically falling back while simultaneously politically integrating with the EU – Bulgaria and Romania accessioned the EU in 2007, Croatia in 2013, and the remaining countries in the region are in the accession process.

The EIS aggregates 27 different indicators, 23 of which measure aspects of national innovation systems such as framework conditions (e.g. foreign doctorate students), infrastructure (e.g. broadband penetration), investments (e.g. R&D and venture capital expenditures), linkages (e.g. public-private co-publications), intellectual assets (e.g. patent applications), and economic impacts (e.g. exports of high tech products). Only the composite "innovators" sub-index employs a bottom-up approach to measure innovation activity at the firm-level. This sub-index aggregates shares of enterprises with product or process innovations, marketing or organizational innovations, and of enterprises innovating in-house to provide a somewhat different picture. According to this sub-index, Montenegro and Turkey were "innovation leaders" in 2019 (above 125% of the EU average), Croatia and Serbia "strong innovators" (between 95% and 125% of the EU average) while Bulgaria, North Macedonia and Romania were still "modest innovators".

Unfortunately, this sub-index remains inconclusive as well since it considers only small and medium sized enterprises (EIS, 2020). Besides, although particularly important for international competitiveness (Schwab, 2019), innovation performance of high technology industries remains entirely unassessed.

Consequently, this paper aims at a bottom-up exploration of the innovation performance of high and medium-high technology industries in Southeast Europe in comparison to the EU average. Next section

reviews extant literature on this topic apart from the EIS and reveals a lack of relevant and conclusive metrics. The subsequent section defines the method and data used in this paper to benchmark the innovation performance of high and medium-high technology industries in the region. Thereafter, the results are presented and finally discussed along with limitations, implications, and future research opportunities.

LITERATURE REVIEW

Measurement of innovation at the national level is subject of several frameworks, most notably Global Innovation Index, Bloomberg Innovation Index, and International Innovation Index, all of which consider some or all Southeast-European countries. The 2020 edition of the annual Global Innovation Index (GII; Cornel University et al., 2020) ranks the innovation performance of 131 countries based on 7 "pillars": institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, and creative outputs. Rather than against a benchmark (e.g. the EU average in the case of the EIS), GII assesses innovation performance against expectations for the respective level of development. In 2019, the innovation performance of Bulgaria, Montenegro, North Macedonia, and Serbia was above expectations, of Croatia and Romania in line with expectations, and of Albania, Bosnia and Herzegovina, and Turkey below expectations for the respective level of development. This is an interesting but – in our context – too coarse-grained a piece of information.

Table 1 Academic literature on comparative innovation performance in Southeast Europe

Item	Scope	Approach and main findings
Kaynak et al., 2017	Ranking of overall innovation performance of EU candidates Iceland, North Macedonia, Serbia, and Turkey	• Technique for Order Performance by Similarity to Ideal Solution (TOPSIS) • Iceland always ranked first; ranks of other three EU candidates depend on data source used • If EIS data are used, the ranking is Iceland, Serbia, Turkey, North Macedonia, which is consistent with the EIS ranking itself
Toth et al., 2018	Drivers of innovation performance of food industry in Bulgaria, Croatia, Cyprus, Estonia, Germany, Hungary, Lithuania, Norway, Portugal, Romania, Slovakia, and Spain	• Regression analysis • Innovation performance explained by networking scope, networking intensity, and market openness and obstacles • Findings consistent with the EIS: Food industry is least innovative in Bulgaria and Romania ("modest innovators"); the performance in Croatia is moderate

Source: Author

The annual Bloomberg Innovation Index (BII; Bloomberg, 2020) ranks only 60 most innovative countries worldwide. The ranking is based on seven indicators: R&D intensity, manufacturing value-added, productivity, high-tech density, tertiary efficiency, researcher concentration, and patent activity. For this paper potentially interesting sub-index for high-tech density is calculated as the percentage of high-tech companies in the population of all publicly listed domestic companies. This unfortunately does not provide any information about the innovation activity and performance of firms in high-tech industries, whether publicly or privately owned.

The International Innovation Index (III) by Boston Consulting (Andrew et al., 2009) ranks 110 countries worldwide according to 2 sub-indices, innovation input and innovation performance. The

sub index for innovation performance is composed of 3 category scores, for R&D results, public impact of innovation, and business performance. The latter sounds promising, but it includes only so called topic-scores for high-tech exports, labor productivity, and market capitalization of listed companies, all of which are of limited help when it comes to the benchmarking of innovation activity at the firm level.

Complementary to the above-mentioned measurement frameworks, academic literature (articles and conference papers) on comparative innovation performance in Southeast Europe has been system-atically searched for in ProQuest. A set of 8 items published in English since January 2000 that have all of the following keywords in the respective abstract has been identified: "Southeast Europe" or the name of at least one country in the region; "technology" or "tech"; and any of the keywords implying measurement of innovation ("innovation metrics", "innovation measurement", "innovation performance", "innovation scoreboard", or "innovation activity"). After analysis of abstracts, 6 items have been excluded because they analyze cases of individual countries only. Remaining 2 items do not pertain to high-tech industries; they are nevertheless briefly summarized in. In sum, extant literature on firm-level high-tech innovation activity in Southeast Europe lacks any conclusive metric. All three indices GII, BII and III follow a top-down approach and primarily rely on macroeconomic indicators, financial market data, R&D spending, and patent count to rank the capacity of national innovation systems. They doubtlessly provide useful information about the environment within which Southeast-European firms innovate, yet they say hardly anything about how well the firms perform with this regard. The EIS goes beyond this and provides a bottom-up sub-index on innovation activity of firms, the scope of which is incomprehensibly restricted to small and medium sized enterprises. Academic publications on the topic are virtually non-existent; besides, the identified items provide only fragmented snapshots regarding the points of time and industries and countries included.

METHOD AND DATA

Recall that this paper aims at a bottom-up exploration of the innovation performance of high and medium-high technology industries in Southeast Europe in comparison to the EU average. Consequently, we first define industries and countries to consider. For high and medium-high technology industries, we use Eurostat classification (Eurostat, n.d.) of technological intensity based on NACE Rev. 2 (Eurostat, 2008) at 2-digit level.

Table 2 High and medium-high technology industries at NACE 2-digit level

Technology level	NACE	Industry
Medium-high-technology	C20	Manufacture of chemicals and chemical products
High technology	C21	Manufacture of basic pharmaceutical products and preparations
High technology	C26	Manufacture of computer, electronic and optical products
Medium-high-technology	C27	Manufacture of electrical equipment
Medium-high-technology	C28	Manufacture of machinery and equipment n.e.c. (not elsewhere classified)
Medium-high-technology	C29	Manufacture of motor vehicles, trailers, and semi-trailers
Medium-high-technology	C30	Manufacture of other transport equipment

Source: Eurostat, n.d.

Given that conflicting views exist as to which countries Southeast Europe encompasses, we commence from the view implied by the Lisbon Strategy and consistent with the CIA World Factbook (CIA, n.d.).

In this view, Greece is considered a part of Southern and Slovenia of Central Europe. However, we include in our further considerations only the countries that have been covered by the EIS, i.e. Bulgaria, Croatia, Montenegro, North Macedonia, Romania, Serbia, and Turkey (although in fact only East Thrace is a part of Europe).

Innovative enterprises we define equally in the sense of the EIS, i.e. as enterprises that have either introduced an outcome of innovation or have any kind of innovation activity, including abandoned, suspended, or ongoing innovation activities. Innovation activity within an industry is then defined as the ratio of innovative enterprises to the total population of enterprises. Finally, innovation performance is the ratio of innovation activity of an industry in a given country to the innovation activity of this industry in the EU as a whole.

For example, in NACE industry C27 (manufacture of electrical equipment), there was a total of 10.529 enterprises in EU in 2016, of which 6.957 were innovative (66,07%). In the same year, 58,10% of C27 enterprises in Bulgaria were innovative, so innovation performance of C27 in Bulgaria for 2016 is 0,5810/0,6607=0,8793 or roughly 88% of the EU average.

Table 3 CIS data extracted

	CIS 2010	CIS 2012	CIS 2014	CIS 2016
Table	inn_cis7_type	inn_cis8_type	inn_cis9_type	inn_cis10_type
Size class	All enterprises	All enterprises	All enterprises	All enterprises
Fields	INNO, TOTAL	INNO, TOTAL	INNO, TOTAL	INN, TOTAL
Description	INNO, INN: Share of enterprises that have either introduced an innovation or have any kind of innovation activity (including enterprises with abandoned/suspended or ongoing innovation activities) TOTAL: Total number of enterprises in the population			

Source: Author

Innovation performance is determined by drawing on secondary data from the publicly available Community Innovation Survey database (CIS, n.d.). The CIS is an extensive survey of enterprises regarding their innovation activities and outcomes; it is carried out every even calendar year by all EU members and several non-EU states. It provides statistics broken down e.g. by country, industry, type of innovators, and enterprise size classes. We extract relevant CIS data since 2010, because most Southeast-European countries started carrying out CIS surveys that year. Processing of survey microdata normally takes up to good two years (EIS, 2020), so CIS data for 2018 were not available at the time of this writing.

Whereas shares of innovative enterprises for each observed industry in Southeast-European countries have been obtained directly from the CIS, shares for the whole EU have been self-compiled. All CIS data from Montenegro are confidential, so Montenegro was excluded from further considerations as well. Eventually, an asymmetric data set of 140 data points for Bulgaria, Croatia, North Macedonia, Romania, Serbia, and Turkey has been created.

Each data point has 4 attributes: country, industry, year, and innovation performance in comparison to the EU average. A total of 28 data points is missing: North Macedonia did not participate in CIS 2010 and 2012 (14 data points); Turkey did not participate in 2010 at all (7 data points) and in 2012 only with some industries (4 data points); and CIS data from Romania for NACE industry C21 (pharmaceuticals) are deemed confidential since 2012 (3 data points). All available data points have been arranged country-wise as unbalanced contingency panels, plotted, and analyzed.

RESULTS

Bulgaria

On overall, the trend in Bulgaria is rather clear and encouraging; innovation activity in high and medium-high tech industries has been increasing in comparison to the EU ever since 2010. In 2016, the performance of each industry was at or above 75% of the EU average. Medium-high tech industries C29 (manufacture of motor vehicles) and C30 (manufacture of other transport equipment) perform particularly well and have reached the EU level. Manufacture of computers and electronics (C26), a high-tech industry, seems also to be catching up, although slower (from 62% in 2010 to 77% in 2016). Pharmaceuticals (C21; high tech) and C20 (chemicals) are of some concern as they persist at roughly 75% of innovation activity in the EU.

NACE	YEAR			
	2010	2012	2014	2016
C20	73%	72%	73%	75%
C21	71%	72%	74%	75%
C26	62%	60%	68%	77%
C27	75%	75%	74%	88%
C28	65%	70%	80%	87%
C29	70%	69%	86%	95%
C30	71%	69%	85%	100%

n/a: not available
c: confidential
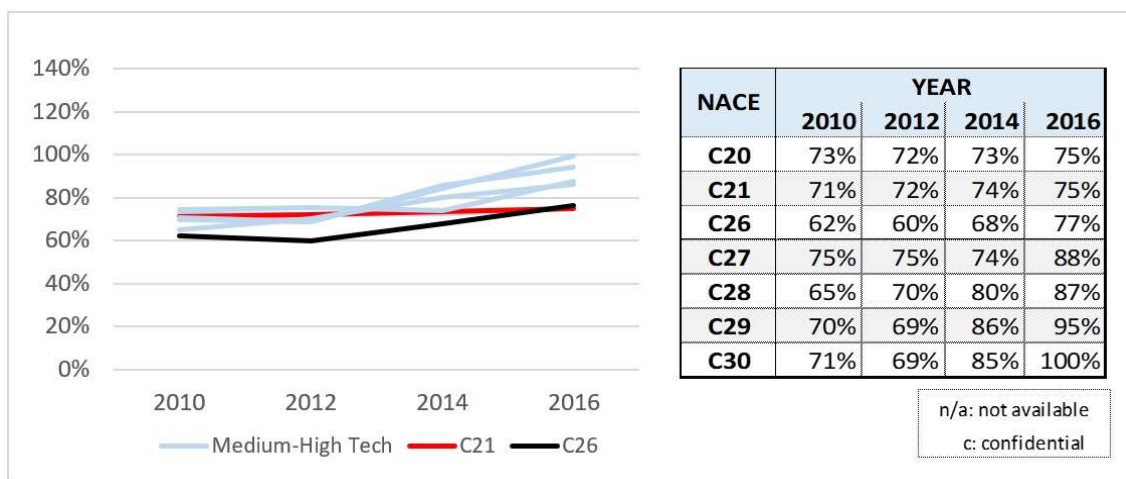
Figure 1 Innovation performance of high and medium-high tech industries in Bulgaria

Croatia

In Croatia, pharmaceuticals (C21) have taken an unambiguous, straight upward trend since 2010 to surpass the EU average by far and reach 125% thereof in 2016. All other industries have shown a zigzag pattern to some degree, manufacture of motor vehicles (C29) even extremely so (from 128% down to 51% and then back to 108%). In 2016, manufacturing of electrical equipment (C27) was also more innovative than the EU average (108%). In contrast, manufacturing of other transport equipment (C30) is staying far behind, at around 50% of the EU average. C26 (computers and electronics) had a severe setback from 2010 to 2012 but seems to have been slowly recovering since.

NACE	YEAR			
	2010	2012	2014	2016
C20	73%	90%	92%	86%
C21	61%	89%	94%	125%
C26	98%	83%	85%	87%
C27	93%	81%	93%	108%
C28	89%	71%	75%	76%
C29	107%	128%	51%	109%
C30	36%	59%	44%	55%

n/a: not available
c: confidential
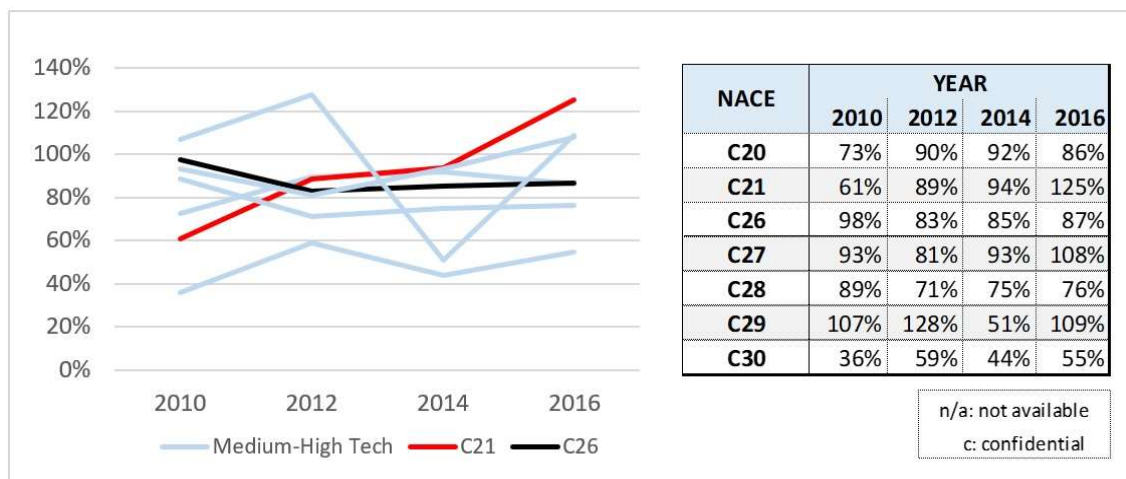
Figure 2 Innovation performance of high and medium-high tech industries in Croatia

North Macedonia

North Macedonia participated only in two CIS so far, therefore the changes of performance from 2014 to 2016 do not necessarily imply trends and should be taken with a considerable grain of proverbial salt. Besides, these changes were mirrored: some industries (C20, C28 and C30) improved in comparison to the EU as strongly as the others (C21, C26, C27 and C29) lost ground. In any case, in 2016, manufacture of machinery and equipment (C28) and manufacture of motor vehicles (C29) were innovating above, and pharmaceuticals (C21) roughly at the EU level. Despite a big jump from 6% of the EU average in 2014 to 45% in 2016, chemical industry (C20) is still far behind. Of particular concern seems the performance drop of C26 (computers and electronics) from 95% in 2014 to 52% in 2016.

NACE	YEAR			
	2010	2012	2014	2016
C20	n/a	n/a	6%	45%
C21	n/a	n/a	121%	94%
C26	n/a	n/a	95%	52%
C27	n/a	n/a	112%	84%
C28	n/a	n/a	67%	110%
C29	n/a	n/a	132%	116%
C30	n/a	n/a	56%	83%

n/a: not available
c: confidential
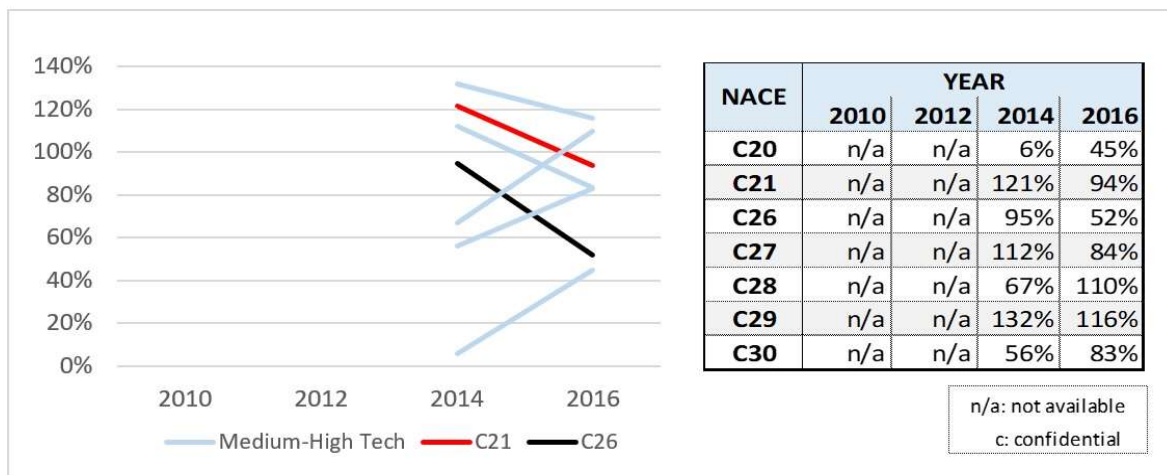
Figure 3. Innovation performance of high and medium-high tech industries in N. Macedonia

Romania

The trend in Romania is as clear as alarming it is: innovation activity in ALL high and medium-high tech industries has been constantly decreasing since 2010 to fall – in most cases by far – below a third of the EU average in 2016. C26 (computers and electronics) is by far the worst performing high tech industry in Southeast Europe, reaching only 15% of the EU average in 2016.

Note that data on C21 (pharmaceuticals) are deemed confidential and are hence not publicly available since 2010. In that year, however, C21 was the best performing Romanian industry regarding innovation activity (74% of EU average).

NACE	YEAR			
	2010	2012	2014	2016
C20	61%	36%	30%	27%
C21	74%	c	c	c
C26	41%	28%	23%	15%
C27	55%	38%	30%	18%
C28	48%	49%	18%	14%
C29	64%	61%	26%	13%
C30	61%	50%	37%	22%

n/a: not available
c: confidential

Figure 4 Innovation performance of high and medium-high tech industries in Romania

Serbia

The changes of innovation performance in Serbian high and medium-high tech industries are on one hand mirrored as in the case of North Macedonia, while on the other they show a zigzag pattern as in the case of Croatia. Pharmaceuticals (C21) and manufacturing of motor vehicles (C29) have been oscillating around, but basically keeping up with, the EU average. Steep deterioration of innovation activity within the computers and electronics industry (C26) is alarming. In fact, this is the second worst performing high-tech industry in Southeast Europe.

NACE	YEAR			
	2010	2012	2014	2016
C20	64%	87%	103%	68%
C21	97%	92%	107%	88%
C26	90%	72%	47%	47%
C27	106%	96%	49%	85%
C28	94%	73%	55%	95%
C29	95%	79%	87%	101%
C30	101%	57%	42%	68%

n/a: not available
c: confidential

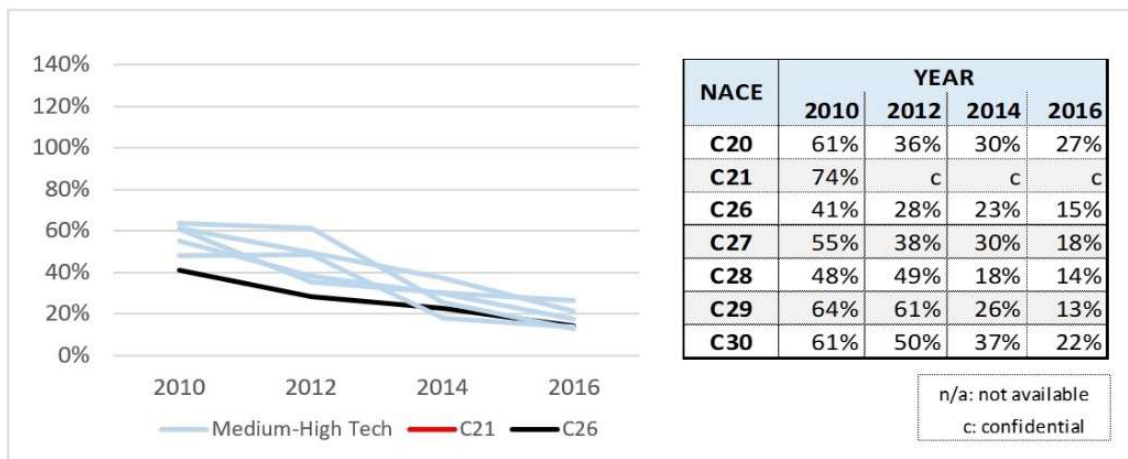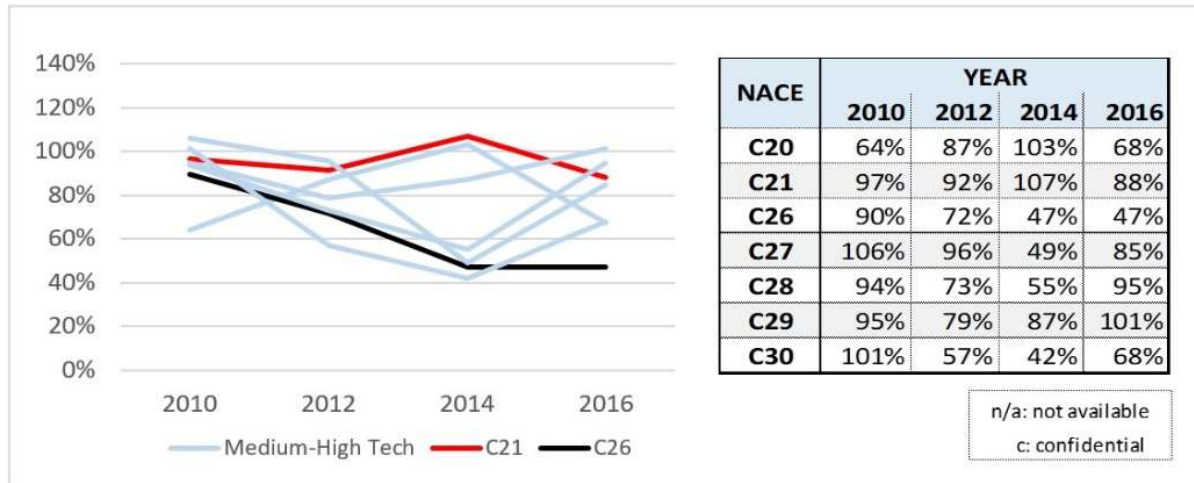*Figure 5 Innovation performance of high and medium-high tech industries in Serbia*

Turkey

In 2016, Turkish high tech industries C21 (pharmaceuticals) and C26 (computers and electronics) were innovating only 7 respectively 4 percentage points below the EU, while innovation activity in all medium-high tech industries was between 5 and 23 percentage points above the EU level. The status was hence clearly favorable in 2016, yet the trends are neither stable nor well recognizable given that Turkey did not participate in 2010 CIS at all and in 2012 only with 3 industries (C20, C21, and C26).

NACE	YEAR			
	2010	2012	2014	2016
C20	n/a	94%	87%	105%
C21	n/a	85%	80%	93%
C26	n/a	92%	89%	96%
C27	n/a	n/a	111%	108%
C28	n/a	n/a	100%	116%
C29	n/a	n/a	114%	116%
C30	n/a	n/a	90%	123%

n/a: not available
c: confidential

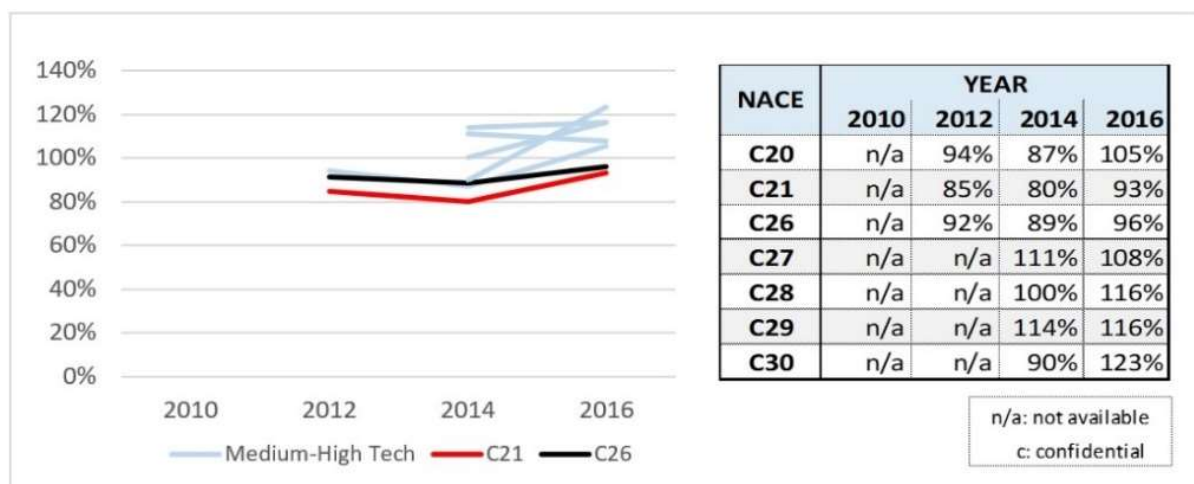*Figure 6. Innovation performance of high and medium-high tech industries in Turkey*

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

This paper presents a differentiated picture of innovation performance in Southeast-European high and medium-high tech industries, which may be of particular interest to executives and policymakers.

The EIS assigns whole countries to categories modest/moderate/strong innovators and innovation leaders, yet our findings clearly point out that the innovativeness of industries, rather than of countries, should be categorized. This is plausible given that national industries lay at intersection of national (OECD, 1997) and sectorial innovation systems (Malerba, 2002). Pharmaceuticals industry (C21) in Croatia would be the only "innovation leader"; the strength of the region are rather medium-high tech industries. All medium-tech industries (C20, C27-C30) are strong innovators in Turkey; manufacture of machinery (C28) is also strong innovator in North Macedonia and Serbia, and manufacture of motor vehicles (C29) in the whole region except for Romania. Concomitantly, there are several problem children that require attention of executives and policymakers, for example all high and medium-high tech in Romania, computers and electronics (C26) in Serbia, and chemicals (C20) in North Macedonia.

Whereas major contributions of this paper are clearly practical rather than theoretical, it nevertheless raises a few theoretical questions, which in turn translate into promising research opportunities. Several patterns of innovation performance presented in Figures 1-6 deserve being explained, for example zigzag trends in Croatia and Serbia, bisection of innovation performance in North Macedonia, or the collapse of innovation activity in Romania. Moreover, it is puzzling and in sharp contradiction to the EIS measurement framework that innovation performance of many industries in the region lays above the EU average although ALL innovation inputs and enablers at the national level are below of it (EIS, 2020; Table).

Table 4. Innovation inputs and enablers in Southeast Europe, % of the EU average

Innovation input/enabler	Bulgaria	Croatia	N. Macedonia	Romania	Serbia	Turkey
Human resources	52%	57%	38%	12%	61%	41%
Attractive research systems	26%	44%	81%	29%	39%	36%
Innovation-friendly environment	43%	41%	51%	65%	69%	69%
Finance and support	12%	39%	13%	42%	40%	45%
Firm investments (in R&D)	41%	91%	62%	8%	86%	89%
Linkages	35%	66%	17%	39%	68%	47%
Intellectual assets	83%	35%	14%	26%	9%	22%

Source: EIS, 2020

Limitations of this paper worth mentioning here are data availability and exclusive focus on innovation as a process. Our data panels are insightful but rather short; last data available are from 2016 and partly incomplete. It is simply that Southeast-European countries started executing biannual CIS surveys relatively recently, that CIS data are made available with a lag of 2 years, and that some figures (C21 in Romania, all CIS data from Montenegro) are deemed confidential. Innovation is a multidimensional phenomenon (OECD & Eurostat, 2018); at the firm level, its two dimensions are innovation as a process or activity, and innovation as an outcome (Crossan & Apaydin, 2010). In this paper, only the former dimension is observed. However, innovation activity is a necessary but not sufficient prerequisite for innovation outcome to occur. In other words, this paper explores how much Southeast-European high and medium-high tech industries innovate in comparison to the EU average, but not how effectively they transfer innovation activity into marketable new products and services, and ultimately economic gains. Two-dimensional explorations of innovation performance in the region are hence warranted and yet to come.

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CORPORATE SOCIAL RESPONSIBILITY IN PUBLIC SECTOR: EMPIRICAL EVIDENCE FROM SERBIA

Dejana Zlatanović[*]
University of Kragujevac, Faculty of Economics, dejanaz@kg.ac.rs

Slađana Savović
University of Kragujevac, Faculty of Economics, ssladjana@kg.ac.rs

Jelena Nikolić
University of Kragujevac, Faculty of Economics, jnikolic@kg.ac.rs

Abstract: *Actual circumstances related to global pandemic and, subsequently, economic crisis, require focusing on socially responsible activities more than ever. Although there are numerous studies on CSR in the private sector, in the public sector they are scarce. On the one hand, the necessity of CSR for private sector organizations is driven by the desire to either become or remain competitive, while for public sector organizations this need is driven by an increased focus on accountability. Thus, the paper deals with CSR in the public sector. The purpose is to highlight the differences of employees' perceptions of CSR in different public sector organizations in the Republic of Serbia. Given that the public sector plays a critical role in creating an enabling environment for responsible business, its socially responsible behavior is implied by itself. However, the obtained results indicate that these organizations often concentrate on CSR activities related to image or some philanthropic activities rather than prioritizing environmental CSR initiatives to attain better organizational performance. Also, the results show that perceptions among employees in public sector organizations are very similar, since statistically significant differences exist only in health care employees' perceptions of some general CSR activities. The paper contributes to expanding the findings related to CSR in public sector organizations, with special attention given to employees' perceptions of CSR in public sector organizations in the Republic of Serbia and enables some recommendations and solutions for improving CSR in public sector as well.*

Keywords: *CSR, public sector, CSR general activities, CSR benefits*

JEL Classification: *M14, M21, Q01*

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[*] Coresponding author

INTRODUCTION

The importance of Corporate Social Responsibility (CSR) for contemporary organizations is undoubtedly demonstrated in numerous studies (e.g. Crittenden et al., 2011; Maignan & Ferrell, 2004; Peloza & Sang, 2011; Vlachos et al., 2009; Stojanović-Aleksić et al, 2016). The World Business Council for Sustainable Development has related CSR to sustainable economic development and the improvement of society and their welfare (World Commission on Environment and Development, 1987). As the world health and economic crisis increased demands to organizations and challenged their behaviour, public sector organisations play an ever-more important role in enabling transparency, efficiency and protecting the public interest. The commitment of public service organizations to Corporate Social Responsibility (CSR) is a key issue that should be taken into consideration. Scientific and professional interest in the performance of CSR in private enterprises has been widely considered and has grown significantly in recent years. However, in the public sector the studies are scarce and its importance is currently growing (Garde-Sanchez et al., 2018; Huy & Phuc, 2020). The studies of CSR in the public sector are mostly dedicated to ethical issues of public administration (Bowman & Knox, 2008; Nedelko & Potočan, 2013). It further implies the necessity of the wider research on CSR in the public sector and indicates the research gap which we aim to overcome with this research.

Accordingly, the paper is focused on social responsibility of the public sector organizations, particularly on employees' perceptions regarding CSR. The paper aims to highlight the differences of employees′ perceptions of CSR in diverse public sector organizations in the Republic of Serbia. Therefore, research is based on the following research questions:

RQ1: How do employees in public sector organizations perceive CSR?

RQ2: Are there significant differences among employees' perceptions in various public sector organizations?

The paper is structured as follows. The first section is dedicated to CSR with particular attention given to the role of public sector organizations in CSR. After highlighting the features of CSR in the public sector, we presented the methodology and empirical research results. Finally, relevant conclusions, practical implications, as well as future research directions are considered.

LITERATURE REVIEW

CSR Features and benefits briefed

Generally, "CSR concerns companies' actions beyond their legal obligations towards society and environment" (Zlatanović & Mulej, 2015). According to ISO 26000, SR "is the responsibility of the company for the influence of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development and prosperity of society; it takes into account the expectations of stakeholders; it is in accordance with the adopted laws and international norms of behavior; it is integrated into the overall functioning of the company (ISO, 2010, p. 3)".

Socially responsible behaviour is now crucial for the reputation of businesses when dealing with informed employees, consumers, communities, investors and others. Benefits of CSR are many, such as driving innovation, fostering trust and transparency, boosting long-term profitability, ensuring competitiveness and engaging workforce. Increasing importance of CSR is also related to financial

benefits, company's image and its use as a means of legitimising the company's actions (Garde-Sanchez et al., 2018).

The positive impact of social responsibility on financial performance has been shown in many papers and researches (e.g. De Bakker et al., 2005; Orlitzky et al., 2003). At the same time, the lower number of papers explores the connection between social responsibility and non-financial performance. In this sense, the following researches can be singled out: Maignan & Ferrell (2001) explore the connection between consumer loyalty, employees' commitment and social responsibility; Scholder Ellen et al. (2006) show that social responsibility positively influences consumers and their perception of products. Finally, Greening & Turban (2000) indicates that social responsibility is very important for recruiting employees.

The non-financial benefits of socially responsible behavior are mainly related to the employees, consumer's satisfaction and company reputation. Researches show that social responsibility enables the satisfaction of instrumental, moral and relational needs of employees, which results in greater commitment to the organization and thus a smaller outflow of employees. At the same time, socially responsible behavior influences greater consumer satisfaction and better company reputation (Galbreath, 2007).

Csr in the public sector

With respect to public sector organisations, the objectives of CSR should go beyond considerations of financial indicators and utility. These organizations have special responsibilities and commitments. Their primary function is to fulfill the social objectives for which they were created and not necessarily to obtain profits, although they must ensure their own sustainability. Most of these organisations were created to correct market failures and/or to provide services or products, for job creation or other public policies. Therefore, issues related to social responsibility are of major concern to these organisations and their implementation of socially responsible policies can be a benchmark for other organisations (Garde-Sanchez et al., 2018).

While CSR is a voluntary management approach by businesses, the public sector plays a critical role in creating an enabling environment for responsible business to thrive. It further implies environment that encourages business activity that minimizes environmental and/or social costs and impacts, but at the same time maintains or maximizes economic gains. Public policy in a wide range of areas impacts on CSR and business ambitions, e.g. environment, labor markets, community development, human rights, anti-corruption and governance reporting.

Thus, corporate social responsibility becomes an important source of value that contributes to the company's competitiveness, but at the same time an important factor in the overall social development (Porter & Kramer, 2006). This implies growing awareness of the importance of corporate social responsibility in both the private and public sectors. In fact, public organizations, especially public administration, are the key stakeholders in the socio-economic governance system and their non-commitment to CSR is inconceivable. Although the connection between the public sector and corporate social responsibility may seem paradoxical, given that the purpose of the public sector is to better meet social interests, poor governance, corruption, as well as the pursuit of management models specific to the private sector – new public management (Babić & Zlatanović, 2020 according to Kolthoff et al., 2006; Diefenbach, 2009), indicate the need to consider this topic in the public sector as well. Also, a number of studies on ethics in the public sector have been conducted, which indicates that this is a relevant research area (e.g. Bowman & Knox, 2008; Nedelko & Potočan, 2013).

The interest of the academic and professional community in reporting on the social, environmental and sustainable behavior of organizations is also growing in the public sector. Accordingly, it can be concluded that the role of organizations in the public sector is twofold. On the one hand, they should encourage the acceptance of instruments and socially responsible behavior by private entities, as part of regulation and control of economic and social activities. On the other hand, they should encourage the principles of corporate social responsibility in their own organizations as well as reporting on these aspects (Fusco et al., 2018; Štreimikienė & Pušinaitė, 2009; Ward, 2004).

Taking into account the dual role of organizations in the public sector, their role in promoting corporate social responsibility should focus on: improving their own corporate social responsibility, promoting and expanding the practice of socially responsible behavior in companies, growing awareness of all stakeholders, and improving cooperation between the state, companies and society as a whole. Since organizations in the public sector should be socially responsible themselves, because their primary purpose is general interest or the common good, the application of the CSR concept in the public sector can, therefore, be considered meaningless (Babić & Zlatanović, 2020).

In this context, it is necessary to rationalize the discussions of this concept in the public sector, primarily for reasons related to corruption and mismanagement, as well as the trend of prioritizing economic over social concerns in the public sector. In this regard, extending the concept of corporate social responsibility to the public sector is necessary.

In order to ensure long-term development, public sector organizations must take into account certain environmental standards and legislation, requirements regarding restructuring, diversity and ethics. In this context, the state should create favorable conditions for the development of corporate social responsibility. At the same time, public sector organizations should develop their own policies, codes of ethics, implementation standards, facilitate access to information, transparency, take measures to prevent corruption, stimulate competitiveness, and invest in science and technology (Štreimikienė & Pušinaitė, 2009). In that sense, the connection between public policy and corporate social responsibility is of appropriate importance, since public policy defines not only the type and trajectory of social responsibility in different contexts, but also the role of stakeholders. The regulatory capacity of the public sector plays a critical role in supporting corporate social responsibility.

Without this capacity or the necessary focus on fundamental human rights, companies face difficulties in finding and maintaining appropriate boundaries in their socially responsible interventions, and may feel pressured to pursue activities that are outside their core competencies and represent a financial cost rather than investment. Corporate social responsibility can also help address the fundamental problems of the investment climate, through public sector activity. Thus, in order for companies to continue to improve their socially responsible behavior, the public sector must ensure the following crucial elements: precision in regulations, basic standards required of all companies, and predictability of government interventions (Fox et al., 2002; Ward, 2004).

METHODOLOGY

Sample and procedure

Despite the above, the relationship between CSR and the benefits of CSR for public sector organizatons is still vague. It indicates the importance of examining public sector employees' perceptions of CSR and its benefits. Thus, we have conducted the research in the public sector organizations in the Republic of Serbia. The organizations are from different activities: public-utility, educational, public administration, health care, sports and recreation, culture and entertainment, as well as of different sizes according to

the number of employees. The sample consists of 133 respondents. As shown in table 1, there are more women (60.9%) than men (39.1%) in the sample structure. Observed by age, respondents aged 36-45 make the largest share in the sample (32.3%). According to the years of work experience, most respondents have more than 15 years of work experience. In terms of education level, most respondents have a university degree (47.4%).

Measures

The five-point Likert scale is used to determine the respondents' degree of agreement with the given items. Respondents have at their disposal answers from 1 – I do not agree at all to 5 – I completely agree.

Table 1 Sample structure

Variables	Frequency	Percentage
Gender		
Men	52	39.1
Women	81	60.9
Age		
18-25	6	4.5
26-35	17	12.8
36-45	43	32.3
46-55	39	29.3
>55	27	20.3
No response	1	0.8
Working experince		
<5	16	12.1
6-10	29	22.0
11-15	34	25.6
>15	53	39.8
No response	1	0.8
Education		
University degree	63	47.4
Higher school education	31	23.3
Swcondary education	38	28.6
No response	1	0.8
Organizational field		
Public utilities	20	15.0
Education	23	17.3
Public administration	65	48.9
Health care	5	3.8
Sports and recreation	14	10.5
Culture and entertainment	6	4.5
Organizational size		
<20 employees	32	24.1
21-50 employees	69	51.9
51-70 employees	31	23.3
No response	1	0.8

Source: Authors' calculation

General attitudes about corporate social responsibility are measured using 10 items. These are the following: *CSR principles are defined by strategic documents at national level; CSR principles are included in the documents of your organization; Your organization promotes socially responsible behavior; Your organization contributes to solving the problems of local community;* Ethical standards and norms are respected *in your organization; Functioning of your organization has no negative effects on users and other stakeholders;* Procedures to prevent corruption are developed *in your organization; Reports on your organization's socially responsible activities are available (e.g. on website or other media); Your organization encourages environmental protection activities (e.g. recycling, waste disposal); Socially responsible activities are conducted in collaboration with other organizations at local/regional/national level. The expected benefits from corporate social responsibility* are measured using nine items. These are as follows:

Data analyses

The Statistical Package for Social Sciences (SPSS version 20.0) is used for data analysis. The reliability and internal consistency of the variables are measured using the Cronbach's Alpha coefficient. The analysis shows that both variables have a high level of internal consistency, since the value of the coefficient is above 0.7. Expected benefits from CSR have higher internal consistency ($\alpha = 0.937$), while the internal consistency of General attitudes about corporate social responsibility is slightly lower ($\alpha = 0.883$).

Testing the normality of the distribution of variables is performed using the Kolmogoro-Smirnov test. The normality of the distribution of variables exists if Sig. > 0.05. The test results show that there is no normality in the distribution of variables. Hence, testing the significance of differences between subsamples is performed using a nonparametric Kruskal Wallis test. Table 2 presents the Cronbach's Alpha and Kolmogoro-Smirnov test values. Testing the research hypotheses is performed using measures of central tendency (mean, median and mode) as well as Kruskal Wallis test.

Table 2 Cronbach's Alpha and Kolmogoro-Smirnov test

Variables	Cronbach's Alpha	Kolmogoro-Smirnov test		
		Statistic	df	Sig.
General attitudes about CSR	0.883	0.099	133	0.003
Expected benefits from CSR	0.937	0.127	133	0.000

Source: Authors' calculation

RESULTS AND DISCUSSION

In order to identify employee perceptions of relevant general CSR issues, descriptive statistics is used, as shown in Table 3. The table shows that public sector employees perceive that the benefits of CSR are large, given the mean values (M = 4.2080). At the same time, it can be noticed that they have positive attitudes towards certain general socially responsible activities (M = 3.8113). The most pronounced attitude is that the *Functioning of an organization has no negative effects on users and other stakeholders*, which indicates that employees in public sector organizations are aware of the importance of users and other stakeholders in building adequate reputation and trust.

Table 3 Descriptive statistics

Variables	N	Mean	Median	Mode	Std. Deviation
General attitudes about CSR	133	3.8113	3.8000	4.30	.69103
Expected benefits from CSR	133	4.2080	4.2222	5.00	.69502

Source: Authors' calculation

However, *The principles of social responsibility are defined in the documents of your organization* (M = 3.5564) and *Your organization encourages environmental protection activities (e.g. recycling, waste disposal)* (M = 3.7068) are items with the lowest arithmetic mean. This indicates the need to review and redefine the relevant documents of the organization so that the principles of CSR are clearly incorporated, but also a much greater commitment in the field of environmental protection.

When it comes to the benefits of socially responsible behavior, *Customer service satisfaction is a measure of business success* and *Corporate social responsibility improves the reputation of the organization* (M = 4.3759) are items with the greatest Mean value, which is also true with *Through socially responsible behavior organizations improve relationships with local community* (M = 4.2331). This corresponds to the previously high values and perceptions of employees in terms of users and the importance of their satisfaction for the reputation of organizations, but also indicates that organizations pay great attention to certain philanthropic activities. However, *Socially responsible behavior of organizations reduces costs* has the lowest Mean (M = 3.9774), which implies that employees are not entirely sure of the financial benefits of CSR, but primarily consider it an important concept from the point of view of building image and reputation.

In addition to identifying general perceptions of public sector employees about CSR, the analysis sought to answer the question of whether there are differences in the attitudes of employees working in different public sector activities. The Kruskall Wallis test was used to test the existence of statistically significant differences in the general attitudes about the corporate social responsibility of the respondents, as well as in the attitudes about the benefits from the corporate social responsibility of the respondents from different sectors. Table 4 presents the test results which show a statistically significant difference in the general attitudes of respondents from different organizations in public sector (p <0.05). Respondents from health and social organizations had the most positive attitudes about social responsibility, followed by respondents from educational sector. This result is quite logical, given that these are organizations whose activities are specific, and which, having in mind their target groups (the sick and children), should be characterized by the highest degree of corporate social responsibility. Respondents from sports and recreational sectors had the least positive attitudes about social responsibility.

Table 4 Kruskal Wallis Test Results – Differences in General attitudes about CSR in various fields of organizations

	Organizational field	N	Mean Rank	Chi-Square	df	p
General attitudes about CSR	public utilities	20	63.40	21.548	5	0.001
	educational organizations	23	88.72			
	public administration	65	60.29			
	health care organizations	5	113.00			
	sports and recreation	14	45.75			
	culture and entertainment	6	79.67			
	Total	133				

Source: Authors' calculation

Table 5 shows the results of the Kruskal Wallis test which tested whether there is a difference in the attitudes of respondents from different industries in terms of the benefits that corporate social responsibility brings to organizations. The test results showed no statistically significant differences

in the attitudes about the expected benefits from CSR of respondents from different industries (p> 0.05). This also corresponds to the aforementioned attitudes regarding the fact that these organizations associate most of the benefits of CSR with their reputation and image.

Table 5 Kruskal Wallis Test Results – Differences in Expected benefits from CSR in various fields of organizations

	Organizational field	N	Mean Rank	Chi-Square	df	p
Expected benefits from CSR	public utilities	20	66.58	0.820	5	0.976
	educational organizations	23	69.33			
	public administration	65	65.02			
	health care organizations	5	79.70			
	sports and recreation	14	68.14			
	culture and entertainment	6	67.67			
	Total	133				

Source: Authors' calculation

CONCLUSIONS AND RECOMMENDATIONS

According to the above considerations, we can conclude that public sector organizations are aware of the importance of CSR, particularly its importance in improving their reputation. Although public sector organizations are more likely to perform socially responsible activities, these organizations are often concentrated on CSR activities related to image or some philanthropic activities rather than prioritizing environmental CSR initiatives to attain better organizational performance. It implies greater focus of public sector organizations on these CSR activities, which can contribute not only to the good image and reputation, but also to the environment and the society as a whole.

These results could be related to some of the main barriers and challenges to the implementation of CSR public sector organizations face, such as lack of financial and technical resources and multiple sets of codes of conduct.

We measured the benefits of CSR by subjective employees' perceptions and these results indicate that employees have insufficient awareness about financial CSR benefits. This could be in accordance with a view that these organizations often lack a clear, quantitative, consistent instrument for evaluating their goals.

Therefore, an alternative could be taken into consideration to meet the transparent and fair requirements when measuring CSR implementation in public sector organizations. In addition, the results demonstrate that employees in various public sector organizations have similar perceptions of CSR, especially the perceptions regarding CSR benefits. However, these perceptions differ when it comes to general CSR activities, with differences only in health care organizations due to their specific features related to ethics generally.

So, in order to improve CSR in the public sector, we can recommend emphasizing the users' and stakeholders' expectations, ameliorating service delivery, improving environmental protection activities, dealing with capability and organizational matters as well as promoting a culture based on improvement, innovation and learning.

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BUSINESS CONDITIONS FOR TECH STARTUPS IN REPUBLIC OF SERBIA

Aleksandar Vekic[*]

University of Novi Sad, Faculty of Technical Sciences, vekic@uns.ac.rs

Jelena Borocki

University of Novi Sad, Faculty of Technical Sciences, borocki@uns.ac.rs

Stanislav Vinkovic

University of Novi Sad, Faculty of Technical Sciences, vinkovit.stano@gmail.com

Mladen Ilic

University of Novi Sad, Faculty of Technical Sciences, substrateskimaki.mladen@gmail.com

Abstract: *The relationship between business conditions and establishment and operation of a startup company is always a very important question, but also difficult for analyzing and identifying their positive and negative correlations. In this research the state of startup ecosystems in the Republic of Serbia was processed. Serbia has a proactive approach in terms of further improving of business environment to policy on micro, small and medium-sized enterprises (MSMEs). Support institutions within the legal regulations participate in defining forward-looking development strategy and a wide range of support services in place, especially funding programs and implementation of electronic services. There is still a number of obstacles that need to be removed in the future. This paper analyzed very important issues such as: institutional support for startup ecosystems, regulations and laws in this area, startup funding, key support organizations and their main programs, and their influence of startup companies development, as well as whole startup ecosystem. This analysis covered the period from 2015-2019, and includes data about Framework Condition indicators collected by using interactive tools European Innovation Scoreboard (EIS). This research enables identification of problems faced by the startup ecosystem in the Republic of Serbia and creates opportunities for determining solutions that should enable its growth and development.*

Keywords: Entrepreneurship, Innovations, Startups, High Technologies, EIS

JEL Classification: L 26, M 13, O 31, O 32

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[*] Coresponding author

INTRODUCTION

In the last couple of decades, the global economy has relied more and more on entrepreneurial and startup potentials, and in them it seeks its support for progress. Various governmental and non-governmental organizations around the world are emerging as important initiators of development, which, through their projects and support programs with mentoring, investment, networking and other measures contribute to increasing this potential. This trend had started in the United States and soon spread around the world. On this issue, Europe is not far behind them either. The Balkan startup ecosystem has been noticeably stronger as time passes, and the atmosphere in which it develops varies from country to country.

Some recognize the potential, others encourage startup entrepreneurship in different ways, while some are not even aware of the importance of this issue for their future. In the last couple of years, it has been noticed that startups from the region, with state support or not, have been more and more successful on the global market, but for even greater success they need an incentive in education, as well as clear strategy for developing startup ecosystems so more young innovative companies emerge. Thus, in the last few years, the startup ecosystem of the Republic of Serbia has been growing significantly and offering young entrepreneurs and innovators a wide range of opportunities, which help business idea see the daylight, turn into a certain product or service and achieve its commercialization on the market. Globalization has contributed to many domestic organizations being connected and networked with successful foreign organizations, which have integrity and respect in the whole world.

Their mutual cooperation gives an exceptional contribution to the growth and development of the startup ecosystem of the Republic of Serbia. The startup ecosystem of the Republic of Serbia has successfully positioned itself on the global map of startup ecosystems created by the organization Startup Genome and is called "Ecosystem Belgrade and Novi Sad" (Startup Genome, 2020), because most activities related to it take place in these cities.

There are currently between 200 and 400 startups in Belgrade and Novi Sad, which is in line with the average in terms of the number of startups in cities in the region, such as Warsaw and Bucharest, while this number is twice the number of startups in Budapest. The startup ecosystem of the Republic of Serbia is recording excellent results, is on a good development path and has exceptional potential. In order to make full usage of these potentials, it is important to enable a positive impact on all important factors of the startup ecosystem, and this primarily refers to state institutions that have the greatest capacity in terms of startup ecosystem development.

LITERATURE REVIEW

One of the main priorities of modern countries is the encouragement of entrepreneurial activity, and the realization of economic development, which is largely based on this activity. Entrepreneurship can be interpreted in different ways, so according to one definition, "entrepreneurship is an activity aimed at initiating, organizing and innovating the company's business, with the basic goal of creating a new market and making a profit. It is related to all aspects of human behavior and action - it develops creativity, promotes the birth of ideas and enriches human needs " (Penezić, 2003). From the aspect of the market and competition, entrepreneurship implies certain competitive behaviors that initiate processes on the market (Kirzner, 1973).

Simply put, entrepreneurship is a field of business that seeks to understand how opportunities create something new (Shane & Venkataraman, 2000). Today, entrepreneurship is one of the most important foundations of economic growth (Pavlova & Sagov, 2020). An entrepreneur appears as the bearer of entrepreneurial activity and today they have the intention of building a significant company that can create wealth for the entrepreneur and investors (Lesonsky, 2007), and for society as a whole.

Entrepreneurial activity could not be imagined without innovations, which aims to create new value around which business activities are directed. In other words, innovations are the creation of new combinations of existing resources (Schumpeter, 1934). According to the OECD Manual, innovation is interpreted as the application of a new or significantly improved product (goods or services), a new process, a new marketing method or a new organizational method in business practice, the organization's workspace or external relations (OECD, 2005). From the aspect of change, innovation can be interpreted as a change that has a very significant positive character (Scott, 2007), and it usually involves shaping certain idea into a solution that adds value from customer's point of view.

Startup companies are important carriers of innovation and they are created and developed in environment that is called a startup ecosystem, which brings together people as well as startups in different stages of development and different types of organizations in a particular location (physical or virtual) that interact with each other to create new startup companies (Inicijativa Digitalna Srbija, 2019). Startup ecosystem is also known as "entrepreneurial ecosystem" and this ecosystem has the ability to innovate, build exceptional companies, create jobs and open businesses (Aleisa *et al.* 2013).The term startup is derived from the English language and it means to start or begin. Startups are mostly newly created companies, i.e. beginners in business. According to Steve Blank, "a startup is a temporary organization formed to find a repeatable and scalable business model" (Blank, 2010).

While Eric Ries, author of the most famous startup book called "The Lean Startup", says that "a startup is institution made of people, designed to deliver a new product or service in conditions where a lot of things are unknown" (Ries, 2011). Technology is one of the most important factors in development process of individual company and whole economy as well.

The use of modern technologies leads to rapid change, which significantly encourages entrepreneurial activity at all levels. The emergence and development of startup companies are closely linked to the development and application of modern technology, so high-tech startups can be defined as „young and small firms that, due to their high-tech products, tend to internationalize from an early stage of their evolution through slow and non-evolutionary gradual stages" (Preece *et al.* 1999).

This kind of companies is characterized by a high level of innovativness (Estay *et al.* 2013), strategic relevance played by knowledge assets and knowledge processes in the company (Malerba, 2010), high level of flexibility and high rate of profitability. Given the importance of these companies and their contribution to accelerated economic development, countries should constantly work on providing favorable business climate for these companies, in order to reduce the uncertainty which is their characteristic. This complex process should result in creation of a „startup society", whose main features are creating changes and encouraging innovation at all levels.

FRAMEWORK CONDITION INDICATORS FOR THE REPUBLIC OF SERBIA

The European Innovation Scoreboard provides a comparative assessment of research results and innovation performance in EU countries, other European countries or by region. It is assessing the relative strengths and weaknesses of national innovation systems and helping countries identify areas

that need to be improved the most. This methodology covers a total of 37 European countries (European Commission, 2020).

Framework conditions capture the main drivers of innovation performance and cover three innovation dimensions (European Innovation Scoreboard, 2020):

- The Human resources dimension includes three indicators and measures the availability of a high-skilled and educated workforce. Human resources captures: New doctorate graduates, Population aged 25-34 with completed tertiary education, and Population aged 25-64 involved in education and training.
- Attractive research systems include three indicators and measures the international competitiveness of the science base by focusing on: International scientific co-publications, Most cited publications, and Foreign doctorate students.
- Innovation-friendly environment captures the environment in which enterprises operate and includes two indicators - Broadband penetration among enterprises and Opportunity-driven entrepreneurship - measuring the degree to which individuals pursue entrepreneurial activities as they see new opportunities, for example resulting from innovation.

Table 1 Indicators of Framework Conditions for Republic of Serbia in Period 2015-2019

Year	Human Resources (Score)	Attractive research systems (Score)	Innovation-friendly environment (Score)
2015	38.96	34.27	24.12
2016	44.70	41.70	24.12
2017	57.48	38.38	40.20
2018	56.62	41.72	56.28
2019	70.38	44.44	120.59

Source: European Innovation Scoreboard, 2020

According to the presented data, a clear progress of the Republic of Serbia according to all three indicators in the observed period can be seen. Within the Human resources indicator, the score increased by 31.42, within the Attractive research systems indicator, it increased by 10.17, while the largest increase in the score was recorded with the Innovation-friendly environment indicator, with an incredible increase by 96.47.

This shows that the attitude towards innovations has changed significantly in a positive direction, and the understanding of their importance has been growing. Also, the conditions for the emergence and development of innovations have significantly improved, and they occupy an important place in the progress of individual companies, but also in the overall economic development of the country. This is certainly due to increased participation of skilled labor in the labor market, as well as improved conditions for conducting research aimed at creating innovation at all levels.

REGULATIVE AND INSTITUTIONAL SUPPORTS FOR STARTUP ECOSYSTEM OF THE REPUBLIC OF SERBIA

By considering policies and regulations related to the startup ecosystem implemented by the Republic of Serbia, many difficulties faced by startup companies can be spotted. Also, there is a tendency of government institutions to eliminate these difficulties and thus positively affect growth and development of startup ecosystem. One of the biggest obstacles in the business of startup companies is

the existing Law on Foreign Exchange Operations, which prevents access to the world's leading payment platforms, which has negative impact on the competitiveness of domestic startup companies.

Table 2 Overview of key government support programs for startup companies for 2020

Institution name	Name of program	Purpose
Ministry of innovation and technological development	Program for promotion and popularisation of innovation an annovative entrepreneurship Support program for the development and promotion of women's innovative entrepreneurship	Making continuous contribution to the development of a sustainable entrepreneurial culture in Serbia Systematic improvement of innovative entrepreneurship among women through the promotion and affirmation of women's innovative entrepreneurship
Innovation fund	Early development program	The program is designed with the intention to support the survival of the company during the critical phase of research and development and enable the development of business capacities through which they will place their innovations on the market.
	Innovation co-financing program	It is intended for companies that need significant financial resources for the commercialization of research and development.
	Science and economy cooperation program	This program is designed to encourage companies from the private sector and public scientific-research organizations to implement joint scientific-research and development projects with the aim of creating new products and services, or innovative technologies, with market potential.
	Innovation vouchers	Innovation vouchers are a simple financial incentive that enables small and medium-sized enterprises to use the services of the scientific-research sector to raise the level of innovation of their products and become more competitive in the market.
	Proof of the concepts	The concept proof program is intended for researchers who believe that their research has the commercial potential for which there is a need in the market.
	Technology transfer program	This program identifies research with commercial potential, which provides further support to raise commercial readiness to a higher level.
Economy chamber of Serbia (Ministry of economy)	Enterepreneurship and self employment promotion program	The goal of the program is to encourage the development of entrepreneurship through joint support for the creation of new economic entities.

Sources: Kabinet ministra za inovacije i tehnološki razvoj (2020), Fond za Inovacionu Delatnost (2020), Ministarstvo Privrede (2020)

Table 3 Overview of key non-governmental organizations and their support programs for startup companies for 2020

Organ. name	Name of program	Purpose
Startit	Stripe atlas	Atlas is a program of the American company Stripe that enables startups to start a business in the American (and global) market in an incredibly easy way. Startit is the first partner of the Stripe Atlas for Serbia.
Ict hub	Academy for innovation management	The Academy is designed as an intensive program whose main goal is to improve individual and organizational innovation skills and thus contribute to the development of innovation competencies of individuals and organization as well.
	Generation 4	Training of young people for the creation and development of a startup company lasting 4 months.
	B2B startup sales	The B2B Startup Sales program is an innovative and intensive way of training that includes over 35 hours of lectures and mentoring sessions.
Business incubator Novi Sad	Interreg IPA CBC Croatia-Serbia: CB NET	The purpose is to increase the competencies of the region by strengthening cooperation between institutions that provide support to businesses, clusters, educational and research centers and entrepreneurs.
	Interreg IPA CBC Hungary – Serbia: IKNNOW	The purpose is to establish a platform for knowledge and technology transfer to enable knowledge exchange and use/exploitation between these two regions.
	EEN – European entrepreneurship network	The goals of EEN are to promote the entrepreneurial spirit and culture, to do business in a European way, to spread awareness of the importance of knowing the relevant legislation of the European Union, helping domestic companies to access European Union markets.
INCENTER	Startin startup program	The StartIn startup program aims to provide support to startups at an early stage of development, through a comprehensive methodological approach based on the lean methodology of startup development.
Impact hub	Business leadership development	The program is focused on MVP creation and market validation.
	Growth readiness	The focus of this program is in finding investments and preparing for the growth of the startup company.
Startup center	Building a business is not an easy job	Mentors and other guest lecturers teach program participants to define, build and develop a successful business and in the process pass it on to young people their many years of experience in running startup companies.
Serbia startup	Western balkans network	The network, which supports the Startup Europe initiative, aims to connect key startup players, encourage an entrepreneurial culture and lead the Western Balkans ecosystem to success.
	Bootcamp village	Bootcamp Village is a platform for cross-sectoral cooperation of three special groups operating in rural areas, namely organic production, rural tourism, creative arts industries and old craft workshops.
	My gate-way	My gate-way is a HORIZON 2020 - Startup Europe initiative that aims to strengthen the capacity of high-tech startups and innovative SMEs in the CEE region to better connect, gain greater market exposure and improve access to finance opportunities.
	Creative business cup	This event empowers entrepreneurs in the creative industries, connects them with investors and global markets and also strengthens their innovative capabilities for the benefit of industry and society.
Ict hub venture	Venture fond	This fund offers up to € 50,000 in exchange for a 5-15% ownership stake in the company. Assistance in finding the next investor as well as professional mentoring support which is intended to lay a good foundation for real business growth.
Spill	Rzl accelerator	The purpose of this program is to provide specialized support to each team, adapted to the needs of the project, through mentorships and expertise.
	Social impact award	Promoting social entrepreneurship among young people and providing opportunities for it to become their career.
	Unreasonable lab	The purpose of this program is to provide knowledge and support to teams for the development of a business idea that solves a social or environmental problem through a five-day camp.
Erste bank	Step by step	The purpose is to provide dedicated loans, which help clients to start and develop a small business, increase employability and contribute to greater development of the local community.

Sources: Startit (2020), ICT Hub Startup (2020), Poslovni inkubator Novi Sad (2020), Incentar (2020), ImpactHUB (2020), Startup Centar (2020), SerbiaStartup (2020), ICTHUBVenture (2020), Razlivalište (2020), Erste Banka (2020), Naša mreža (2020).

Amendments to this law from 2018 have slightly improved the situation, but it is still a problem that this law applies only to the sale of software and digital products on the Internet, which are traded exclusively through telecommunications, digital or IT devices. For all those companies that sell other physical goods

over the Internet, the ban on payment in foreign currency remains, which is a big problem for companies that aim to sell products on foreign markets.

The government has recently introduced several tax breaks that can be of great benefit for the further development of startups, namely (Inicijativa Digitalna Srbija, 2019):

- Research and development costs are double calculated for tax purposes, lowering the base of corporate income tax on income of a company,
- Revenues from all IPs developed in Serbia are taxed at only 3% instead of the regular 15%, and if combined with an accelerated deduction from research and development, the income tax can easily be reduced to 0%,
- There is a 30% tax credit for companies that invest in startups (maximum around 850,000 euros),
- The founders of startups and up to 9 employees do not pay taxes on salaries and contributions in the first year,
- 70% deduction to tax and social contribution can be applied if you employ a foreigner in Serbia and pay at least three times the average national salary (except for internal transfers)

One of the acceptable ways to invest in startups and their further development is to acquire them." In an acquisition, a stronger company takes ownership - it buys a weaker company. The weaker company thus ceases to exist as a legal entity, and its shareholders are paid by the acquiring company. The acquiring company establishes management control over the acquired company, which now continues to operate in a new organizational form within the original organization (Mihalik-Čolak, 2006).

Very strong sectors of Serbian startup industry are blockchain and gaming (Startup Genome, 2020). In order to achieve a high level of development of the Serbian startup ecosystem, help is necessary from couple of different institutions with different support mechanisms, which can be: financial, consultative, mentoring, promotional, etc. The following table shows the most important institutions and their support programs, and they are in the domain of the government sector.

In addition to the support of government institutions, non-governmental institutions, which also offer various programs to support and finance startups, certainly play a major role in supporting startup companies and the entire startup ecosystem.

Business incubators, clusters, as well as science and technology parks appear as very important institutions in the process of startup ecosystem development. Business incubator can be defined as „an organization designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services that could include physical space, capital, coaching, common services, and networking connections" (Enterpreneur, 2020). There are currently about 25 business incubators in Serbia (Naša mreža, 2020). A special type of incubator is Science and technology park that is established in order to connect science and economy in the service of creating innovations and raising the overall competitiveness of the economy.

Science and technology parks are associated with the university (usually the technical and technological faculties of a university), companies and local self-government units, where they can be both founders and users of services as members (Razvojna Agencija Srbije, 2020). Currently, the Science and Technology Park Zvezdara in Belgrade has been working in full capacity in Serbia, and science and technology parks have been opened in Nis and Novi Sad as well.

Clusters are associations that bring together participants from the famous triple helix - business, education, public administration - and involve them in activities and projects that will produce positive results (Vojvodina ICT Cluster, 2020). Currently, there are 7 clusters from different areas of industry in the Republic of Serbia.

CONCLUSIONS AND RECOMMENDATIONS

Based on the conducted research, it can be concluded that the starting ecosystem of the Republic of Serbia is on a good development path, but certain obstacles must be overcome so that this development path continues. The state should have the key role in removing these barriers, which should help analyzing and solving the problems faced by startup companies. One of the first measures should be the regulation of the Law on Foreign Exchange Operations, in order to enable companies to access the current world platforms for payment and online trading. Also, state policy and strategies should be based more on the development and investment in startup companies, the benefit of which would be felt by all citizens of the Republic of Serbia.

Such strategy would reduce unemployment, increase GDP, and also help local communities to progress faster. The state should focus on preserving small companies that have achieved business success, so that there is no acquisition by a large foreign company, or the phenomenon that a big fish eats a small one, because then the state, and thus the community, loses a lot.

Although the Serbian startup ecosystem cannot boast of excessive support from the state, local startup companies are doing extremely well on the world market and achieving notable results. Such success is large due to support programs created by government institutions, but primarily because of the support provided by various non-governmental organizations, both in the form of financial and consultative support to beginners in business.

For the further progress of the entire startup ecosystem, it is necessary that all its stakeholders provide the public with as much quality and relevant information as possible, so that all interested parties can get better image about the situation of the Serbian startup ecosystem. Organizations that monitor the Serbian startup ecosystem, such as the national initiative Digital Serbia, and the international organization Startup Genome, which has put the Serbian startup ecosystem on its map of the world's best startup ecosystems, are of great help on this path. The future of further progress lies in the development of the startup ecosystem, and especially its IT branches through Tech Startups. Based on the research, the excellent potential of human resources and intellectual capital, the activities of the research system, as well as the increasingly favorable and friendly climate within the innovation environment were noticed.

This is an excellent signal that further development will go in the right direction, and that all interested parties could take the right place in the startup ecosystem of the Republic of Serbia. For this reason, it is very important that institutional support grows and that their support programs are widely available. It is up to the startup companies themselves to recognize and take advantage of the opportunities offered to them within the startup ecosystem, in order to reach their full potential, achieve and exceed their business goals.

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DIGITAL COMPETENCIES BEFORE AND DURING THE COVID-19 PANDEMIC CRISIS - COMPARATIVE STUDY

Małgorzata Tyrańska
Cracow University of Economics, malgorzata.tyranska@uek.krakow.pl

Sylwia Wiśniewska
Cracow University of Economics, sylwia.wisniewska@uek.krakow.pl

Robert Szydło[*]
Cracow University of Economics, robert.szydlo@uek.krakow.pl

Marek Koczyński
Cracow University of Economics, marek.koczynski@uek.krakow.pl

Abstract: *The aim of this article is to determine weather COVID-19 pandemic crisis has an impact on the level of digital competences among students and recent graduates. Apart from the critical analysis of the literature on digital competences, the quantitative study is performed in order to compare the results from the time before and during pandemic. It was revealed that students and recent graduates assess some of their digital competences in a correct way, but the correlation was weak. The most interesting finding is that indeed the statistically significant impact of COVID-19 on the development of digital competences with. The study made by dedicated questionnaire and Mann-Whitney U analysis indicated that the level of digital competence was higher during pandemic (Mdn=23) that before pandemic (Mdn=18), U=1949.00, p<0 among students and recent graduates. This result may have an implication for preparing and conducting distant learning programmes as well as preparing young people for the demand of digital competence on labour market that was highly accelerated by the pandemic.*

Keywords: *competency, digital competencies, pandemic*

JEL Classification: *J24, I20*

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[*] Corresponding Author

INTRODUCTION

The COVID-19 pandemic is a challenging experience for each country in the world. The situation requires sometimes a drastic change of our habits and life. There is no one single element of our daily routines that was not affected by COVID-19 in some way. The urgent need to use computers and smartphones for daily tasks, distant education, flexible working possibilities such as home-office mode and even changing the attitude of government and various public institutions to online problem solving made digital tools even more necessary. It is possible to do shopping, arrange meetings, sand official papers by mail or smartphone app. It is even mandatory to install an app when being on a quarantine. All those situations accelerate the need of developing digital competences among students and recent graduates. But is fluent usage of internet and smartphone enough to claim the high level of digital competences? In this article the level of various digital competences as well as the impact of COVID-19 on them will be presented.

LITERATURE REVIEW

The conception of competency received growing popularity among scholars and practitioners during the last years. The concept "competencies" comes from the Latin term "competentia" that means correspondence, conformity, scope of authority, powers of attorney. The issue of competencies appeared in the literature with the publication of works of two management psychologists: R.W. White (1959) and D.C. McClelland (1973). Higher interest particularly in the issue of competencies occurred in the 1980s thanks to R.E. Boyatzis (1982), and this was due to factors such as: increased complexity of entities operating in the market, the need for professional reorientation, increasing multifunctionality and the necessity of employee versatility and the perception of "learning" as a key factor for the organization's success.

Currently, on the basis of management science, the concept of competences is considered from the perspective of an employee or workplace. The American approach combines competencies with a specific person (competency), and the British approach with the position of work (competence). An American concept developed by R.E. Boyatzis (1982) is focused on the analysis of people who achieve above-average results, and especially on some of these people's characteristics (including personal qualities, motives, skills, self-image, perception of the social role, scope of knowledge). Contradictory, the British concept was created for the purpose of the National Vocational Qualifications (NVQs) project, aimed at better adjustment of educational programs to the needs of the labour market. It focuses on the work field and defining tasks and effects from the point of view of work requirements for contractors. In this approach, the meaning of competencies is connected with properties of work, not individuals, and their purpose is to define the minimum standards of performance of a given work, and not to determine outstanding contractors (Tyrańska, 2015).

It is worth emphasizing that various elements of competencies are indicated in the literature. Nonetheless, the key components of competencies include knowledge, skills and attitudes, which – when used in the work process – are used to achieve the organization's goal (Oczkowska, Lula, Wiśniewska, 2018).

In the literature digital competence is defined as "the set of knowledge, skills, attitudes (thus including abilities, strategies, values and awareness) that are required when using ICT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment" (Ferrari, 2012, p. 43). "Digital competence consists in the ability to adopt and use new

or existing information technology to analyse, select and critically evaluate digital information in order to investigate and solve work-related problems and develop a collaborative knowledge body while engaging in organizational practices within a specific organizational context" (Vieru, 2015, p. 6718). The digital competences include According to Ferrari (2012):

Figure 1 Components of Digital Competence
Source: (Ferrari, 2012, p. 43).

- "information management refers to the knowledge, skills and attitudes (henceforth: KAS) needed to identify, locate, access, retrieve, store and organise information",
- "collaboration refers to the KAS for linking with other users, participate in networks and online communities, and interact with others constructively and with a sense of responsibility",
- "communication refers to the KAS for communicating through online tools, taking into account privacy, safety and netiquette",
- "creation of content and knowledge refers to the expression of creativity and the construction of new knowledge through technology and media, and also to the integration and re-elaboration of previous knowledge and content and its dissemination through online means",
- "ethics and responsibility are understood as the knowledge, attitudes and skills needed to behave in an ethical and responsible way, aware of legal frames",
- "evaluation and problem-solving is understood in more than one case study as the identification of the right technology and or media to solve the identified problem or to complete a task and also as the assessment of information retrieved or the media product consulted",
- "technical operation is the area that refers to the KAS one needs for effective, efficient, safe and correct use of technology and media".

According to Ala-Mutka (2011), digital competences involve instrumental knowledge and the skills for tool and media usage; advanced skills and knowledge for communication and collaboration, information management, learning and problem-solving, and meaningful participation; and attitudes towards strategic skill usage in intercultural, critical, creative, responsible and autonomous ways.

Table 1 Digital competencies according to the DigComp 2.0 and own study

The Digital Competence Framework 2.0		Research categories
1. Information and data literacy	1.1 Browsing, searching and filtering data, information and digital content To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies. 1.2 Evaluating data, information and digital content To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content 1.3 Managing data, information and digital content To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.	**1. Information and data literacy- the same as in the source**
2. Communication and collaboration	2.1 Interacting through digital technologies To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context. 2.2 Sharing through digital technologies To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices. 2.3 Engaging in citizenship through digital technologies To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies 2.4 Collaborating through digital technologies To use digital tools and technologies for collaborative processes, and for co-construction and co-creation of resources and knowledge. 2.5 Netiquette to be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.2.6 Managing digital identity To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.	**2. Communication and collaboration - the same as in the source**
3. Digital content creation	3.1 Developing digital content to create and edit digital content in different formats, to express oneself through digital means. 3.2 Integrating and re-elaborating digital content to modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge. 3.3 Copyright and licences to understand how copyright and licences apply to data, information and digital content	**3. Digital content edition and** / **4. the use of office software**
	3. 4 Programming To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.	**5. Programming**
4. Safety	4.1 Protecting devices To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy. 4.2 Protecting personal data and privacy To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used	**6. Cyber security**

	4.3 Protecting health and well-being To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.4.4 Protecting the environment To be aware of the environmental impact of digital technologies and their use.	
5. Problem solving	5.1 Solving technical problems To identify technical problems when operating devices and using digital environments, and to solve them (from troubleshooting to solving more complex problems) 5.2 Identifying needs and technological responses To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility). 5.3 Creatively using digital technologies To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments. 5.4 Identifying digital competence gaps To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up to date with the digital evolution.	7. Hardware and e-commerce

Source: own study based on DigComp 2.0.

In the opinion of scientists the ability to use digital technologies does not only depend on the ability to create effectively used digital tools and information (Calvani, Cartelli, Fini, Ranieri, 2008; Ala-Mutka, 2011; Ferrari, 2012; Murawski & Bick, 2017). Moreover, based on the analysis of the digital competence models presented above, it can be concluded that digital competences include basic opportunities for social participation, such as effective cooperation and communication, critical thinking and problem solving using digital technologies and information, which are also included in the category of soft skills.

For the purpose of the article, the following dimensions of digital competences have been adopted from The Digital Competence Framework 2.0 (https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework, 24.11.2020) and some modifications were also made by Authors of this paper (Table 1). It was in the authors' best intention to save the comparability of researched dimensions yet also to emphasise the most important aspects of digital competencies in the context of the labour market demand. The subdimensions 5.3 and 5.4 are not included in the research questionnaire because of the perceived impossibility of checking them with the test method. The lac of those two subdimensions will not affect the research so as the comparison is based on general dimension level not the subdimensions.

METHODOLOGY

The aim of this paper is to determine weather COVID-19 pandemic time has an impact on the level of digital competence among students and recent graduates. To achieve the goal, some partial goals were introduced. Those are:

- Describing the level of digital competence among students and recent graduates before the pandemic time.
- Describing the level of digital competence among students and recent graduates during the pandemic time.

- Determine the difference between the time before and during COVID-19 pandemic.

Introduced goals can be achieved by statistical verification of hypothesis:

H1: Before pandemic time, there is a positive corelation between the level of proficiency and the digital competence level defined as a general test score.

H2: Before pandemic time, there is a positive corelation between the level of perceived competence and the score received in a test in terms of every dimension.

H3: During pandemic time, there is a positive corelation between the level of proficiency and the digital competence level defined as a general test score.

H4: Before pandemic time, there is a positive corelation between the level of perceived competence and the score received in a test in terms of every dimension.

H5: The digital competence level measured by the general test score during COVID-19 pandemic is significantly higher than before COVID-19 pandemic.

H6: The digital competence level measured by respective dimensions during COVID-19 pandemic is significantly higher than before COVID-19 pandemic in each of the dimension. Gathering data process was conducted with the usage of the questionnaire created by the authors. It is based on the test, which is the objective method of gathering data.

Research participants had to first do the self-assessment of each of seven dimensions and in the second part of the questionnaire they were asked to answer 35 questions, that gives 5 questions for each dimension of digital competencies. The questionnaire introduced to the participants using CAWI method. It is important to state, that the research was conducted in accordance with every ethical standard.

Participants who volunteered to take part in the research had to agree for that. Nor email addresses neither personal data were collected during the research.

Each participant was informed of the possibility to withdraw from the research at any time without consequences. The questionnaire was based on secured G-SUIT drive, accessed only by the researchers, that is in accordance with Personal Data Protection Act.

Table 2 The age of research participants

Age					
Before		After		Total	
Mean	St. Deviation	Mean	St. Deviation	Mean	St. Deviation
24.57	5.945	20.03	2.149	22.32	5.020

Source: own study.

The data verification was conducted using quantitative method with the usage of Spearman's rho and Pearson's r correlations, Kolmogorov-Smirnow and Shpiro-Wilk normality tests as well as Mann-Whitney U test for two independent means performed by SPSS-26 software.

The age of participants is presented in table 2.

The mean age of the participants in total was M=22.32; SD=5.02. It is important to state, that the participants from the Before the COVID-19 pandemic were older (M=24.57; SD=5.945) than participants from the pandemic time (M=20.03; SD=2.149).

Other characteristics are shown in table 3.

Table 3 The characteristics of research sample

		Pandemic					
		Before		During		Total	
		Number	%	Number	%	Number	%
SEX	Men	33	35.9%	26	28.9%	59	32.4%
	Women	59	64.1%	64	71.1%	123	67.6%
	Total	92	100.0%	90	100.0%	182	100.0%
Education level	Student	67	72.8%	89	99%	156	85.7%
	Graduate	25	27.2%	1	1%	26	14.3%
	Total	92	100.0%	90	100%	182	100.0%
Proficiency	Time to time	3	3%	12	13%	15	8%
	Regular	50	54%	60	67%	110	60%
	Advanced	34	37%	16	18%	50	27%
	Professional	5	5%	2	2%	7	4%
	Total	92	100%	90	100%	182	100%

Source: own study.

In total 182 people took part in the research, out of which 59 were men (32,4%) and 123 were women (67.6%). The structure of first sample (before pandemic) was represented by 33 men (35.9%) and 59 women (64.1%) and the second sample (during pandemic) was represented by 26 men (28.9%) and 64 women (71.1%).

According to the education level 156 participants were students (85.7%) and 26 were graduates (14.3%). In the first sample 67 participants were students (72.8%) and 25 were graduates (27.2%). In the second sample 89 participants were students (99%) and only 1 person was a graduate (1%).

Out of 182 participants 15 of them declared to be time to time users (8%), 110 declared to be regular users (60%), 50 of them are advanced users (27%) and only 7 declared to be professional users (4%). Considering the time before and during pandemic values for time to time users were equal to 3 (3%) and 12 (13%) respectively in terms of time to time users, 50 (54%) and 60 (67%) for regulars, 34 (37%) and 16 (18%) for advanced users and 5 (5%) and 2 (2%) for professionals.

RESULTS AND DISCUSSION

The obtained results are presented in accordance with the hypothesis.

H1: Before pandemic time, there is a positive corelation between the level of proficiency and the digital competence level defined as a general test score.

As one variable is measured on racio scale and one on the ordinar scale, Spearman's rho was used for statistical verification of hypothesis 1. The results obtained are presented in table 4.

Table 4 Correlations between proficiency level and score before pandemic

			Proficiency level	Score
Spearman's rho	Proficiency level	Correlation Coefficient	1.000	.408[**]
		Sig. (1-tailed)	.	.000
		N	90	90

[**]. Correlation is significant at the 0.01 level (1-tailed).

Source: own study

The result of Spearman's rho is equal to $\rho=0.408$, $p<0.001$. That allows to state, that there is a statistically significant correlation between perceived proficiency level and the score obtained in the test. The power of this correlation is rather weak.

H2: Before pandemic time, there is a positive corelation between the level of perceived competence and the score received in a test in terms of every dimension.

As both variables are measured on a racio scale, r-Pearson's was used for statistical verification of hypothesis 2. The results obtained are presented in table 5.

As it is presented in the table 5, only three pairs gained a statistical significance. Those are Perceived and real use of office software $r=0.226$, $p=0.016$, programming$=0.374$, $p<0.001$ and hardware and e-commerce $r=0.407$, $p<0.001$.

Table 5 Pearson's correlation of perceived and obtained levels of digital competence before

		Information and data literacy	Communication and collaboration	Digital content edition	The use of office software	Programming	Hardware and e-commerce	Cyber security
Perceived Information and data literacy	Correlation	.103	.077	-.027	.224[*]	.385[**]	.206[*]	.340[**]
	Sig. (1-tailed)	.167	.235	.401	.017	.000	.026	.001
	N	90	90	90	90	90	90	90
Perceived communication and collaboration	Correlation	.105	.050	.189[*]	.230[*]	.369[**]	.262[**]	.290[**]
	Sig. (1-tailed)	.161	.319	.037	.015	.000	.006	.003
	N	90	90	90	90	90	90	90
Perceived digital content edition	Correlation	.077	.137	.058	.233[*]	.119	.324[**]	.154
	Sig. (1-tailed)	.235	.100	.294	.013	.131	.001	.074
	N	90	90	90	90	90	90	90
Perceived the use of office software	Correlation	.041	-.001	-.007	.226[*]	.050	.344[**]	.026
	Sig. (1-tailed)	.352	.496	.473	.016	.321	.000	.405
	N	90	90	90	90	90	90	90
Perceived programming	Correlation	.187[*]	-.029	.139	.284[**]	.374[**]	.219[*]	.245[*]
	Sig. (1-tailed)	.039	.393	.095	.003	.000	.019	.010
	N	90	90	90	90	90	90	90
Perceived hardware and e-commerce	Correlation	.173	.170	.214[*]	.414[**]	.407[**]	.407[**]	.360[**]
	Sig. (1-tailed)	.051	.055	.021	.000	.000	.000	.000
	N	90	90	90	90	90	90	90
Perceived cyber security	Correlation	.205[*]	.065	.032	.169	.207[*]	.236[*]	.075
	Sig. (1-tailed)	.026	.270	.383	.056	.025	.012	.240
	N	90	90	90	90	90	90	90

Source: own study

The statistical test shows that other correlations are unsignificant. The power of correlation of use of office software and programming are week and for hardware and e-commerce is rather weak.

H3: During pandemic time, there is positive corelation between the level of proficiency and the digital competence level defined as a general test score.

As one variable is measured on racio scale and one on the ordinar scale, Spearman's rho was used for statistical verification of hypothesis 3. The results obtained are presented in table 6.

Table 6 Correlations between proficiency level and score during pandemic

			Score	Proficiency level
Spearman's rho	Score	Correlation Coefficient	1.000	.468[**]
		Sig. (1-tailed)	.	.000
		N	92	92
[**]. Correlation is significant at the 0.01 level (1-tailed).				

Source: own study

The result of Spearman's rho is equal to $\rho=0.468$, $p<0.001$. That allows to state, that there is a statistically significant correlation between perceived proficiency level and the score obtained in the test. The power of this correlation is between rather weak and moderate.

H4: Before pandemic time, there is a positive corelation between the level of perceived competence and the score received in a test in terms of every dimension.

As both variables are measured on a racio scale, r-Pearson's was used for statistical verification of hypothesis 4. The results obtained are presented in table 7.

As it is presented in the table 7, only four pairs gained a statistical significance. Those are Perceived and real communication and collaboration $r=0.253$, $p=0.008$, use of office software $r=0.247$, $p=0.009$, programming$=0.542$, $p<0,001$ and cyber security $r=0.193$, $p=0.033$.

The statistical test shows that other correlations are unsignificant. The power of correlation of use of communication and collaboration, office software and cyber security are week or very week and for hardware and for programming is on a moderate level.

H5: The digital competence level measured by the general test score during COVID-19 pandemic is significantly higher than before COVID-19 pandemic.

As the score variable is measured on a racio scale the Kolmogorov-Smirnov and Shpiro-Wilk tests of normality were performed to determine the way of statistical validation of hypothesis 5. The results are shown in table 8.

Both tests reveal that the structure of data is not under the normal distribution. That is why non-parametric test were used to verify hypothesis 5.

Non-parametric test Mann-Whitney U was performed and indicated that the level od digital competence was higher during pandemic (Mdn=23) that before pandemic (Mdn=18), U=1949.00, p<0.

H6: The digital competence level measured by respective dimensions during COVID-19 pandemic is significantly higher than before COVID-19 pandemic in each of the dimension.

As the level of digital competence is measured on a racio scale the Kolmogorov-Smirnov and Shpiro-Wilk tests of normality were performed to determine the way of statistical validation of hypothesis 5. The results are shown in table 9.

Both tests reveal that the structure of data is not under the normal distribution. That is why non-parametric test were used to verify hypothesis 6.

Table 7 Pearson's correlation of perceived and obtained levels of digital competence during

		Information and data literacy	Communication and collaboration	Digital content edition	The use of office software	Programming	Hardware and e-commerce	Cyber security
Perceived Information and data literacy	Correlation	.095	.204*	.071	.212*	.104	.082	.143
	Sig. (1-tailed)	.184	.026	.252	.021	.163	.219	.087
	N	92	92	92	92	92	92	92
Perceived communication and collaboration	Correlation	.167	.253**	.136	.296**	.101	.196*	.087
	Sig. (1-tailed)	.055	.008	.097	.002	.168	.030	.205
	N	92	92	92	92	92	92	92
Perceived digital content edition	Correlation	.131	.099	.031	.108	.086	.050	.010
	Sig. (1-tailed)	.106	.175	.384	.153	.208	.318	.461
	N	92	92	92	92	92	92	92
Perceived the use of office software	Correlation	.087	.174*	.038	.247**	.129	.132	.112
	Sig. (1-tailed)	.205	.048	.361	.009	.110	.106	.143
	N	92	92	92	92	92	92	92
Perceived programming	Correlation	.021	.169	.059	.342**	.542**	.122	.201*
	Sig. (1-tailed)	.422	.054	.287	.000	.000	.124	.027
	N	92	92	92	92	92	92	92
Perceived hardware and e-commerce	Correlation	.070	.236*	.100	.349**	.210*	.130	.213*
	Sig. (1-tailed)	.254	.012	.171	.000	.022	.108	.021
	N	92	92	92	92	92	92	92
Perceived cyber security	Correlation	.101	.291**	.172	.307**	.130	.173*	.193*
	Sig. (1-tailed)	.170	.002	.051	.001	.108	.049	.033
	N	92	92	92	92	92	92	92

Source: own study

Table 8 Kolmogorov-Smirnov and Shpiro-Wilk tests of normality for the general score

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Before	.138	90	.000	.955	90	.003
During	.100	92	.023	.950	92	.002
Total	.072	182	.023	.983	182	.025

a. Lilliefors Significance Correction

Source: own study

Table 9. Kolmogorov-Smirnov and Shpiro-Wilk tests of normality for dimensions

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Information and data literacy	.182	182	.000	.920	182	.000
Communication and collaboration	.157	182	.000	.925	182	.000
Digital content edition	.182	182	.000	.925	182	.000
The use of office software	.159	182	.000	.933	182	.000
Programming	.228	182	.000	.846	182	.000
Hardware and e-commerce	.292	182	.000	.787	182	.000
Cyber security	.197	182	.000	.894	182	.000

a. Lilliefors Significance Correction

Source: own study

Non-parametric test Mann-Whitney U was performed, and its results are shown in table 10.

Table 10 Results of Mann-Whitney U test for digital competence dimensions

	Information and data literacy	Communication and collaboration	Digital content edition	The use of office software	Programming	Hardware and e-commerce	Cyber security
Mann-Whitney U	3103.000	2331.000	3014.000	2666.500	3532.000	3099.000	2019.000
Wilcoxon W	7198.000	6426.000	7109.000	6761.500	7627.000	7194.000	6114.000
Z	-3.026	-5.258	-3.286	-4.233	-1.794	-3.179	-6.194
Asymp. Sig. (2-tailed)	.002	.000	.001	.000	.073	.001	.000
a. Grouping Variable: Pandemic							

Source: own study

Based on the test result it is adequate to state that:

- Information and data literacy are higher during pandemic time (Mdn= 3) than before (Mdn=2) U=3103.00, p=0.002.
- Communication and collaboration are higher during pandemic time (Mdn= 4) than before (Mdn=3) U=2331.00, p<0.001.
- Digital content edition is higher during pandemic time (Mdn= 3) than before (Mdn= 3) U=3014.00, p=0.001.
- The use of office software is higher during pandemic time (Mdn= 3) than before (Mdn= 2) U=2666.50, p<0.001.
- For the dimension of programming the result is statistically non-significant p=0.073.
- Hardware and e-commerce are higher during pandemic time (Mdn= 5) than before (Mdn= 4) U=3099.00, p=0.001.
- Information and data literacy are higher during pandemic time (Mdn= 4) than before (Mdn= 3) U=2019.00, p<0.001.

Based one the presented results it is possible to fully confirm hypothesis about the proper assessment of own's digital competence bot before and during pandemic at long as the general score is taken into consideration. It is important especially if digital learning is concerned, when proper assessment of the competence is mandatory to fully participate in the learning programme, especially in MOOC (Castano-Munoz, Kreijns, Kalz, Punie, 2017). Within the seven dimensions only for few of them the self-assessment shows significant correlation with the test result, so the hypothesis 2 and 4 can not be confirmed. It shows that the students' group is not homogenous in terms of digital competence (Hatlevik, Christophersen, 2013). For programming skills it is possible that current students didn't have a chance to learn programming, and previous achievements in the field (for example programming) are a valid predictor for better digital competence in this field (Hatlevik, Gudmundsdottir, Loi, 2015). It may be a good idea to encourage a self development in this field and especially focus on women education (as they were the majority of the research group). Self development for women is considered to be the best way of learning ICT (Verges, Hache, Cruells, 2011; Garcia-Gonzalez, Gros, Escofet, 2012; Jimenez-Cortes, Vico-Bosch, Rebollo-Catalan, 2017).

When discussing the general results od every dimension it is interesting that although young people can correctly assess their digital competence, they are not on such a great level (based on average score from the test, that it may appear. This conclusion is also stated in various research (Li, Ranieri, 2010).

When the focus of the research goes to the impact of COVID-19 Pandemic it is very clearly pointed that the level of digital competence raised both in general score and most of the dimensions. So that hypothesis 5 about the impact of COVID-19 on enlarging the digital competence in general can be verified positively and hypothesis 6 about the raise in every criteria can be verified positively with one exception of programming skill, but in this case the result is on the border of statistical significance.

As EY report states (2020) COVID-19 accelerated the need for digital competence on a labour market and this may also have impact on students and their attitude towards this kind of competence. EU in their online publications (2020) and A. Gewerc, D. Persico and V. Rodes-Paragarino (2020) state the importance of digital competence as well. M.J. Sa and S. Serpa (2020) indicates the importance of enlarging distant learning in order to help students to learn the technology and fulfil the needs of labour market and UCLG (2020) indicates even more that digital competences are the mean to go forward and develop. The impact of such a fast raise of digital competence may be visible in every stage of life, as most of them were moved to the online world (König, Jäger-Biela, Glutsch, 2020), especially education (Crick, Knight, Watermeyer, Goodall, 2020). Even health and medical services in Poland are connected with the need to install a quarantine app on smartphone to track a location during the isolation need. C. Kapetaniou (2020) states that COVID-19 pandemic is a way to close the digital skills gap (Ćwiek, 2018), and that is happening. The need for distant education, tones of information about the usage of digital competence as well as the prof of the possibility to elastic form of working (home office) undoubtfully accelerated the need for digital competencies. And it is easily visible in the results of the research – that students and recent graduates are willing to learn and develop their digital competence.

CONCLUSIONS AND RECOMMENDATIONS

The research was conducted in the period of one year. It is possible that not only the COVID-19 pandemic had the influence on digital competence. The first part of the research data was collected in a face to face contact when respondents did not have a chance to check the web. For the second study, according to pandemic restrictions, it was the only way to gather data with CAWI method that in theory allows participants to check the web while doing the test. Another limitation might be connected with the theory that was the base for the research questionnaire and the test. Although DigComp 2.0 is a popular and well organised framework (Kluzer, 2019, Perifanou, Economides, 2019) it might be beneficial to include some other theories to the research, especially those mentioned by (Ferrari, Punie, Redecker, 2012; Riina, Yves, Stefanie, Godelieve 2016 or Kluzer, 2019) or use the empirically created dimensions introduced by (Janssen, Stoyanov, Ferrari, Punie, Pannekeet, Sloep 2013).

The researchers are planning to investigate digital competencies deeper, and try to create even better test for objective assessment of digital competencies based that will have the connection with 8 levels introduced in DigComp 2.1 framework (Carretero, Vuorikari, Punie, 2017). There is also a plan to create normalisation for the current test and propose it to international partners.

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AGILE PROJECT PORTFOLIO MANAGEMENT BASED ON CLOUD SERVICES

Nenad Stefanović∗
University of Kragujevac, Faculty of Technical Sciences, nenad@ftn.edu.rs

Andrijana Gaborović
University of Kragujevac, Faculty of Technical Sciences, andrijana.jovicic@ftn.edu.rs

Jelena Plašić
University of Kragujevac, Faculty of Technical Sciences, nenad@ftn.edu.rs

Abstract: *In today's business environment, project management has become increasingly important for achieving long-term success and competitive advantage. The main challenge of project management is to fulfil the project goals within the given constraints, including scope, time, quality, and budget. The secondary challenge is to optimize the allocation of necessary inputs and apply them to meet pre-defined objectives. Organizations typically initiate and execute many projects that are very challenging to plan, monitor, coordinate, and manage. Project portfolio management (PPM) is a high-level view of all the projects across the entire organization. PPM enable organizations to enhance control and visibility across multiple portfolios, programs, and projects, optimize costs, align activities with strategic goals, and drive collaboration in order to successfully realize projects. However, Project portfolio management is not implemented or applied fully in many organizations due to a lack of appropriate software platforms and tools. In this paper, an innovative cloud-based PPM platform that enables collaborative, flexible and agile project portfolio management is presented. It comprises various services and tools that enables managers and team members to effectively manage interconnected projects, tasks, and resources. The main advantages of the proposed PPM platform include improved collaboration and coordination, integrated reporting and analytics, increased agility, insights-driven decision making, and alignment with strategic business objectives.*

Keywords: *Project management, Project portfolio management, Cloud computing, Business intelligence, Web portal.*

JEL classification: *O 22, M 15, D 89, D 79*

∗ Corresponding author

INTRODUCTION

Project management is the process of leading the work of a team to achieve goals and meet success criteria at a specified time. The primary challenge of project management is to achieve all of the project goals within the given constraints. (Phillips, 2003) A project is a temporary endeavor designed to produce a unique product, service or result with a defined beginning and end (usually time-constrained, and often constrained by funding or staffing) undertaken to meet unique goals and objectives, typically to bring about beneficial change or added value. (Nokes and Kelly, 2007)

The expansion and development of the application of Project Management leads to new ideas, procedures and approaches in the field of multi–project management. Besides Project Management and Programme Management, today we distinguish Project Portfolio Management (PPM), Enterprise Project Management (EPM) etc.

Development of Portfolio Project Management as a specialized management discipline started with Project Management, which refers to the management of a single project, through Programme Management, which includes managing several projects (program), to Project Portfolio Management, which includes management of several independent projects and programs. Project Portfolio Management (PPM) concentrates on several projects in one organization and considers the goals of the organization and how much individual projects within the program or portfolios contribute to achieving the goals of the organization. (Figure 1)
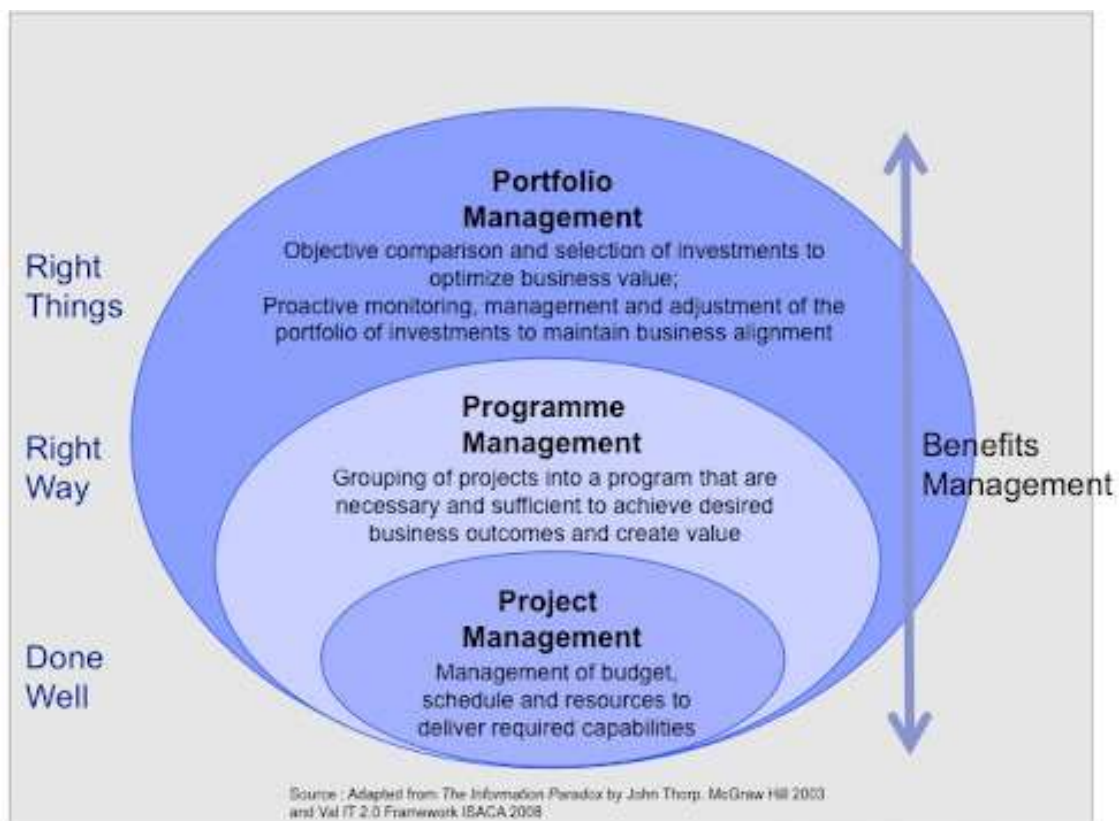

Figure 1 Comparison of Portfolio Management and Programme Management and Project Management
Source: https://othersideofrisk.files.wordpress.com/2012/12/projprogportthorp.jpg

PPM is a modern discipline of project management that includes the management of one or more project portfolios and connects the strategies and other business initiatives of the organization with the corresponding projects. Project portfolio management includes a number of sub-processes such as

identification, selection, prioritization, management and control of projects, programs and other related activities to achieve the strategic goals of the organization.

A portfolio is a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet strategic business objectives. The project or programs in portfolio may not necessarily be interdependent or directly related. Funding and support can be assigned on the basis of risk/reward categories, specific lines of business, or general types of projects, such as infrastructure and internal process improvement. (Figure 2)
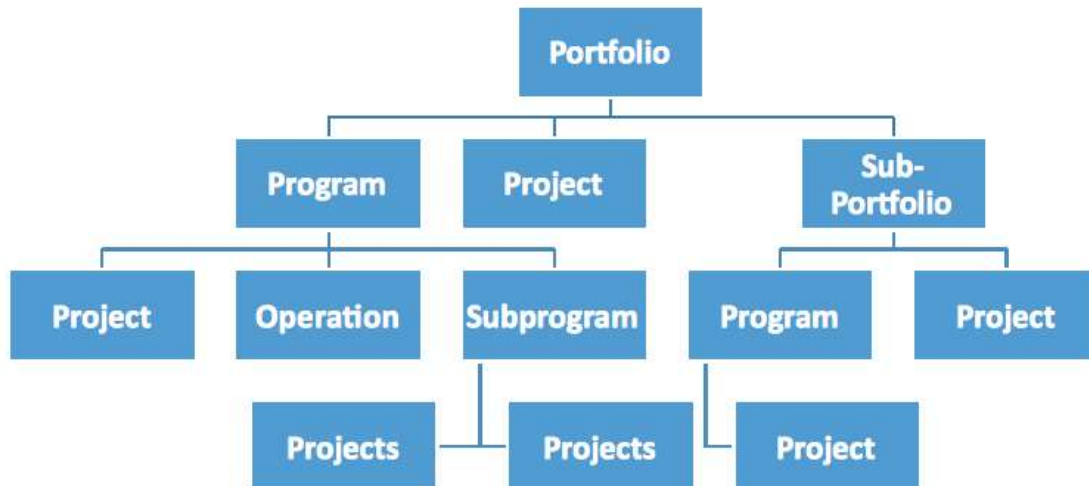
Figure 2 Portfolio

Source: https://www.journeymexico.com/program-of-projects?showimg_aldggj=program+of+projects.png

Organizations manage their portfolios based on specific goals. One goal of portfolio management is to maximize the value of the portfolio by careful examination of candidate projects and programs for inclusion in the portfolio and the timely exclusion of projects not meeting the portfolio's strategic objectives. Other goals are to balance the portfolio among incremental and radical investments and for efficient use of resources. Senior managers or senior management teams typically take on the responsibility of portfolio management for an organization. (PMI, 2013)

LITERATURE REVIEW

Project portfolio management (PPM) is defined as "a component collection of programs, projects, or operations managed as a group to achieve strategic objectives" (PMI, 2013). From the given definition, it can be seen that effective PPM relies on effective management of its components to deliver outputs that align with the organisational objectives. The study of Thomas et al. (2002) confirmed the need to align project delivery capability with corporate strategy. According to Crawford, Hobbs & Turner (2006), the decision-making processes for project portfolio selection, as well as tools and capability to carefully select the projects that achieve the desired benefits, can impact project success. Furthermore, the organisational management must aim to optimise available resources and manage the level of project and portfolio risks, as well as provide strategic alignment in the governance of projects.

Acknowledging the significance of aligning projects with the corporate strategies, PMI's Pulse of the Profession In-Depth Report: Success Rates Rise (PMI, 2017) highlighted the project failure rates of projects that did not meet the organisational goals and business intent. The report stated that the rates continue, with 17% of projects failing outright. Furthermore, it was estimated that for every US$1 billion spent on a failed project, $97 million is lost forever. The concept of project portfolio management (PPM)

is based on theories of portfolio selection and originates from the area of finance and investment in The Standard Portfolio Management for portfolio management. The third edition of PMI's portfolio management standard includes portfolio management process groups (defining, aligning and authorizing controlling groups) and five knowledge areas (strategic management, governance management, performance management, communication management and risk management) (PMI, 2013), which aims to cover a wide range of practices for any organizational type and portfolio size. Despite the existence of PPM standards and practices, the PPM delivery remains a challenge. This could result in failing business alignment, monetary losses, unmet productivity and decreased morale of project stakeholders (Patanakul 2015). Martinsuo (2013) pointed out that the lack of awareness of practices and context could be one of the key explanations why organisations still struggle with resource sharing and constant changes in their portfolios. As a result, the success of portfolio management falls behind expectation. According to Voss and Kock (2013), the success of PPM can be evaluated from overall business success, average project success, future preparedness, use of synergies, strategic fit and portfolio balance. It was further suggested that portfolio value should be monetarily and non-monetarily taken into consideration. The larger a portfolio becomes, the more that better alignments with organisational objectives and PPM practices are required. The recent PMI's Pulse of the Profession (PMI, 2017) reveals that only 62% of strategic initiatives (organisation's projects) met their goals. The report further states the most important factors for strategic initiative failure (Hadjinicolaou et al., 2017):

- Lack of clearly defined and/or achievable milestones and objectives to measure progress
- Poor communication
- Lack of communication by senior management
- Employee resistance
- Insufficient funding

MANAGING PROJECT PORTFOLIO IN CLOUD ENVIROMENT

Numerous studies show that 68% of projects in the IT industry are considered chalenged or failed, 82% of those suffer from schedule overruns, and 43% from cost overruns. That is about $5 billion loss every year, only in the United States. (Project Online)

Organizations that use a Project Portfolio Management Software are:

- 44% more likely to complete projects on time or early
- 38% more likely to complete projects on budget
- 52% more likely to hit the expected ROI (Return of Investments). (PMI site)

PPM Software is a software that combines system of technologies, processes, and methodologies to plan, develop, and execute projects with higher efficiency and less error than traditional approaches to project management. Companies use this software to centralize and coordinate the workflow of all projects across a portfolio of work. The goal of this software is to optimize the use of resource and selection of project work to achieve the companies operationally, financial and strategic objectives. Good PPM software provides an organization with the skill to identify which projects are most critical to their company objectives. These softwares helps automate processes, streamlining the planning, managing, and delivery of each project. PPM software allows every company to organize their project into a single portfolio through which can easily be studied and monitored for progress and reviewed whether the project had quality execution. It allows companies to plan possible targets and due dates according to the input data. PPM software provides business analysis for companies looking to invest in new projects

by consolidating and organizing every piece of data regarding proposed and current projects. (Predictive Analitics Today)

Project Portfolio Management in PPM software is used to capture all project ideas in one place, and then guide them through a decision-making process catered to business's needs. Using these tools can help users make decisions about which proposals to approve, and track progress on a project until the work is completed.

Approach to Project Portfolio Management using cloud-based solutions includes following steps:

- Project detail pages - pages where users can view and update project information.
- Stages - sets of project detail pages specific to one area of the project lifecycle.
- Phases - a way to organize multiple stages.
- Workflows - a way to enforce your business processes as projects move through the various phases and stages.
- Enterprise project types - a way to bring phases, stages, and project detail pages together with a workflow into a standardized way of doing a project.

PROJECT DETAIL PAGES

Project data can be viewed or updated on project detail pages. User can customize a project detail page by choosing web parts that use the necessary field. Project detail pages are displayed to the user at various stages of a project whenever you need to gather information from or display information to a user.

STAGES

A stage includes one or more project detail pages, grouped to gather information about a project. This information can be used or updated by a workflow. It can be definied which project detail pages are displayed in a given stage, which fields are required and which are read/write or read-only, and which phase the stage is part of.

For each stage of a project, it is recommended to define what actions need to take place and what information needs to be gathered based on business requirements for the project. This information helps to define the list of displayed fields in the project detail pages and what actions users need to take. The following steps list the general procedure:

- Define what needs to happen with the project in each stage
- Define the required information that you want to capture using project detail pages
- Define the state of the fields in each stage (Required, read/write, or read-only)

PHASES

A phase is used to organize multiple stages that make up a common set of activities in the project life cycle. Examples of phases are project creation, project selection, and project management. The phases themselves are just a way of organizing stages and do not determine the order in which the stages are executed.

WORKFLOWS

Workflows enforce business processes and provide a structured way for projects to move through phases and stages. Users can set up a workflow to do a variety of actions based on the input for each stage,

including sending emails, assigning tasks, and waiting for specific project actions. (Microsoft Documentation)

RESULTS AND DISCUSSION

Nowadays companies can choose between two distinct types of solutions: on-premise and cloud based. On-premise means that software is installed on a local server, usually within the company's building, while cloud based solutions have a wide range of variations, from rented servers and virtual private servers to software as s service (SaaS) solution. This means that users are spared from high initial costs for hardware and software, and have just to pay a monthly fee. Besides lower costs, hardware and software scaling became much easier and realized with a simple click of the mouse, while additional services can be used, like online e-mail client, business intelligence, online promotions, etc. That is why many businesses are moving from local on-premise software to cloud computing. There are many of PPM cloud-based solutions on the market.

In this paper we will present Microsoft's solution for projects and portfolio management – Microsoft Project Online, on an example of project portfolio. Figure 3 presents a Project Center in Project Online. Project Center represents portfolio of projects in one organization. The timeline at the top of the Project Center provides a simple way to show all of the projects and mayor tasks going on in the organization. Projects are evaluated by following parameters: overall health, schedule health, work health, resource health, cost health and issue health. Every parameter has a graphic indicator that helps highlight problems in the schedule. Red circle means that project parameter is blocked, yellow that parameter is behind schedule, and green that parameter is on track.
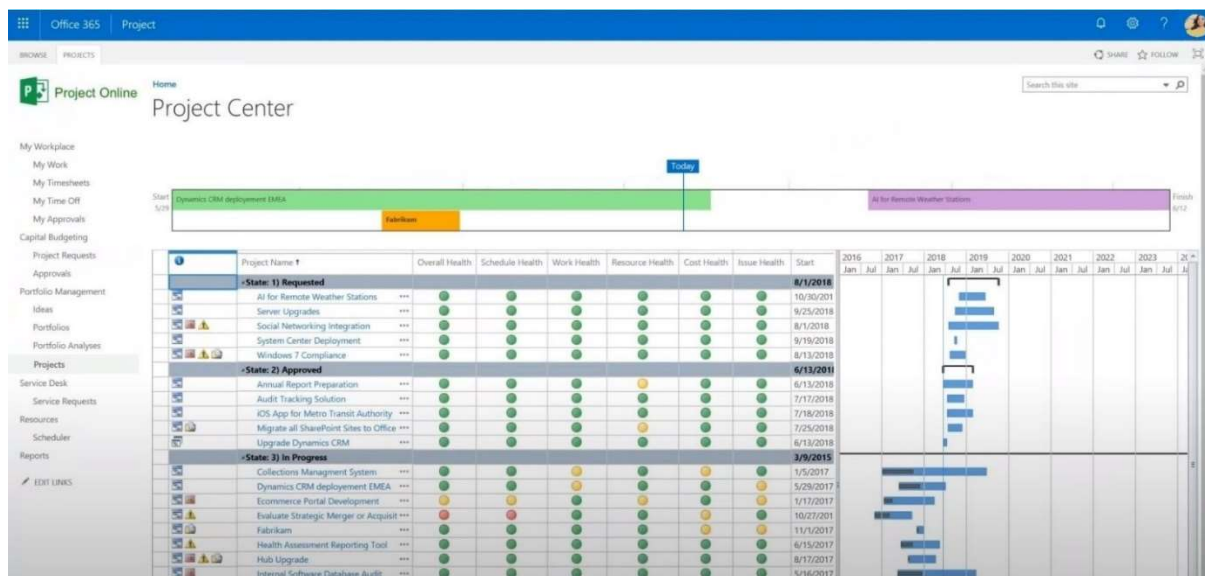

Figure 2 Project Center

Source: Project Online, Screenshot

Portfolio analysis is a structured technique to balance identified work requests and available resources. Project Online enables portfolio analysis with several features:

- Project portfolio definition
- Resource pool definition
- Project prioritization

These features may be combined to create specific scenarios. For example, one scenario may assume annual funding levels of $20,000,000. Other scenarios may assume funding levels of $10,000,000. Some scenarios may prioritize growth. Other scenarios may prioritize risk mitigation.

The process of assessing these scenarios and defining an optimal selection of projects is known as portfolio analysis. The following steps should be performed before starting a portfolio analysis.

- Define projects and project proposals.
- Define the key cost elements of these projects (i.e., total cost, capital expense, operational expense, etc.).
- (Optional) Define the work required to support these projects and project proposals.
- (Optional) Define the available pool of resources that will be delivering the project portfolio.
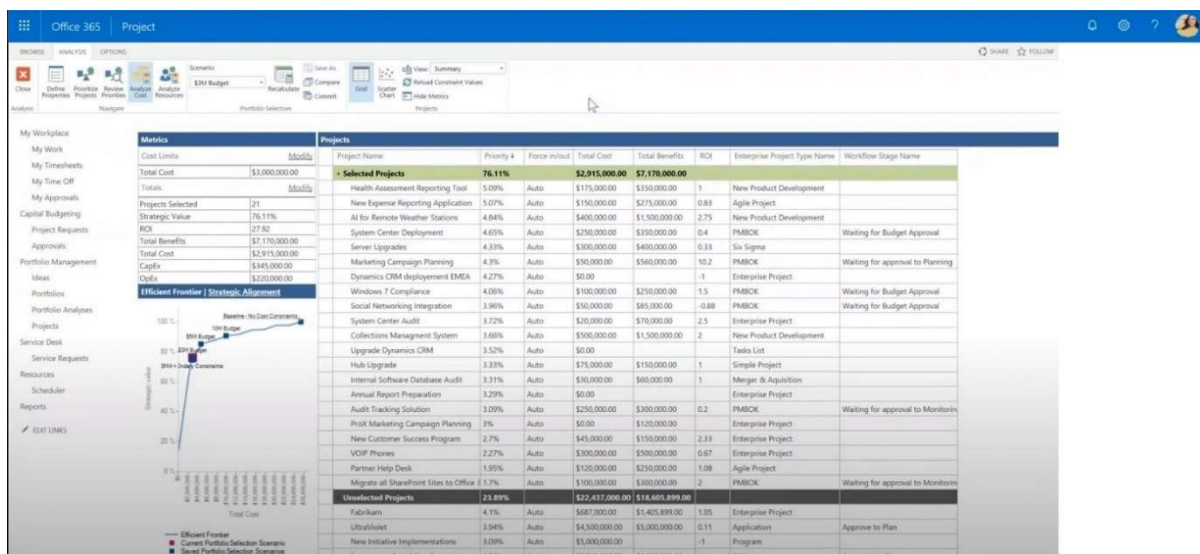- Define portfolio prioritization mechanism(s). (Portfolio Analyses)

Figure 3 Cost Analyses - $3 million Scenario

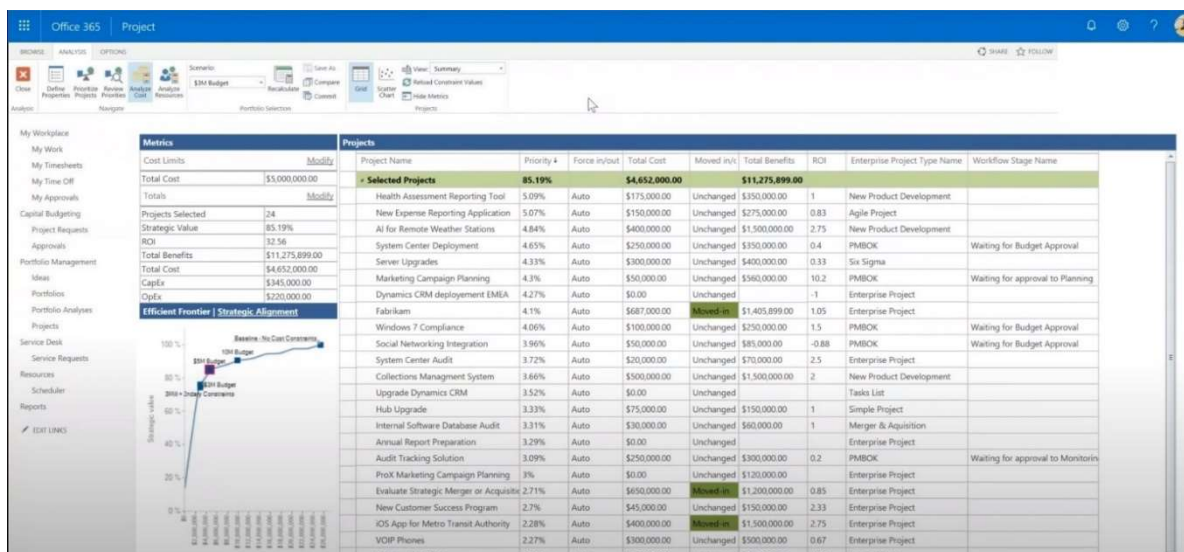*Source:* Project Online, Screenshot

Figure 4 Cost Analyses - $5 million Scenario

Source: Project Online, Screenshot

Figure 4 represents an example of Portfolio Analyses. In this What-if Scenario organization has a limited budget of $3 million. Using an Analyse Cost button, Project Online analyzes portfolio of projects and cost options to get the best return on company's investment. In this example, Project Online suggests projects that organization should select (76,11% of portfolio) if they want to stay within budget. On Figure 4 we can see projects that should be selected, estimation of their total cost, and total benefits from them. Also, we can see projects that organization should not select, estimated loss if they select those projects etc. If we change budget in the Total Cost field, values will be changed (Figure 5).

CONCLUSIONS AND RECOMMENDATIONS

In this paper we present an innovative cloud-based PPM platform that enables collaborative, flexible and agile project portfolio management – Microsoft Project Online. It comprises various services and tools that enables managers and team members to effectively manage interconnected projects, tasks, and resources. The main advantages of the Microsoft Project Online platform include improved collaboration and coordination, integrated reporting and analytics, increased agility, insights-driven decision making, and alignment with strategic business objectives.

As a cloud-based solution, Microsoft Project Online helps organizations to improve collaboration, get data insights, improve data security, reduce costs and improve their mobility, flexibility, and scalability. Microsoft Project Online represents an excellent choice for organizations and businesses, as a complete online platform integrated with other Office 365 service.

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INFORMATION LITERACY COMPETENCIES IN DIGITAL AGE: EVIDENCE FROM SMALL- AND MEDIUM-SIZED ENTERPRISES

Marijana Simić*
University in Kragujevac, Faculty of Economics, msimic@kg.ac.rs

Marko Slavković
University in Kragujevac, Faculty of Economics, mslavkovic@kg.ac.rs

Jasmina Ognjanović
Faculty of Hotel Management and
University of Kragujevac, Tourism in Vrnjačka Banja, jasmina.lukic@kg.ac.rs

Abstract: *The rapid diffusion of technology has put pressure on enterprises to implement changes that reflect on their current strategy and business model, but also on the ways of communication and collaboration. It is argued that nowadays, we read, write, listen, and communicate differently than we did 500 years ago. Therefore, information literacy is one of the most prevailing concept, but the prior literature is limited in the number of empirical studies analyzing digital competences. In digital age and the era of information explosion, it is necessary to examine firms' readiness for starting the transformation initiative, especially in terms of information management. Data were collected through survey questionnaires sent to key informants in SMEs, such as CEO, Managing Director, General Managers, Owner, Managers, Assistant Manager, Technicians and Senior Staff. A questionnaire is used as a research instrument, divided in several sections. Apart from gathering demographic data, the questionnaire included the 12-item scale to assess information literacy. Using a sample of 77 SMEs in Serbia, the purpose of this paper is to determine the level of information literacy among managers and directors in SMEs. Findings of this study can be used to reveal the importance of information literacy for socio-economic development of the society and employability of the labour force. Beyond the social implications, this study provides guidelines to fill the gap in employees' literacy and to make a match between firms' demands and programs developed by educational institutions and training centres.*

Keywords: *Information Literacy, Digitalisation, Digital Age, Small and Medium Enterprises (SMEs)*

JEL classification: *D80, M10, M21*

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* Corresponding author

INTRODUCTION

In the era of knowledge and digitalisation, increasing competition has highlighted the importance of networking, connection and cooperation. The use of information and communication technology (ICTs) as the basis of all changes in today's era of digitalization requires the engagement of high qualified employees, who need to perform complex and interactive tasks (Van Laar et al., 2017). Employees are expected to efficiently manage available information and possess knowledge that will be useful in their professional, but also in personal life. Thus, employees need not only education in terms of installation of modern technology, but also it is necessary to develop the skills that will enable to adapt to the requirements of the digital environment (Ahmad, Karim, Din, & Albakri, 2013).

Development of Internet has caused the changes in functioning society (Simić & Nedelko, 2019), whereby the key challenge is not only the technological aspect, but the focus is on attracting qualified candidates and on human capital development. Previous studies indicate the need for digital competences development (Katz, 2007), that implies changes in educational field, with focus on lifelong learning (Goldie, 2016) and redefining the qualification structure of employees in enterprises (Vieru & Bourdeau, 2017). As an important precondition for the implementation of the necessary changes that are stated as a part of the digital transformation within enterprise it is necessary to ensure efficient management and effective use of available information.

Redefining job descriptions and required competencies (Demir, 2019; Slavković & Simić, 2019) in era of high transparency and availability of information, conditions the need for developing information literacy. According to American Library Association (1989) information literacy is considered as an ability to recognize when information is needed, but also to locate, evaluate, and use effectively the needed information. Information literacy is classified as a skill for 21st century, bearing in mind the fact that collecting and sharing relevant information is as important as reading and writing in earlier centuries (Partnership for 21st Century Skills, 2003). Therefore, it is evident that individual's ability to handle information, to solve problems and critical thinking have great impact on his/her future success (Katz, 2007).

Due to the emergence of digital media, information sharing is significantly changed, thus distinction between information literacy and similar terms is blurred (Polizzi, 2020), i.e. computer literacy (Simonson et al., 1987), ICT literacy (Katz, 2007), media literacy, digital literacy (Koltay, 2011). Working in the age of information abundance points to the importance of developing information management skills, which is why it is expected that information literate individuals will be ready to adapt, so they will be more successful and more productive in information-technological environment (Rader, 2019). Although we live in era of modern technologies and Internet, it is identified that citizens still lack key digital competences (Slavković & Simić, 2019). Similarly, it was found that the level of information literacy is not satisfactory (Rockman, 2004; Katz, 2007; Head & Eisenberg, 2010). Most of previous studies were focused on assessing students' information literacy (Head & Eisenberg, 2010; Fraillon et al., 2014), but it is necessary to point out the key limitation of the conducted research, concerning implemented methodology. Namely, in literature there is no consensus on the methods and techniques used to assess citizens' information literacy (Gross & Latham, 2009). However, a significant number of studies emphasize the importance of information literacy, as a skill that should be developed within educational institutions (Lloyd & Williamson, 2008) and that the assessment of students' knowledge and abilities can determine their working potential in the era of digitalization (Fraillon et al., 2014).

Since information literacy may be perceived as a key precondition for integration into the digital environment, there is limited evidence, which verifies the level of development of information literacy within enterprise. Respecting small and medium enterprises (SMEs) as key drivers of economic development (Costa et al., 2020), it is necessary to determine the extent of managers' readiness to answer on digitization requirements. Therefore, the main aim is to assess information literacy within SMEs in Serbia, whereby the research covers key employees in positions that are crucial for the success of enterprise, but who are also expected to be leaders in implementing changes in the modern business environment.

The paper is structured as follows. After the introduction, literature review is provided, which presents the key challenges of the fourth industrial revolution, as well as the need to determine the information literacy level and its improvement, as one of the important condition for successful digital transformation. The research methodology, sample description and the method of data collection are presented in next part. Based on the collected data, statistical analyzes were conducted, that were used to draw the conclusions at the end of this paper.

LITERATURE REVIEW

Industry 4.0 challenges

The forth industrial revolution has announced the beginning of changes in all fields, due to the emergence of wide range of challenges. The main challenges, but also the opportunities for enterprises, reflect key Industry 4.0 characteristics, such as: digitization, optimization, customization of production, human machine interaction (HMI), value-added services, automatic data sharing and communication (Roblek, et al., 2016; Posada et al., 2015; Lu, 2017). Faced with the given requirements, enterprises are committed to transform numerous processes and activities in the value chain, from procurement to sales and marketing (Slavković & Simić, 2019). A high degree of automatization has contributed to the increase of operational efficiency and productivity (Lu, 2017), which consequently reflects on changes in the nature of employees' work (Müller et al., 2018), as well as the elimination of simple and manual tasks (Simić & Nedelko, 2019).

Evident changes in the domain of quality and quantity of professional and private life (Slavković & Simić, 2019), as well as the introduction of digital content and media imply the need to develop appropriate skills, which will enable the implementation of modern technological solutions. The changes in qualification structure of employees have resulted in increasing the need for employees to acquire competencies in software development and IT technologies (Rüßmann et al., 2015). Previous results indicate that in enterprises major issue is development of digital culture and knowledge acquisition, than the difficulties in installing advanced technology. Advanced technologies represent a novelty (Butschan et al., 2019), while competence development is one of the most important basis for successful transformation process. Sousa and Rocha (2019) determined that the set of required competencies of employees changed consequently under the influence Internet of Things (IoT), cyber-physical system (CPS), cloud technologies, big data, mobile technologies, artificial intelligence and robotics. The success in digital age depends on skills and knowledge of their employees, whereby it is important to attract candidates who are ready to put digitization into place (Simić & Nedelko, 2019). The changes concerning human resource management and human capital development are necessary if we want to maximize the benefits of using modern technology and Internet (Butschan et al., 2019). Thus, it is necessary to create appropriate patterns of behaviour (Zhong et al., 2017), to formulate innovative educational programs and their contents, in order to enable acquiring and developing new competences and skills (Slavković & Simić, 2019).

The implementation of new technologies have lead us to the changes in the way to communicate and collaborate (Lu, 2017). Information and communications technologies (ICT) are important for the process of creating and sharing knowledge and information around the globe, that effect citizens' everyday life. The hyper abundance of information, as well as high transparency, requires the acquisition of appropriate skills, which will enable making distinction between relevant and irrelevant information. Therefore, an important task for enterprises in the digital era is also information management, while information literacy has become a major component of citizens' education (Fraillon et al., 2014). The results of previous studies have shown that information resources are increasingly important as enterprise assets in complex digital environment (Evans & Price, 2016), while it is proved that data, information and knowledge (implicit and explicit) can significantly enhance business performance (Bedford & Morelli, 2006; Ladley, 2010; Evans & Price, 2016). Although IT infrastructure provides the basis for implementing digital transformation, information management has great impact on business performance (Cotteleer & Bendoli 2006; Davenport 1998; Mithas, et al., 2011) hence employees need to be trained to efficiently manage available information (Carretero et al., 2017).

Information literacy in digital environment

Although the term "information literacy" has been widely used in the literature, the distinction between this term and similar concepts is blurred. According to Polizzi (2020) information literacy refers to "the ability to access, identify, locate, evaluate, organise and effectively create, use and communicate information". Bearing in mind increasing complexities of the current digital environment, in era of new forms of information products affected by digital transformation, information literacy improvement is required, that is something much broader than an enhanced form of computer skills. Accordingly, nowadays information literacy is considered as a type of functional literacy that represents the ability to collect and use information necessary for everyday life (Bawden & Robinson, 2002).

In literature information literacy is a well known term, which has evolved over the years of the last century. The term information literacy first appeared during the 1970s, indicating a paradigmatic transition from the industrial to the digital era. Zurkowski (1974) introduces the concept "information literate workforce" that represents employees skilled at applying information resources. In the early 2000s, information literacy became an essential element of the academic library's mission (Maughan, 2001 in Head, 2013), and it is defined as the competencies, that enable individual to locate, retrieve, evaluate, select, and use information sources (Bawden, 2001 in Head, 2013). Individuals that are information literate are able to recognize when it is necessary to obtain information and they are skilled to evaluate, and apply that information (Head, 2013). Rader (2019) argues that the information-literate citizen will be able to survive and be successful in today's environment, which mean that they will be productive, healthy, and satisfied with their lives. Being successful in digital age means dealing effectively with rapidly changing environments and using appropriate information for problem solving (Bawden & Robinson, 2002).

The findings of previous studies indicate the introduction of modern technologies, such as social media and mobile technologies that have increased the ability of young people to communicate with one another and to publish information to a worldwide audience in real time. According to the International Computer and Information Literacy Study (ICILS) it is proved that the level of access to ICT and levels of use of advanced technologies have been raised among young population, but big variations in CIL proficiency are also identified (Fraillon et al., 2014). Although young citizens grew up with the Internet, due to they are named "Net Generation", there is increasing evidence that students do not use technology effectively when they learn or communicate (Rockman 2004). Results of study conducted by Katz (2007)

indicate that students have difficulties with ICT literacy despite their technical skills. In accordance to previous results, Head and Eisenberg (2010) in their research highlight that two-thirds of the respondents (61%) ask for help their friends and/or family members while sorting through and evaluating information for personal use and nearly half of the students (49%) asked their instructors for assistance with assessing the relevant information for course work.

METHODOLOGY

For data collection, a questionnaire was used, which was specially designed for this research. Although there is no unified framework for assessing information literacy, the statements are formulated in accordance with the European Competence Framework 3.0, developed by the European Commission for Standardization. The questionnaire included the 12-item scale to assess information literacy, whereby respondents expressed the extent of agreement on the 5-point Likert scale (1- absolutely disagree; 5- absolutely agree).

In the next step ANOVA test was conducted, whereby the level of education of employees was used as a grouping variable. In almost all statements, significant difference between employees of different levels of education was proven. The results of the Post-hoc Sheffe test are presented below, where it has been proven that employees with lower level of education have a lower level of information literacy, which is fully expected result.

Table 1 Descriptive Statistics

ID	Items	Mean	Std. Deviation
I1	I know ICT devices and tools applicable for the storage and retrieval of data	3.6364	1.08711
I2	I am able to gather internal and external knowledge and information needs	3.6494	1.09744
I3	I am able to formalise customer requirements	3.5481	.79300
I4	I am able to translate/reflect business behaviour into structured information	3.6753	.83416
I5	I am able to make information available	3.9351	.87866
I6	I am able to capture, storage, analyse, data sets, that are complex and large, not structured and in different formats	3.4545	.99400
I7	I am able to apply data mining methods	3.6364	1.03757
I8	I am familiar with the impact of legal requirements on information security	3.6364	.94464
I9	I am aware of possible security threats	3.9221	.99692
I10	I know the different service models (SaaS, PaaS, IaaS) and operational translations (i.e. Cloud Computing)	2.7143	1.42217
I11	I am able to apply relevant standards, best practices and legal requirements for information security	3.7403	.93756
I12	I am able to anticipate required changes to the organisation's information security strategy and formulate new plans	3.6104	.87593

Source: Authors' research

Table 2 Results of ANOVA test

ID	Items	F	Sig.
I1	I know ICT devices and tools applicable for the storage and retrieval of data	14.483	.000
I2	I am able to gather internal and external knowledge and information needs	6.071	.004
I3	I am able to formalise customer requirements	1.424	.247
I4	I am able to translate/reflect business behaviour into structured information	7.031	.002
I5	I am able to make information available	8.557	.000
I6	I am able to capture, storage, analyse, data sets, that are complex and large, not structured and in different formats	6.550	.002
I7	I am able to apply data mining methods	6.172	.003
I8	I am familiar with the impact of legal requirements on information security	4.291	.017
I9	I am aware of possible security threats	1.063	.351
I10	I know the different service models (SaaS, PaaS, IaaS) and operational translations (i.e. Cloud Computing)	7.919	.001
I11	I am able to apply relevant standards, best practices and legal requirements for information security	3.491	.036
I12	I am able to anticipate required changes to the organisation's information security strategy and formulate new plans	6.251	.003

Source: Authors' research

Table 3 Results of ANOVA test – Post-hoc Scheffe test

Items	SE[a] vs. CE[b]	CE vs. UE[c]	SE vs. UE
I1	-.66667[*]	-.67949	-1.34615[*]
I2	-.59524	-.35348	-.94872[*]
I3	-.23333	-.11538	-.34872
I4	-.59048[*]	-.14286	-.73333[*]
I5	-.50000	-.38462	-.88462[*]
I6	-.57143	-.31319	-.88462[*]
I7	-.46667	-.44872	-.91538[*]
I8	-.23810	-.46703	-.70513[*]
I9	-.00952	-.34432	-.35385
I10	-.64762	-.74725	-1.39487[*]
I11	-.60000	-.07692	-.52308
I12	-.60952[*]	-.11355	-.72308[*]

[a] *Secondary education,* [b] *College or some type of specialization,* [c] *University education*

Source: Authors' research

According to Business Registry Agencies database, SMEs are chosen, that actively operate on the territory of Serbia. In order to make difference between SMEs and non-SMEs, a definition proposed by European Commission was used. According to this definition, an enterprise can be called an SME if it has "up to 250 employees," "annual turnover up to EUR 50 million," and "balance sheet total up to EUR 43 million". Data were collected through survey questionnaires sent to key informants in SMEs, such as

CEO, Managing Director, General Managers, Owner, Managers, Assistant Manager, Technicians and Senior Staff. These respondents were selected because they are considered as key actors in the process of digital transformation, and they are expected to have a significant level of readiness, which will determine the overall success in implementing the necessary changes. We have randomly selected 256 SMEs, and the invitations to potential participants were sent via email with a link to the web-based survey questionnaire. A total of 92 surveys were received (35.9% response rate), and after removing 15 incomplete surveys, the final study sample was 77 SMEs.

The data analysis was conducted in SPPS - statistical package for social sciences. First, reliability analysis was performed, presenting the value of the Cronbach's alpha coefficient. Second, descriptive statistical analysis was performed, which involves calculating the arithmetic mean and standard deviation for each statement separately, in order to determine the level of information literacy of the respondents. Finally, analysis of variance (ANOVA test) was conducted to determine the difference in the level of information literacy between different groups of respondents.

RESULTS AND DISCUSSION

In first step reliability analysis was conducted, whereby Cronbach's alpha coefficient is 0.919, which indicates the high internal consistency of statements used in this research (George & Mallery, 2003). Second step represents performing descriptive statistical analysis that is used to make a conclusion about the level of respondents' agreement with defined items. Based on the obtained results, it is evident that the lowest degree of agreement is identified in case of readiness to use different service models (SaaS, PaaS, IaaS) and operational translations (i.e. Cloud Computing), while the highest level is noted considering awareness of possible security threats, as well as in case of making information available to wide audience.

CONCLUSIONS AND RECOMMENDATIONS

Digitalization places new demands to enterprises, which is why employees should be hired to enable the implementation of transformation processes. One of the important preconditions for successful transformation is efficient management and use of information. Nowadays we no longer have a problem with lack of information, but the problem is how to make a distinction between relevant and irrelevant information in case of abundance of data and information. Accordingly, the importance of information literacy is emphasized, which is in line with the need for reading and writing in earlier centuries. Being information literate in today's environment means being ready to survive, which is why this skill is classified as one of the important prerequisites for successful digital transformation.

This paper contributes to the scarce literature of information literacy. Based on empirical evidence from SMEs in Serbia, we get insight about the level of employees' information literacy, which also reflects the level of readiness of enterprises for digital transformation. In accordance to previous studies it may be concluded that the level of information literacy is still at the underdeveloped level, and it is possible to define guidelines for the improvement. Moreover, it is clear that candidates of higher level of education possess a higher level of information literacy, which is in line with the nature of their job. Since the level of information literacy among the respondents is on average, the actions for the improvement should be taken. Apart from changes concerning the innovation of educational programs, in order to eliminate the gap in information literacy, appropriate training programs and in-house trainings should be organized. In future researches, we may try to discover the level of digital competences, as well as to create an adequate competence framework that will assure the survival in today's business environment.

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CONSUMER BEHAVIOR TRENDS DURING THE CORONAVIRUS PANDEMIC

Kochkova Yana Anatolyevna

Ulyanovsk state university, Faculty of management in Ulyanovsk

Ivanova Tatyana Yurievna

Ulyanovsk state university, Faculty of management in Ulyanovsk

Snežana Živković[*]

University of Niš, Faculty of occupational safety in Niš

Abstract: The role of a consumer is very important in an economic system because it is one of the driving forces of the economy, including the digital one. Consumer behavior can be described as the process in which individuals or groups of individuals purchase a tangible or intangible product to satisfy their needs. Consumer behavior is a complex phenomenon that consists of a set of decision-making processes, various economic factors and market incentives. The ambiguity of these processes made it much more difficult to predict and control this phenomenon. However, since consumers are the main source of income for companies, studying their behavior is essential for achieving market survival and financial prosperity in today's volatile environment. Today, we can see changes in the consumer purchasing decision-making process. In this article, we examined the main trends in consumer behavior. To understand how the purchasing behavior model has undergone changes in today's conditions, we conducted a study among students from the city of Ulyanovsk, aimed to identifying changes in the behavioral model. Consumer behavior data show sustained shifts that lead to more deliberate and targeted purchases. Demonstrative consumption will give way to more practical consumption. The rampant search for deals will be replaced by greater selectivity in purchases and the use of technology and tools that emerged during the crisis.

Keywords: Consumer behavior, Economic Trends, Entrepreneurship, Coronavirus

JEL Classification: D 12

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[*] Corresponding author

INTRODUCTION

The current spread of COVID-19 has broader implications not only for the functioning of the economy as a whole and its business entities, but also leads to changes in the consumer model. The crisis is forcing everyone to change their purchasing habits. We find the study of consumer behavior in the works of researchers - marketers such as L.E. Basovsky and F. Kotler, T. Parsons, R. Taflinger and many others. We believe the current pandemic is changing consumer behavior and will continue to have an impact even when the crisis subsides. In times of recession, consumers have a pronounced tendency to change their current buying behavior due to the financial problems that always accompany the economic crisis. They become more selective and only focus on what they think is necessary to survive (Gabriela 2010.) Like any major global crisis, the coronavirus pandemic creates additional risks, problems and threats to the foreign policy of each government, but also opens up new opportunities and prospects for business. Thus, the coronavirus is challenging brands. As consumers take protective measures, their concerns about their health and financial well-being, their behavior will continue to have enormous social and economic impact. The goal of our study is to determine what changes have occurred in the consumer's behavioral model during the crisis. Using the information received from the research results, we will be able to give a number of recommendations to businesses that will help them get out of the crisis and increase sales. Also, studying trends in consumer behavior can provide an accurate picture for developing a new adaptive strategy in the midst of a crisis.

LITERATURE REVIEW

One of the important conditions for the existence of the market is the presence of the consumer on it. In this case, the direct role of the consumer is exceptionally great for the development of the market itself and market relations. According to O.N. Romanenkova, S.V. Countryman and V.V. Sinyaeva, not only sales and production volumes are predetermined, but also the assortment of goods for which there is a demand. It should be noted that in the special literature you can find two concepts, such as "consumer" and "buyer". Obviously, there is a close relationship between the two, but also significant differences. According to Konah Y.L. (Konah, 2018) buyer is characterized as a citizen who has the intention to order or purchase goods, as well as who uses them exclusively for their personal, family, household and other needs not related to entrepreneurial activities. Thus, it turns out that consumers are potential and existing clients of the company, and buyers are persons who have already bought a certain product. The second case is distinguished by the fait accompli of the purchase of goods, i.e. this is nothing more than the real behavior of the buyer. In the works of economists devoted to the study of consumer behavior, the applied nature of the research and the corresponding understanding of its subject are emphasized in the definition itself. R. Blackwell and P. Miniard (Blackwell & Miniard, 2000) characterize consumer behavior as: "Consumer behavior is an activity aimed directly at obtaining, consuming and disposing of products and services, including decision-making processes that precede and follow these actions." Thus, D. Angel, R. Blackwell and P. Miniard point out that the study of consumer behavior "is traditionally understood as finding out why people buy - in the sense that it is easier for the seller to develop strategies for influencing consumers when he knows why buyers buy certain products or brands".

METHODOLOGY

To understand how the purchasing behavior model has undergone changes in today's conditions, we conducted a study among students from the city of Ulyanovsk, aimed to identifying changes in the

behavioral model. The collection of research data was carried out with the help of teachers of the Department of Management under the leadership of T.Yu. Ivanova. The data collection method involved filling out test materials and questionnaires by university students. The sources for compiling the questionnaire were the works of Savko E.S. (Savko, 2009) and Yakovlev A.A. (Yakovlev, 2010). The number of respondents - 90 people. The survey was conducted in the period from 2.08.2020 to 24.08.2020. 10% of the questionnaires were filled out on hard copies and 90% were collected electronically.

The object of study was students of all courses, their model of purchasing behavior in a crisis situation. The structure of the questionnaire included 23 questions. We used qualitative data which was expressed in words and analyzed through interpretations and categorizations. The following types of questions were used in the questionnaire: multiple choice questions, rating scale questions, matrix questions, open-ended questions and ranking questions.

RESULTS AND DISCUSSION

Our study found that the pandemic had an impact on some of the purchasing behavior among students. 95% of respondents are aware of the danger of the virus and assess the threat at a high level. To the question: "What measures do you take to ensure your own safety and your family when you visit the store and make a purchase?". We got the following data (Fig. 1).
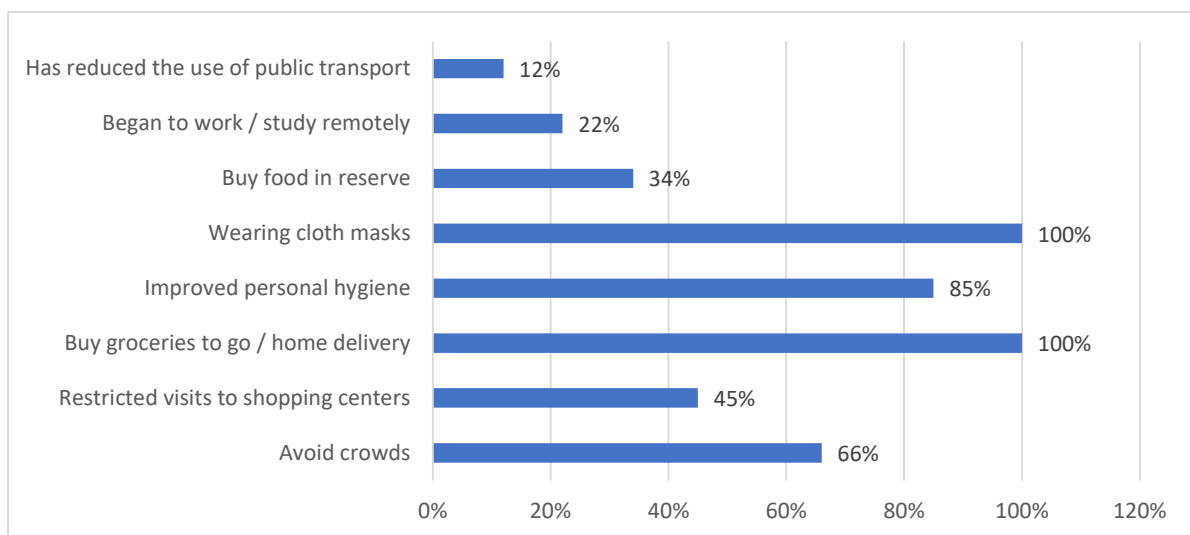

Figure 1 "What measures do you take to ensure your own safety and your family when you visit the store and make a purchase?"

Preferences in choosing a place of purchase have changed. The clients' normal lifestyle has stopped. Simple actions like going to the grocery store or having dinner with friends are now difficult, risky, or even forbidden, and the demand patterns have changed. Among the respondents, it was revealed that the growth of orders of goods through online stores increased (among 76 people). This is also due to the fact that 80% at the beginning of the pandemic significantly restricted visits to public places, including shopping centers and supermarkets (completely limited - 50%; partially - 45%; did not restrict - 5%).

The survey showed that many of the changes affected the respondents and their families. These changes included:

- Decrease in income;
- Depression;
- Increase in prices for goods and services.

Analyzing the incentives of the marketing mix that influence the decision to purchase goods during a pandemic, we can say that the main factor, as noted by the respondents, was the elements of promotion (95%) and the price (100%). Factors such as the product itself and distribution methods remained less significant. It can be concluded that as a result of unemployment and a decrease in the purchasing power of the population, a special role is played by the price of goods and promotion elements (sales, advertising), which the consumer pays attention to in the first place. Distribution methods came in last place (4%). When choosing several products of the same category (analysis of alternatives), the respondents began to pay attention to the following characteristics (Fig. 2)
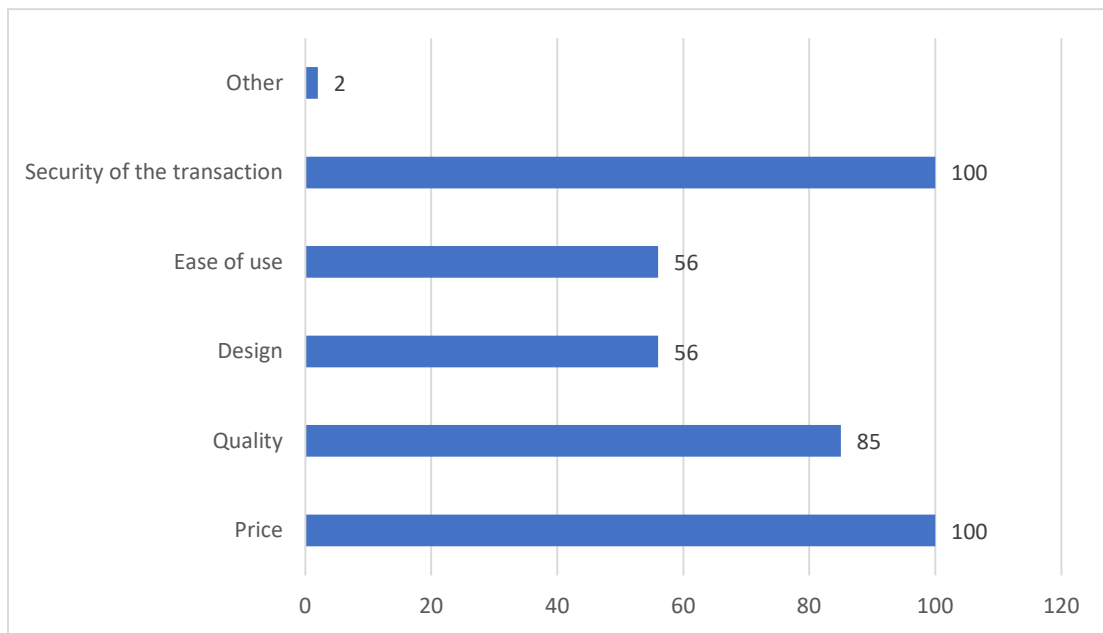

Figure 2 "To what did you start to pay attention to when choosing several products of the same category?"

As we can see, the majority of respondents began to pay attention to such a factor as the safety of delivery and price. The factor of product quality turned out to be less significant, as well as usability and design. As other criteria for choosing a product, 2 percent of respondents noted the practicality and durability of the product and speed of delivery.
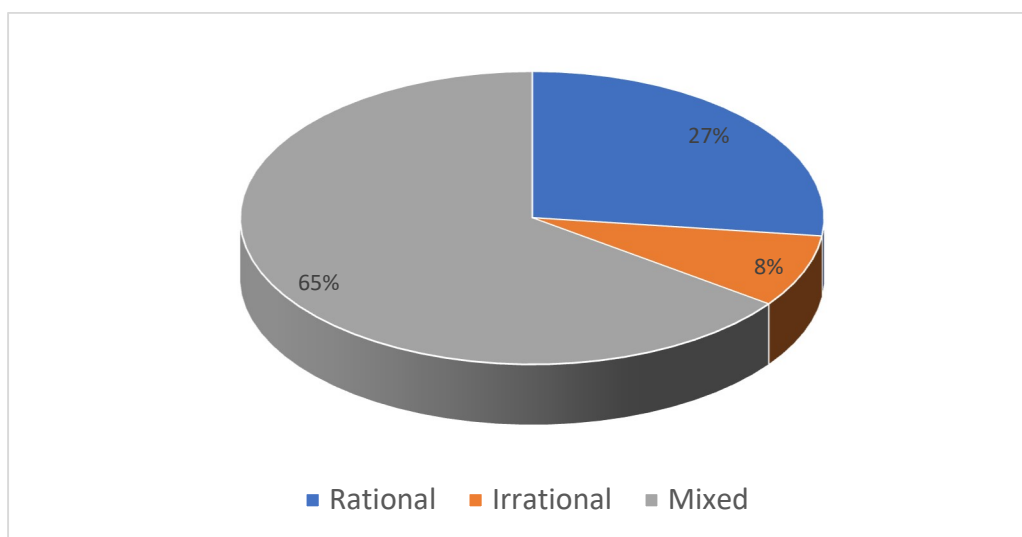

Figure 3 Making a purchase decision before a crisis

Marketing incentives have changed. Mainly, there has been a restriction of channels and methods of distribution and promotion of goods. There was a shortage of demand in a number of segments.

As for the source of information about the choice of goods, they have not changed (this was noted by 95% of respondents).

The style of making a purchasing decision in general has changed. Thus, more than half of the respondents answered that they changed their buying style and began to buy more thoughtfully, with an analysis of alternatives (Fig. 3 and Fig. 4).

The purchasing behavior of the respondents in general became more rational in relation to many items of purchase. Previously, 65% of respondents made a mixed decision (depending on product categories), and 8% were irrational. Today we can see that the situation has changed (Fig. 4).

The level of irrationality was 2% among the respondents, and now 44% make a mixed decision. A rational purchase decision is now made by 56% of the respondents.
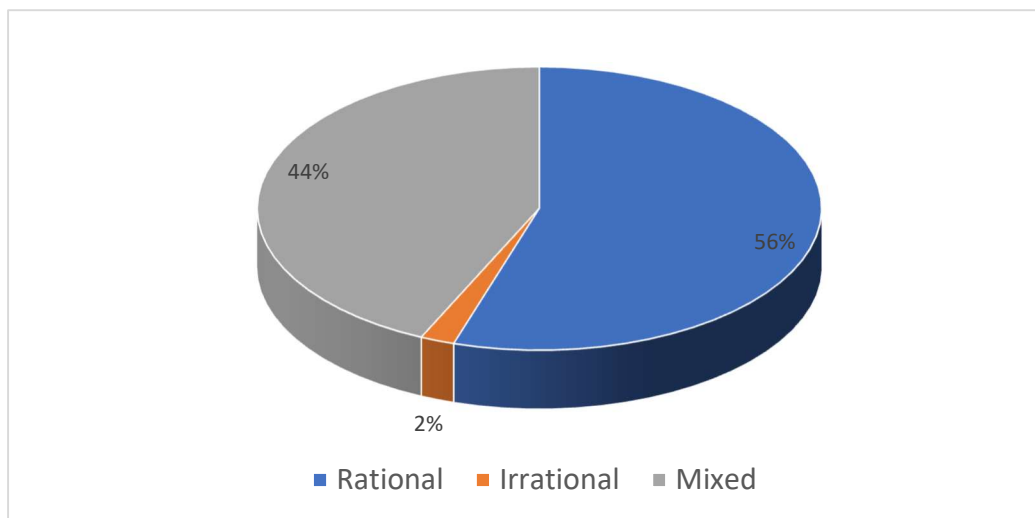

Figure 4 Making a purchase decision after the crisis

Also, to the question: "Can we say that you have become more selective in the choice of goods?", more than half of the respondents (88%) answered positively, and 9% chose the answer "partially".

We can draw conclusions based on the research results. As the COVID-19 crisis continues and businesses around the world begin to reopen, consumer behavior has begun to change, altering established elements in the traditional model.

Analyzing the current situation, it can be noted that such factor as the adaptability of decision-making has acquired an important role. Consumers quickly adapt to changed decision patterns and behaviors based on a range of individual and contextual characteristics. The spread and response to the coronavirus has made the physical and social environment highly fluid, working without fixed, sustainable patterns. Our thinking and planning approaches can no longer depend on automatic behavior.

There is a change in the consumer purchasing decision process. At the stage of forming needs, the consumer is guided not by what he needs, but by what is needed in a crisis. Next comes the process of information retrieval. Because people are isolated in times of crisis, they cannot use many commercial sources, such as the opinion of the sales staff. Moreover, while there are certainly differences across countries and regions, we can identify several major trends in consumer sentiment and behavior.

First, there is a decline in consumer optimism because of the long-term impact of COVID-19. According to research by "McKinsey&Company" most consumers around the world still expect COVID-19 to affect their routine for a long time to come, with 70% of consumers in hard-hit countries expecting

adjustments to their procedures in four months or more. In most countries, consumers expect their finances to recover faster, although more than half of consumers in most countries still believe their finances will be affected within four months or more (Arora et al., 2020).

Table 1 In-home media consumption due to the coronavirus outbreak among internet users worldwide as of May 2020, by country

	World-wide	Italy	France	Germany	China	United States	United Kingdom	Australia	Japan
Watching more news coverage	67%	67%	50%	60%	77%	43%	50%	42%	56%
Watching more shows/films on streaming services (e.g. Netflix)	51%	53%	31%	21%	63%	42%	32%	30%	21%
Watching more TV on broadcast channels	45%	55%	53%	35%	46%	42%	32%	32%	51%
Spending longer on messaging services (e.g. WhatApp, Facebook Messenger, etc)	45%	60%	24%	22%	59%	17%	24%	19%	8%
Spending longer on social media (e.g. Facebook, Instagram, Twitter etc)	44%	52%	27%	21%	50%	32%	21%	28%	23%
Spending more time on computer/video games	36%	41%	39%	21%	29%	29%	20%	24%	32%
Reading more books/listening to more audiobooks	35%	36%	24%	19%	44%	25%	19%	16%	18%
Listening to more streaming services (e.g. Apple Music, Spotify etc)	35%	25%	14%	13%	49%	18%	14%	16%	11%
Listening to more radio	18%	29%	23%	24%	16%	16%	17%	15%	9%
Reading more magazines	16%	23%	14%	17%	14%	12%	15%	14%	16%
Reading more newspapers	14%	18%	14%	10%	17%	12%	9%	5%	7%
Creating/uploading videos (e.g. on Tik Tok, YouTube etc)	14%	10%	7%	5%	17%	6%	6%	6%	5%
Listening to more podcasts	12%	8%	6%	6%	13%	10%	11%	11%	4%

Source: Watson, A. (2020, June 18). Consuming media at home due to the coronavirus worldwide 2020, by country. *Statista*. Retrieved from https://www.statista.com/statistics/1106498/home-media-consumption-coronavirus-worldwide-by-country/

Second, there is an increase in demand for essential goods. The coronavirus pandemic is changing people's consumer preferences. They spend less for simple reasons: stores are closed and many of those who shop online are primarily buying essential goods (Braterskiy, 2020). Our research also confirmed this trend.

The third trend is the rise in spending on home entertainment. The COVID-19 pandemic is changing the model for how we use media and entertainment. Sitting in isolation at home, our social life has moved to the Internet and consumption has grown noticeably in the home segments of television, online games, etc.

A global study conducted in May 2020 found that the coronavirus had a direct impact on media consumption around the world. More than 40 percent of consumers spent more time on data sharing services and social media. Interestingly, while at least 50 percent of respondents in most countries said they watch more news, the numbers for Australia and the United States were lower, at only 42 percent and 43 percent, respectively. Demand for games is growing. The COVID-19 pandemic, which spread across the globe in early 2020, poses a major threat to public health, but also to the entire entertainment industry. As cinemas and theaters closed their doors to try and stop the spread of the disease, many people turned to home entertainment during periods of self-isolation. According to the results of K. Gough's research, there has been a significant increase in the consumption of video games (Fig. 5).

The COVID-19 pandemic that spread across the world at the beginning of 2020 was not only a big threat to public health, but also to the entire entertainment industry. While cinemas and theaters closed their doors to try to stem the spread of the disease, many people turned to home entertainment during periods of self-isolation. During a March 2020 survey, video gamers in the United States reported that they spent 45 percent more time playing video games amid the quarantine than in the previous week.
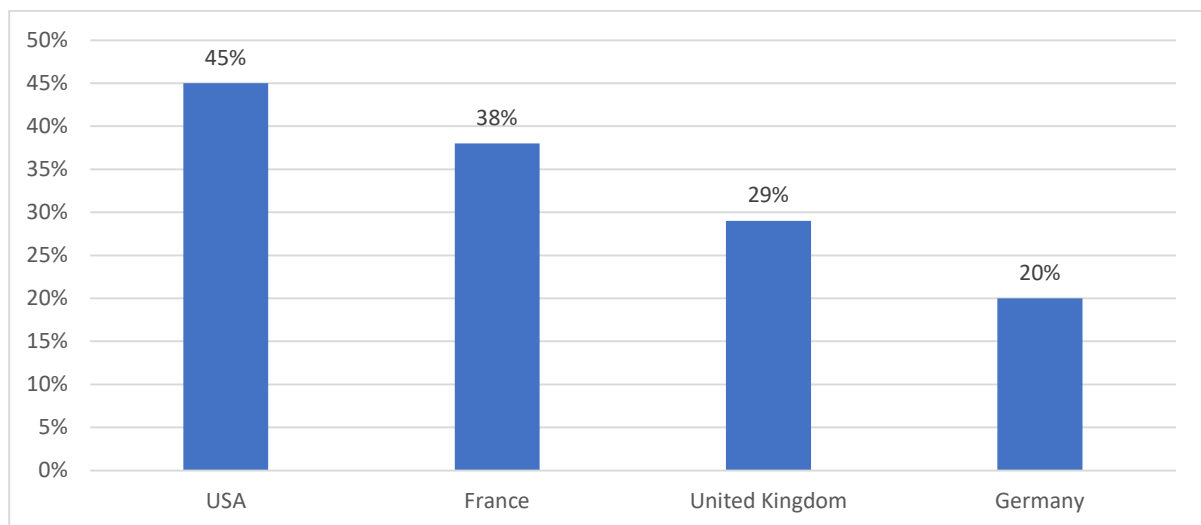

Figure 5 COVID-19: increase in time spent playing video games worldwide as of March 2020Published by Christina Gough, Jun 18, 2020

Source: Gough, C. (2020, June 18). COVID-19: Increase in Time Spent Playing Video Games Worldwide as of March 2020. *Statista*. Retrieved from https://www.statista.com/statistics/1111587/video-game-time-spent-covid/

The global video game industry is booming despite widespread economic turmoil caused by the coronavirus. With the practice of social distancing to reduce consumer and business activity to a minimum, one of the key attractions of massively multiplayer online games (MMOG) is the ability to compete and communicate with others in the gaming environment.

The fourth trend - consumers are moving to online and digital solutions, as well as to channels with a limited number of contacts to receive goods and services. The intent to shop online by category is positive, as shown by our research in Ulyanovsk. In all countries, consumers are adopting and expanding

digital means of accessing products and services. Companies must strictly control their costs. A flexible approach to management will be essential to control the costs of labor, rent and non-income areas. Investments should be made in the digitalization of all enterprise processes and in increasing efficiency. Innovation is more important today than ever. More importantly, if an innovation works to meet basic human needs, then it has the potential for longevity - as long as the need persists.

Today we can see an increase in Internet sales. According to a study by the AdvantShop agency, in April 2020 the number of new online stores doubled (99.02%) compared to January-March, and one and a half times more than in April last year. This is due to the fact that a business has to adapt to a new life and the best solution - is to go online.

People who were previously unwilling to shop online are finding today that using apps and social media make shopping easier than ever. One of the critical drawbacks of online shopping is the lack of human interaction. As more cities are closed, nonessential businesses are ordered to close, and customers tend to avoid public places. Restricting shopping for everything other than essentials is becoming the new normal. Brands must adapt and be flexible to meet changing needs. In physical stores, consumers also want to see an ongoing emphasis on cleaning and safety. As consumers determine where to shop, they prioritize cleaning and disinfection and look for places to shop where there are masks, gloves and barriers.

During the pandemic, the delivery of food and essential goods via the Internet became the only means of communication with the world for many self-isolated or forced quarantine Russians. According to the Association of Retail Companies (AKORT), which includes the country's largest retailers, at the beginning of April the traffic of stores in the "near home" format in Russia decreased by 20-30%, number of supermarkets - by 40-60%. At the same time, there was a sharp influx of buyers into online grocery delivery services, which even led to a disruption in the provision of their services (Online trade: how consumer preferences have changed during the pandemic. 2020).
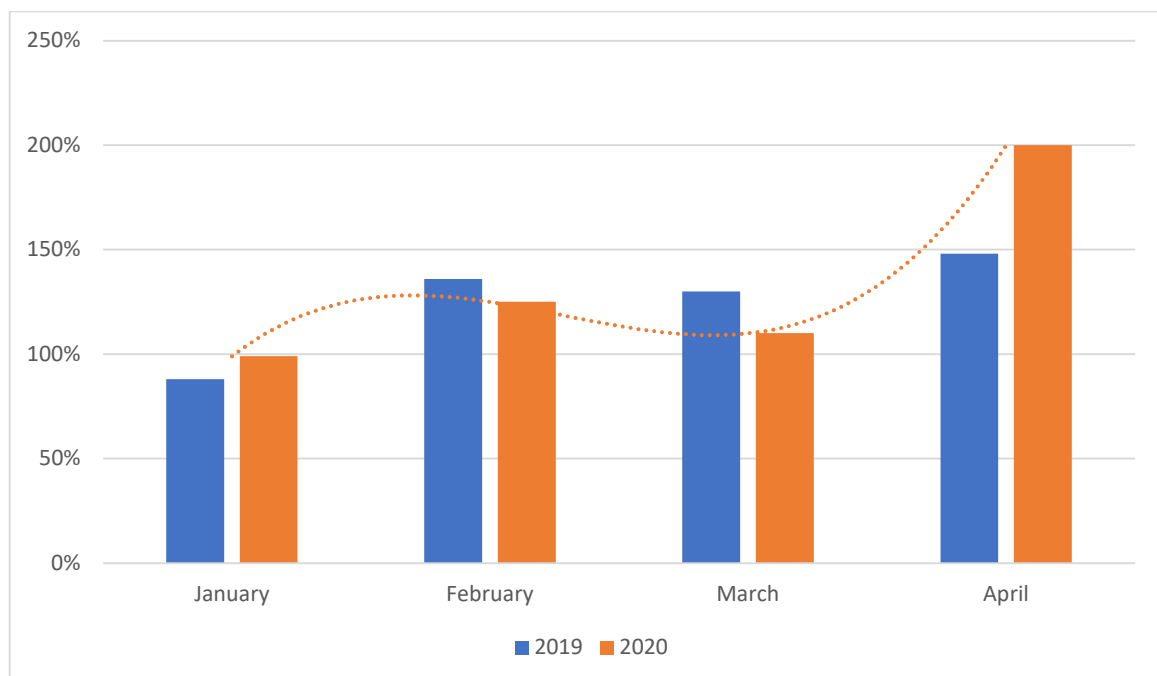

Figure 6 New online stores in Russia

Source: Analytics on Online Sales During the Quarantine Period. (2020, May 5). *AdvantShop.* Retrieved from <https://www.advantshop.net/blog/common/analitika-po-onlain-prodazham-v-period-karantina?fbclid=IwAR2kEirS64VAStKVl-jkbzxbAeW-5i95h4sNtzh-XTLWRwxYr77smt1tXYw

The COVID-19 crisis will end sometimes. Changes in consumer preferences and business models will experience an immediate crisis. This has begun to show in China, where the number of consumers intending to make a permanent move to online shopping (increased by 55 percent and overall e-commerce penetration since COVID-19 has increased by three to six percent) (Diebner et al., 2020).

As during the war, the army adapts its tactics and strategy in accordance with the changing situation, so companies must apply new management decisions in order to win. Today we can see how the post-crisis economy has introduced new non-standard solutions for many areas where remote communication methods are used:

- Fitness trainers conduct classes online;
- Estate agents conducting online tours of apartments for sale;
- Movies premiered online while cinemas are closed (Ilyin, 2020);
- Car dealers broadcast the interiors of new cars;
- Farmers harvest in the field to sell goods to buyers online;
- Chefs conduct live cooking lessons in restaurant kitchens;
- Musicians give live performances from their homes and ect.;

CONCLUSIONS AND RECOMMENDATIONS

The above examples of digitalization in times of crisis show us that companies can still connect with their customers and stay afloat during difficult times.

The virus has accelerated three long-term courses of action:

- An ever-growing focus on health. Brands must heed these changes and prioritize supporting healthy lifestyles of consumers and employees. Having a "health strategy" will be a strategic differentiator for the foreseeable future.
- The growth of conscious consumption. Consumers are more attentive to what they buy. They tend to shop more consciously and buy more sustainable options. Brands will need to make this a key part of their offering (for example, by exploring new business models).
- Growing love for local brands. The desire to shop locally is reflected in both the product that is purchased (for example, local market, handicraft) and the way of shopping (supporting community stores).

In particular, those who viewed digital commerce as a secondary line of business now have to restructure all aspects of their activities taking into account the trends of remote shopping. To increase the volume of online sales, you should also think about expanding the product and service line. This situation provides an opportunity to increase revenues, attract new customers and stimulate a shift in distribution channels, but this all depends on the stability of digital channels and their scalability. With agility and responsiveness, businesses can take advantage of these new opportunities, while systems must be able to withstand growing demands and action must be taken at an accelerated pace.

The COVID-19 pandemic is accelerating the development of digital commerce around the world, forcing businesses to rethink their digital strategy in order to exploit new opportunities and gain significant share in new digital customer segments. We believe that a business in this case must answer three main questions in order to increase the efficiency of an online sales:

- How to support customers and employees in times of uncertainty?

- How to stabilize digital operations, ensure smooth transactions and the ability to cope with growing demand?
- How to change products, services and markets, create new partnerships and ecosystems to retain new and existing customers?

Companies can also set up an inquiry and response center. In dealing with inquiries from their customers, companies can scale up their "quick response" process by asking the right questions, analyzing data, and using predictive analytics in real time across all customer communication channels. Implementing such an infrastructure for exploring queries will allow them to adapt their working methods over time, making them more relevant.

We can conclude that consumer attitudes, behavior and purchasing habits are changing - and many of this will remain after the pandemic. While shopping is currently focused on the most basic needs, people are more mindful, buying locally, and going digital. Their priorities have become focused on the most basic needs, the demand for hygiene, cleaning products and basic foodstuffs is increasing, while the demand for nonessential goods is falling. COVID-19 is a health and economic crisis that has a lasting impact on consumer attitudes, behavior and purchasing habits. Companies can adapt to these changes by taking response actions to be even stronger in the future.

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GLOBALISATION AND REGIONALISATION

WORLD PRACTICE STATE SUPPORT OF EXPORT

Anatolii Mazaraki

Doctor of Sciences (Economics), Professor, Kyiv National University of Trade and Economics, rektor@knute.edu.ua

Ganna Duginets[*]

Doctor of Sciences (Economics), Associate Professor, Kyiv National University of Trade and Economics, g.duginets@knute.edu.ua

Abstract: It is substantiated that the results of the study are important for the formation of the mechanism of transformation of institutional support for exports in Ukraine. The specifics of the activity of state institutions (level of development and main goals of formation of the institutional mechanism for export support) in the USA, Great Britain, Germany, France, Canada and other developed foreign countries are given. The characteristics of the subjects and tools of export promotion and the results of the analysis of the world experience of the most successful application of tax incentives for export activities are given. The identification of mechanisms for non-financial support of exporters shows that the promotion of exports in world practice is represented by a system of interacting governmental and non-governmental institutions. A study of government incentives for exports in the world showed that almost all countries have a separate institution that regulates export activities in the country.

The conclusion on expediency of combination in one department, namely in the Ministry of Foreign Affairs (MFA), functions of formation of foreign policy and foreign economic strategy of the states is received. The Ministry of Foreign Affairs plays a dominant role in the processes of organizing the support of exporters both at the level of communication with state institutions of other countries and at the level of initiating a number of changes in the policy of export promotion within the country. The practical significance of the study is that its results and developed proposals can be used in the practice of public authorities to improve the process of forming the export strategy of Ukraine for the future.

Keywords: State Support, Export, The Institutional Mechanism, The Ministry Of Foreign Affairs

JEL classification: F 68, M 38, O 24.

[*] Corresponding author

INTRODUCTION

Global crises in the world economic system have very serious consequences for the economy of any country. Thus, taking into account the specifics of the economic system of Ukraine, we can note its export-oriented nature. A significant problem that can be traced today in the organization of export activities of domestic enterprises is the low level of institutional support for producers by public authorities in the international market.

The vast majority of domestic enterprises supply raw materials and semi-finished products to the world market, and the share of high value-added products remains quite low. Such trends do not contribute to the economic security of the country, which requires the formulation of new approaches to the organization of export activities at the level of individual sectors of the national economy. To increase the level of competitiveness of Ukrainian enterprises, including the importance of the transformation of mechanisms of institutional support for exports in the direction of diversification of markets. All the above highlights the issue of studying the world practice of state export support.

LITERATURE REVIEW

The issue of the effectiveness of export support by the state is regularly studied by experts from the International Monetary Fund, the World Bank, a number of think tanks in the United States and Western Europe.

Research on the relationship between export promotion policies and further economic growth is also noteworthy. Thus, the research of D. Santos on the example of five ASEAN countries (Santosa, 2018), the work of D. Vnukovsky on the study of the experience of the Export Promotion Agency in Great Britain, Hungary and the Czech Republic (Wnukowski, et al, 2016), the work of Éltető A., Antalóczy K. on public assistance policy on state trade facilitation policy and relevant institutions in the Baltic States, Visegrad and Iberia are interesting (Éltető, Antalóczy, 2017).

As for domestic scientists, the following studies deserve attention: O. Kamyanetskaya on the system of state support for exporters in developed countries; A. Mazaraki on the institutional framework for supporting the export of domestic producers (Mazaraki, et al, 2018). O. Sharov on the analysis of general theoretical issues of economic diplomacy as a science of international economic relations and a means of implementing foreign economic policy (Sharov, 2019).

Without denying the significant contribution of existing developments in the chosen field of study, it should be noted another aspect that must be taken into account in shaping the foreign policy of the state. This is the identification of the features of the development of state policy to improve the institutional framework of exports in the economy of Ukraine.

METHODOLOGY

The study uses a complex of complementary methods of scientific identification of economic processes and phenomena: the system-structural, comparative and statistical analysis, and the informational, process and institutional approaches.

The information base of the research is formed by statistical and analytical materials and informational and analytical collections, bulletins and reviews, made public by such sources as the Organization for Economic Cooperation and Development, World Bank Group, European Bureau of

Statistics, Ukrainian and foreign research centres, factual information provided by state authorities, a wide range of domestic and foreign literary sources, and results of own research.

RESULTS AND DISCUSSION

In modern conditions, state support for exports, which is represented by a system of interacting governmental and non-governmental institutions, is a priority of economic policy of foreign countries. In the context of globalization, export support is one of the most dynamic areas of modern economic policy of foreign countries. By solving the problem of increasing national competitiveness, developed and developing countries significantly increase the intensity and scale of state export assistance.

According to a U.S. report. Congress on Global Export Credit Competition (EXIM, 2020) the most common means of state support for exporters are as follows:

- institutional support, which is the organization of measures for the formation and implementation of foreign economic strategy by governments and authorized public administration bodies (the Ministry of Foreign Affairs in particular);
- export crediting, which is implemented by different countries in accordance with their objectives and priorities.

The experience of the United Kingdom is quite indicative in terms of organizing effective institutional exporters. In order to support national exporters, the UK Government, on behalf of the country's Foreign Ministry, works in four main areas, including business support at all levels and scales. These areas are as follows: incentives, information, assistance in entering foreign markets and financial support.

Also, these areas and other artifacts of export promotion policy are defined in the document "British Export Strategy" (GOV UK, 2020). The implementation of these directions is aimed directly at overcoming the aforementioned barriers; each is supported by a set of resources and initiatives. Support and promotion of export activities in the British Foreign Office, in accordance with the government's export strategy, is based on the following principles (GOV UK, 2020):

- increasing the share of the private sector involved in foreign trade operations;
- stimulating medium-sized enterprises to export activity;
- organization of an open dialogue between the state and enterprises for joint solution of problems;
- raising awareness of small and medium-sized businesses about the mechanisms to support export activities;
- creation of an array of up-to-date analytical information on foreign markets, levels of competition in them;
- processing, analysis and dissemination of "best practices" of export activities among enterprises of all business levels.

The British Foreign and Commonwealth Office (UKTI) is accountable successfully for the implementation of the export strategy. The economic departments of the foreign diplomatic missions of the United Kingdom are an integral part of this department. In total, there are approximately 162 sections operating in almost 100 countries outside the country. The manager and a certain number of employees belong to the diplomatic staff (rotation takes place every 3-4 years). Other employees of the department are recruited from the local population of the host country on a long-term basis (EESC, 2020). In particular, a number of initiatives have already been implemented in the UK as part of the information mechanism, including the following:

- Great.gov.uk: The portal was launched in November 2016 to support businesses that need information and advice on export activities. About 3.6 million users have visited the service since its launch. The platform also allows you to establish business contacts with foreign companies from around the world.
- Establishment of an intellectual property management service: provides consulting services to provide information to exporters in the trade of exclusive rights abroad, as well as when entering new markets. In addition, the service provides support to companies in the event of conflicts in the field of patent protection.
- Establishment of an association of e-commerce consultants: this event allows small and medium-sized businesses to develop their own export plan (plan to enter a foreign market) through the use of digital platforms and solutions, as well as develop online strategies for marketing, advertising and promotion foreign markets. In addition, e-commerce consultants help to establish direct online contacts between UK companies and manufacturing, trade organizations, economic growth centers, trade associations in foreign markets.

Also noteworthy is the French experience of institutional assistance to enterprises in entering the foreign market. The Rhône-Alpes region, with the largest trade balance, traditionally open to Europe and the world, has made significant progress in this direction, demonstrating pragmatism and the ability to innovate in foreign trade, creating the ERAI (Enterprice Rhone Alpes International) in 1987. This was done at the initiative of the authorities, the Union of Entrepreneurs and the Chambers of Commerce and Industry of the region (ERAI-MONDE, 2020).

Due to the dual action of decentralization and globalization, the necessary functions of state organizations at various levels, at the initiative of the government, were concentrated at the local level. However, the main catalyst in the implementation of assistance programs for exporting companies is the Ministry of Foreign Affairs. At that time, local institutions were given the regulatory role and function of an arbitrator at the regional level. The role of organizations such as ERAI MONDE, which works to promote and support exporters of major French regional and national organizations, as well as foreign companies seeking to enter the French market, is important. ERAI MONDE is one of the world's largest support networks for companies in their international development. The positive experience of ERAI MONDE can be used in the conditions of modern Ukraine (ERAI-MONDE, 2020).

In the context of achieving the goal of the study, it is interesting to analyze the experience of Canada. The Ministry of Foreign Affairs of Canada reports to the Office of Trade Commissioners, which is headed by a senior official of the Ministry in the rank of Deputy Minister, who reports to three functional units: International Business Development Policy (forward planning group); Operations and Services Bureau (organization of free educational programs, seminars and conferences for exporters, methodical guidance of foreign institutions); Market Development Bureau (market research center, market research by priority sectors and preparation of reviews, work with industry associations). The main tasks of the Service of Trade Commissioners: preparation of Canadian companies to enter international markets; assessing the company's potential in target markets and providing advice on market strategies; search for contacts; assistance in resolving problematic issues in the field of business (Government of Canada, 2020). In Denmark, for example, there is a Trade Council under the Danish Ministry of Foreign Affairs and Development, which is responsible for finding new markets, solving problems of Danish companies in cooperation with foreign governments, analyzing the purchasing power of foreign consumers and the needs of foreign markets, etc. (Ministry of Foreign Affairs of Denmark, 2020).

The Ministry of Foreign Affairs and Trade of Hungary is responsible for the realization of the foreign economic interests of the state in the host country; assistance in increasing the export of Hungarian

goods and services and their entry into foreign markets, effective representation of the interests of Hungarian enterprises through economic and diplomatic means, providing commercial information to Hungarian enterprises and assisting in establishing appropriate links; within the framework of the EU's common trade policy, the provision of the necessary information to pursue Hungary's foreign economic interests (KORMANY, 2020).

Table 1. Characteristics of entities and instruments of export promotion for some developed foreign countries

Country	The subject of regulation	Tools
The USA	export-import bank Ministry of Trade	direct lending, credit insurance and other insurance programs technical assistance, specialized research, feasibility studies, orientation visits, grants for trainings and conferences
The UK	Ministry of Foreign Affairs, Foreign Office	export credits and guarantees, providing extended consultations, assistance in market research
Japan	Ministry of Foreign Affairs of Japan	taxes: special deductions from export earnings, return of import duties to exporters; financing that stimulated exports: measures to reduce the cost of exports before departure, the establishment of a Japanese bank of export-import operations; favorable exchange rate; export competitions; lending
The Netherlands	Ministry of Foreign Affairs of the Netherlands	carries out practical work to ensure the promotion of Dutch companies, their goods and services in foreign markets
Denmark	Trade Council under the Ministry of Foreign Affairs and Development of Denmark	direct lending, credit insurance and other insurance programs
Canada	Ministry of Foreign Affairs of Canada	training Canadian companies to enter international markets; assessing the company's potential in target markets and providing advice on market strategies; search for contacts; assistance in resolving problematic issues in the field of business
The Republic of Lithuania	Ministry of Foreign Affairs of the Republic of Lithuania	provides consulting and information support to exporters, including services on market analysis, consulting on export activities, staff training, finding business partners, organizing the participation of Lithuanian companies in international exhibitions (exporters are reimbursed about 70% of costs), organizing business visits or finding business partners through Enterprise Lithuania representative offices abroad (in the most promising countries of sale of Lithuanian goods).
Germany	Federal Ministry of Economy and Technology Federal Ministry of Foreign Affairs German Chambers of Commerce	coordination of export promotion activities of all federal institutions; export promotion programs for small and medium enterprises, etc. building the image of the country; study of the political and economic environment Marketing researches; building the image of the country; study of the political and economic environment; export support services
France	Ministry of Foreign Affairs, Ministry of Economy and Finance	information and consulting support, organization of assistance in issuing export credits

Source: compiled by the author according to (Dziuba, 2016; Kamyanetska, 2016; Loshenyuk, 2017)

Obviously, this is not an exhaustive list of countries (to some extent, the Ministries of Foreign Affairs of France, the Netherlands, Lithuania, and Slovakia are tasked with supporting exporters (Government of the Netherlands, 2020; MZV, 2020; URM, 2020). In modern conditions, politics and economics are so interdependent that ignoring this fact leads to miscalculations, both in political and economic matters. Conversely, taking this dependence into account when planning and making strategic decisions will provide the best results.

Describing the mechanisms of non-financial support for exporters, we can summarize that abroad, export promotion is represented by a system of interacting governmental and non-governmental institutions. A study of state incentives for exports in the world showed that almost all countries have a separate institution that regulates export activities in the country (Table 1).

Table 2 Examples of the most successful use of international experience in the application of tax incentives

Country	Adjustment tools
India	In India, tax deductions of 125 to 200% are allowed for targeted R&D expenditures within the country. Companies are also allowed to attribute to the cost of salaries of employees engaged in R&D and the cost of materials that companies have incurred for up to three years before starting a business. It is also important to note that tax breaks for R&D activities in India do not apply to the IT industry.
China	Reduced VAT rate (0% for certain R&D services), preferential income tax rate (15% for R&D companies at a basic rate of 25%) and exemption from customs duties on imports of innovative equipment. The state also reimburses all VAT paid on innovative equipment purchased domestically
Singapore	Territorial system of taxation. If part of the income of a Singaporean company is considered not received in the territory of Singapore, it may not be subject to income tax within the country. An additional incentive for R&D is applied in the form of tax deductions from 100 to 300% of the target costs. At the same time, tax deductions over 150% can be applied only by enterprises whose activities are carried out within the country. Companies are also allowed to attribute direct R&D costs to costs, including depreciation of relevant equipment and staff salaries.
Israel	Tax benefits and grants are applied. In Israel, R&D companies have reduced income tax rates of up to 16% and even up to 5% (with a normal income tax rate of 25%). Rates vary depending on the size of the company and the priority of the area in which it operates. Among the peculiarities of Israel is the preferential treatment for business angels (private investors), which allows them to deduct from their taxable income the amount of investment in Israeli R&D companies (maximum deduction for one company - 5 million new Israeli shekels), thus de facto reducing personal income tax
Ireland	the income tax rate is one of the lowest in the EU -12.5%. Additionally grants the right to a tax credit of 25% for targeted costs and costs for the implementation or reconstruction of facilities used in the R&D

Source: compiled by the author according to (Kotysh, Strizhak, 2017; Skok, 2016))

Based on the information given in table 1, we can conclude that the considered export promotion policies in different developed countries have certain common features: the provision of financial assistance (loans, grants), informing, assistance in foreign market research.

Considering the financial levers of support for exporters, we note that in modern world practice there is a conditional division of public export credit into two major groups - short-term and long-term export credit.

However, despite the fact that credit support for exporters is the main financial instrument that stimulates foreign trade, fiscal instruments also play a significant role, which are calculated in the appropriate tax incentives in the development of export activities. Some examples of the most successful use of international experience in applying tax incentives are developed in the table. 2.

The following tax incentives are applied to exporters in the world (especially in the scientific and technical sphere): tax deductions, tax credits, preferential rates, accelerated depreciation and various grants. They are aimed at reducing VAT, income tax, capital gains tax and, sometimes, personal income tax. At the same time, different combinations of tax incentives are used in different countries. Regarding the support of short-term export operations, in some countries, in particular in the EU, ESA is prohibited by law to provide short-term support primarily due to the large number of providers of this type of service. At the same time, other countries (particularly in Asia) encourage ESA to provide short-term export credit financing mainly so that private providers become the main domestic providers of short-term trade credit support for all exports, as their number in the domestic market is very limited.

Also in this issue it is necessary to reveal the features of the policy of export promotion of some of the most developed countries in the world - Germany and the United States.

Germany's national support system for foreign economic activity was established more than 60 years ago, and during the operation of this system the volume of exports (after increasing to 1963), due to the growing international trade market, has not changed, allowing only slight fluctuations. The exporter support system in Germany consists of:

- measures of a financial nature: granting and insuring export credits against economic and political risks; insurance of investments of enterprises abroad, abolition of VAT for exporting companies; preferential terms of trade with European countries, subsidies - direct and cross.
- information and consulting support of foreign economic activity: assistance in carrying out exhibition and fair activities abroad, obtaining expert consultations on production issues, staff training, R&D, as well as financing costs incurred in launching innovative products on the market, including patents, foreign trade network chamber.

German direct investment abroad through the relocation of German capital to countries with more favorable production conditions facilitated the opening and use of sources of raw materials and semi-finished products, as well as opened new markets for German goods and services, creating conditions for political and economic development of recipient countries, favorable for German business (Kotysh, Strizhak, 2017).

In the United States, one of the main directions of export development has been the protection and support of the development of industries that are most promising in terms of strengthening international competitiveness. These are the aerospace industry, telecommunications, the production of environmental technologies, energy, transport and financial services (Loshenyuk, 2017). At the end of the XX century the United States provided economic assistance in the form of loans to European countries, supporting their market economies and thus maintaining the market for American exports. Then the "Swiss" formula for reducing tariffs on industrial goods was adopted, free trade zones, framework agreements on trade and investment with developing countries, providing them with technical assistance (Mazaraki, et al, 2018).

At the moment, as part of export support, companies are provided with guarantees for private loans and tax benefits, equalization of "competitive conditions", the media report on new opportunities. The Ministry of Trade subsidizes exhibition and fair activities. Companies can also receive a package of free services, which includes: market research of the counterparty country, analysis of this sector of

production, analysis of international markets. The state stimulates the involvement of American private capital in the social and economic development of the least developed countries and countries with economies in transition.

CONCLUSIONS AND RECOMMENDATIONS

Export development in developed countries is of paramount importance. As a result, economic factors of national interests are always present in the current foreign policy priorities of all countries, as they are a source of well-being of citizens, ensure the development and prosperity of the state. The results of the analysis of the world practice of state policy of export promotion in different developed countries indicate the presence of certain common features: the provision of financial assistance (loans, grants), information, assistance in foreign market research. Another conclusion useful for implementation in Ukraine is the feasibility of combining in one department, namely the Ministry of Foreign Affairs, the development and further implementation of foreign policy and foreign economic strategy. Taking into account the experience of other countries, an effective state model of protection and promotion of the interests of Ukrainian business abroad should be created on the basis of the Ministry of Foreign Affairs. Including by supplementing this model with an economic unit. Further researches of authors will be directed on a substantiation of the mechanism of such transformation.

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ICT BASED MANAGEMENT OF SMART VILLAGES DEVELOPMENT

Lela Ristić[*]

University of Kragujevac - Faculty of Economics, lristic@kg.ac.rs

Milica Vujičić

State University of Novi Pazar - Department of Economic Sciences, vujicicmilica@yahoo.com

Miloš Dimitrijević

University of Kragujevac - Faculty of Economics, mdimitrijevic@kg.ac.rs

Contact person. The potential of information and communication technologies can play a key role in more rapid and sustainable development of rural areas in the coming period using the smart village management model. It is understood that important determinants for development of smart and competitive villages are good connections - broadband infrastructure in rural areas, access to the market via the Internet, modernization of farms and diversification of rural economy. All rural settlements have a chance to be smart, and the implementation of this concept applies to the entire rural environment, groups of rural settlements and their links with cities. Rural areas are often faced with slow and unreliable ICT infrastructure networks, which limits their access to information and services that can boost the economic and social development. Accordingly, the subject of research conducted in this paper is the ICT based management of smart villages development. The aim of this research is to point out to the necessity of introducing ICTs in the development of rural communities. The paper starts from the following hypothesis: If future directions of rural development rely more substantially on ICT, more prosperous development of rural communities can be expected. The Conclusion section brings to attention the fact that identifying bottlenecks and eliminating the digital divide in the rural-urban relationship, while improving ICT and entrepreneurial skills, as well as promoting social norms, new ideas and best practices in rural management, is a key feature and important strategy in the implementation of the smart villages concept.

Keywords: Management, Smart villages, Rural development, ICT (Information and Communication Technology), IoT (Internet of Things)

JEL classification: O39, Q16, R59.

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[*]Corresponding author.

INTRODUCTION

The application of the smart villages concept includes the use of modern ICTs, e-government, good infrastructure, efficient public transport, food safety, environmental and socio-economic development, health care, individual and community development, modern education systems, local business development, modern waste, water, forest and land management, production and use of renewable energy, energy efficiency and capacity building in the field of agriculture and rural development. Regardless of the complexity of the concept, the issue of revitalization of rural areas using the mentioned model is becoming increasingly relevant. Examples of good practice relating to smart villages have common sustainability features, innovative solutions and adequate strategies, regardless of rural differences.

The subject of research in this paper is the ICT based management of smart villages development and the Internet of Things.

The aim of the research is to stress the necessity of introducing the ICT and Internet of Things into the process of rural development.

The paper starts from the following hypothesis: If future directions of rural development rely more substantially on ICT, more prosperous development of rural communities can be expected.

LITERATURE REVIEW

The smart villages concept is relatively new within the framework of rural development policy (Zavratnik et al., 2018). This concept implies that traditional networks and services are replaced by digital ones, that knowledge is better applied to benefit the local population, i.e., the social and economic development of a specific area, which also implies providing a better standard of living for the entire rural community. More efficient use of resources within this concept is aimed at preserving the environment, but also at creating new development opportunities for the rural economy, such as more efficient patterns of energy production and consumption by local community, new jobs, environmental benefits, development of modern e-farms and etc. (Somwanshi et al., 2016). In parallel, modern technologies, investments and human capital are key factors in the creation and implementation of the smart villages concept. This concept focuses on local population's acquiring of e-literacy skills, better access to e-health, e-banking and other important public services, as well as implementing innovative solutions to environmental problems, promoting local products, services, traditional values and etc. (Jovanović & Gavrić, 2018).

The main reasons for introducing the smart villages concept are (Hess et al., 2018):

- Responding to depopulation and demographic change;
- Finding local solutions to public funding cuts and the centralisation of public services;
- Exploiting linkages with small towns and cities;
- Maximizing the role of rural areas in the transition to a low-carbon, circular economy;
- Promoting the digital transformation of rural areas.

Important determinants for the development of smart and competitive villages are (Thorpe et al., 2016): good connections – developed broadband infrastructure in rural areas, in order to overcome the isolation of these areas when it comes to the availability and use of various modern services; development and access to the market via the Internet; population education; modernization of farms and diversification of rural economy for the sustainability of rural communities.

The application of the smart villages concept includes (Hess et al., 2018): precision agriculture (automation, sensors, robotics, etc.); digital platforms (e-learning, e-health, e-government, e-banking, etc.); mobility and suitable social services; circular economy, in terms of adequate waste management; new business models, development of entrepreneurship and SME sector; investments in rural development and the like.

Efforts to develop smart villages imply a set of actions, measures and policies aimed at sustainable development of rural areas (Visvizi et al., 2019).

In the European Union (EU), the development of smart villages is promoted by: Common Agricultural Policy (CAP); Cohesion policy; Horizon 2020; Digital Europe Program for 2021-2027; ENRD Thematic Groups; Broadband Competence Offices; Digital Innovation Hubs; European Pilot Projects and Preparatory Actions, such as Smart Rural Transport Areas (SMARTA); Smart Rural Areas in the 21st Century, etc. Their purpose is to implement successful practices, information methods and broadband networks (ENRD, 2017).

Rural areas across Europe are undergoing rapid changes. In this context, smart villages are seen as communities that need to respond proactively to relevant contemporary challenges, in order to find new opportunities for survival and development. There are different models concerning possible action, building on digitalization, social innovations, establishing cooperation with urban areas, the transition to a greener and healthier economy and equal opportunities for all. Rural policy and development creators in the EU, at national, regional and local levels, find new opportunities to apply the smart villages concept. However, smart villages do not copy the model of digitalization of urban areas, but strengthen the attractiveness of rural areas and create conditions for increasing competitiveness in the process of transforming the EU into a digital economy. The key challenges for successful digitalization of rural areas are supported by appropriate education and training, as well as investment in modern forms of broadband network (Hess et al., 2018).

METHODOLOGY

The research builds on scientific methods suitable for the identified problem area, such as content analysis - in terms of analysis of relevant documents and official statistics (Eurostat, Statistical Office of the Republic of Serbia, European Network for Rural Development, etc.), as well as the results of previous research conducted by many authors across the world in modern environment. The methods of description and comparison are supported by appropriate tabular and graphical representations and figures. In addition, given the specific nature of the researched issues, historical, analytical and synthesis methods are used.

RESULTS AND DISCUSSION

Smart villages share certain traits

Smart villages (Figure 1) are rural communities which build on their existing strengths, where traditional and new networks are enhanced by means of digital communications technologies, social innovations and the better use of knowledge for the benefit of inhabitants. Namely, smart villages share certain traits (ENRD, 2018a):

- They are about rural citizens taking the initiative to find practical solutions that would transform their locality, efficiency targets are carefully balanced.

- They are about using digital technologies only when appropriate to better serve the local community – not because they are fashionable.
- Many initiatives taking place involve the surrounding countryside, groups of villages, small towns and links to cities.
- They are about building new forms of cooperation and alliances – between farmers and other rural actors, between municipalities, the private sector and civil society, between the "bottom-up" and the "top-down".
- There is no single model or off-the-shelf solution. Successful projects take stock of local assets, draw on the best available knowledge and make change happen.

When used strategically, many rural development programmes are supporting "bottom-up" planning, training, technical assistance, piloting and financing of innovative projects. Smart villages use rural development policy as a catalyst to mobilize financial and human resources. At the same time, rural communities are responding to the challenges they face (ENRD, 2018a).
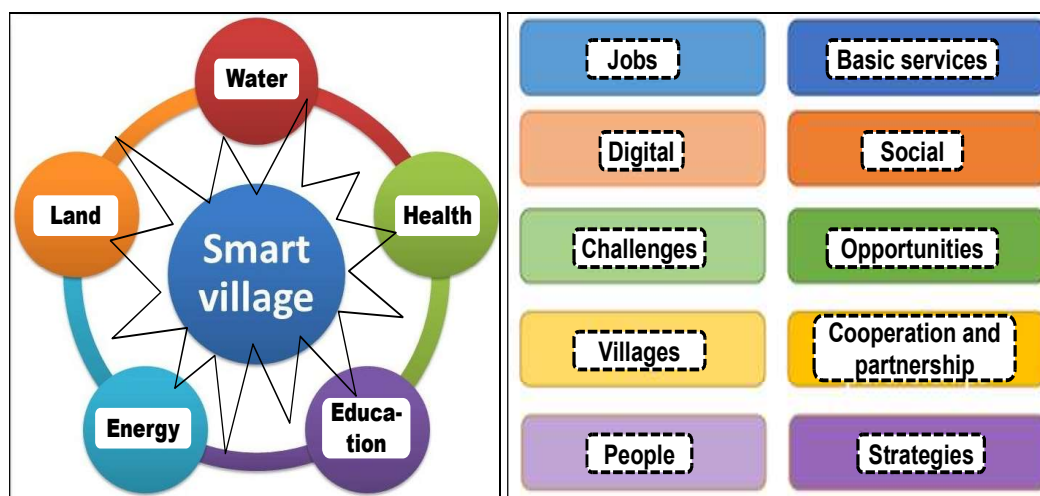

Figure 1 Smart villages

Source: IQS. (2019); & Soto, P. (2018)

Digital transformation of rural areas

In the early stages of digital transformation of rural areas there is a stronger need to support hard physical investments to bring internet and digital infrastructure to rural areas, together with soft interventions for capacity building in digital skills to take advantage of the investments made. As villages move towards more advanced stages, the interventions focus increasingly on the combination of soft and hard actions to enable villages and their actors to become digital players within wider regional and national ecosystems (ENRD, 2020).

To ensure digital transformation benefits, rural communities create conditions for smart villages. Taking into account the specific needs of each rural area and existing policy support, they must tackle all three components of the digital divide (ENRD, 2018b):

- broadband infrastructure;
- promoting the uptake of digital services;
- digital skills and literacy.

Information and communication technologies (ICTs) can be successfully applied if the cooperation with users is adequately designed. Unlike the traditional rural development management, in modern

environment the "bottom-up" process that focuses on the significant participation of local community should be implemented. Thus, ICTs can make a measurable and great contribution to (Ranade, Londhe & Mishra, 2015):

- Organized settlements - housing zones, playgrounds, agricultural land and infrastructure;
- Smart agriculture - precision agriculture enables information-based decision-making approach to farm management;
- Road infrastructure - ensures that all houses and people in rural areas are adequately connected;
- Smart water supply - more rational use of surface and groundwater resources;
- Smart sanitization – smart equipment facilitates surveillance and prevention, disease-free villages;
- Education - virtual classroom allows the use of knowledge provided by experts at other locations;
- Disaster management – disaster management cells are set up in villages and are connected with the regional and national disaster management centers via central server.

Smart villages require proper connecting of spatially dispersed sensors to the network, as well as the Internet. A large number of sensors, interactive communication and other information needs require a well-organized information-communication structure. Since we talk about rural areas, the only information and communication structure available is most often the one provided by mobile network carriers.

The major problem regarding the communication infrastructure in rural areas can be addressed by instaling fiber-optic infrastructure that will connect these areas with their neighbouring towns or cities. Rural-urban functional linkages are very important (Figure 2). In addition, communication between houses in a smart village can be established via coaxial cables, ensuring the high-speed data transmission. There is also the option of using a 5G network, which is based on optical signal transmission through the atmosphere, in the village area.

Certainly, the optimal solution regarding the communication infrastructure in a smart village is specific for each village or group of villages.
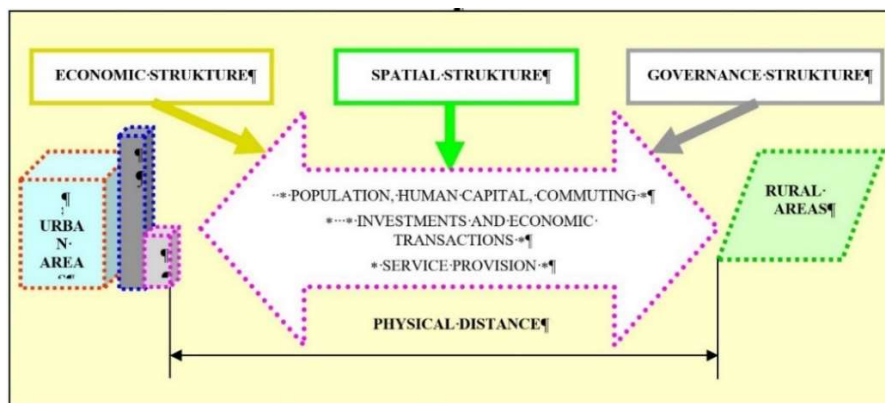

Figure 2 Rural-urban functional linkages
Source: Hess et al. (2018)

Communication in a smart village can be established in two ways: one way is to transmit all data via coaxial and optical cables where high-speed broadband Wi-Fi is used in the village; another way is to install a 5G base station in the village, thus no local Wi-Fi network is required. In both cases, all villagers regardless their location – whether they are in the field, in the vehicle or in their houses are connected to broadband high-speed Internet.
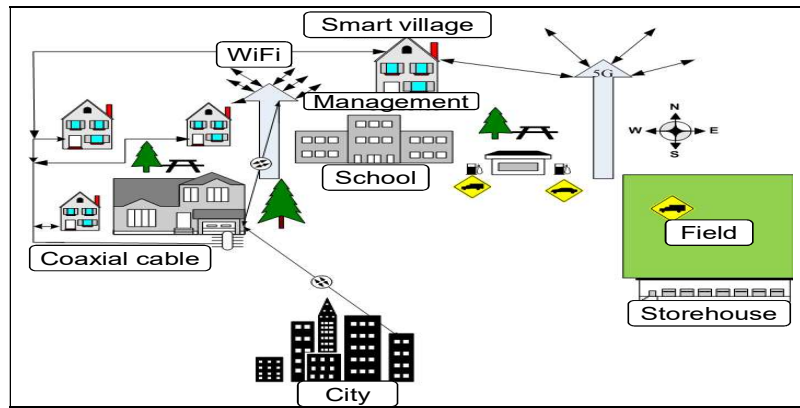
Figure 3 Communication in a smart village
Source: Ristić, L., & Barbarić, Ž. (2019)

Figure 3 shows the house as a smart village administration unit. This house keeps all the information about local sensors and networks in the smart village and all important data and information are transmitted from here to individual facilities and users. In terms of the landline telephone network development, no increase in the number of subscribers is expected in the coming period given that the use of mobile services is on the rise. The development of landline telephone network could go in the direction of greater representation of radio-relay connections, especially in rural areas where is difficult to lay wires and cables.

Internet of Things

According to the definition of the Internet of Things (IoT), provided by the International Telecommunication Union (ITU), "IoT describes the network of a billion or a trillion of physical objects - "things" - that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet". Users have access to services and are thereby able to interact with these smart objects via the Internet (Kaur, 2016). The basic principle of the IoT is to create a large network, consisting of various smart devices and networks, in order to enable sharing of data and information about global matters from any location and at any time. IoT is the technology of the future in the field of communication.

Figure 4 Technologies in smart villages
Source: Ristić, L., & Barbarić, Ž. (2019)

It is also the key to the concept of smart cities and villages. It allows the elements in the system to behave smartly, i.e., communicate and collaborate with each other. Objects are connected via wireless networks; these objects or devices are equipped with components for intelligent decision-making. Technologies

used in IoT are: RFID, 3S, WSN, Cloud computing, etc. Radio frequency identification (RFID) is a technology that assigns recognizable tags to various objects and devices.

These tags convert classic objects to smart objects. A technology popularly referred to as 3S technology consists of GPS (Global Position System), GIS (Geographic Information System) and RS (Remote Sense), which provides details about where various objects are located, using sensors, satellites, etc., and processes that information. The Wireless Sensor Network (WSN) is used to transmit information in the IoT. It consists of a network of sensors and storage resources, and computing is provided by Cloud services, which are location independent. The term Cloud computing is commonly used to describe data centers available to many users over the Internet. Gartner (2012) defines Big Data as high-volume, high-velocity and/or high-variety information assets that demand cost-effective, innovative forms of information processing that enable enhanced insight, decision making, and process automation. Figure 4 shows technologies that are of interest to smart villages.

The aspects concerning how the quality of life in villages can be improved by using IoT and smart village models are quite interesting. The first step in designing a smart village is to identify all the objects that will communicate with each other, and then one needs to plan a large number of sensors, surveillance cameras, buttons, emergency and other switches. These sensors and devices are connected to the Internet and able to produce huge amounts of data, which need to be stored and processed on Cloud servers. Data can be further analyzed for efficient use, using Big Data analytics and tools such as Hadoop. The ultimate goal implies smart homes, weather forecasting, education, surveillance, health care, elderly safety, smart agriculture and circular economy.

Smart homes

Smart homes are set up using sensors and cameras, thus communication with remote owners is established allowing them to take the necessary actions; for example, sensors installed in the house can detect smoke and automatically start water sprinklers to extinguish the fire. Similarly, sensors can monitor electricity consumption in the house and can turn off lights when not in use. The security of the building can be monitored by cameras and appropriate warnings can be generated, in case of any anomalies.

Weather forecast and irrigation

Accurate weather information can be of great benefit to people in the countryside. Using sensors to predict the weather can help farmers, as many agricultural activities, such as sowing, irrigation and harvesting, depend on the weather. Smart irrigation systems can use field sensors and satellite data to ensure optimal use of water resources. All this information can be available to farmers through alerts on their mobile phones.

Agricultural products

Given that agriculture is the backbone of rural development, farmers should benefit most from the IoT system and the smart villages concept. The product should be monitored from farm to fork. The entire chain of activities can be monitored and improved using data from sensors and similar sources, which is useful to farmers, processors, warehousing, transportation, suppliers, distributors, etc. (Kaur, 2016). Sensors located in the fields can help farmers by providing information on crop selection for planting, crop yield based on soil type or climate, smart irrigation and the like. Crop diseases can be predicted using sensor data and crop maturation can be detected.

Circular economy

Circular economy, as an integrated waste management system, is a regenerative economic system that is achieved by designing and creating products in a way that maximizes their life cycle using the

maintenance, servicing and recycling activities. This leads to the renewal of ecosystems, supported by a large number of innovations, thus having a significant impact on the habits of society as a whole.

Dairy processing plants

The secondary activity of a large number of farmers is raising livestock for dairy products. Temperature, food, water and health, as well as other livestock needs, can be monitored. Grazing cattle in the open fields has its risks, therefore, by the use of sensors it can be remotely controlled.

Healthcare services

Smart health services are needed to improve the quality of life in villages. Installation of technically advanced devices and equipment, connected with doctors, are needed in rural ambulances and hospitals. In hospitals and clinics, hospital beds can be equipped by sensors which can detect various changes of patient status, and send the data directly to the doctor.

Surveillance system

Security is a big concern in many villages, because the lighting is dim at night, and these areas are far from police stations and cities. In case of theft or robbery, in a smart village, the nearest emergency button can be pressed thus immediately sending a notification to the nearest police station. Cameras can be used to locate thieves and to avoid future incidents.

Education

Residents of smart villages are being trained to participate in activities that support a better lifestyle. IoT brings together different technologies, such as the Internet, mobile and smart devices, and thus facilitates the learning process. Rural schools should be equipped with the Internet and other equipment, hence allowing the learning process to become a fun activity and making possible the transition from traditional schools to "smart schools" (Kaur, 2016).

Concern for the safety of the elderly

A positive example of good practice in the EU relates to caring for the safety of the elderly, so that they can live in their homes as long and as safe as possible, because the most accidents involving the elderly occur in their homes; in remote and sparsely populated areas they cannot effectively get help from others. Such projects have been implemented in Finland, Austria, France and Germany, where regional authorities are developing smart technologies to help local people and entrepreneurs, i.e., to create an attractive environment for both the young and the old in rural areas, thus supporting demographic revitalization and future development (ENRD, 2018a).

Cooperatives

Smart village concept relies on cooperatives, thanks to its possibility of application in the establishment of green cooperatives, in addition to the existing traditional cooperative forms. Using the ICT and modern forms of digitalization, cooperatives are widespread in many areas of business, and most cooperatives relate to the agri-food sector, which predominatly uses raw materials from rural areas and is commonly located there.

Use of information and communication technologies in the Republic of Serbia

In the Republic of Serbia in 2019, 80.1% of households are connected to the internet (a 7.2% increase compared to 2018). 73.1% of households have a computer. In terms of the internet connection, 71.1% of internet users access the internet via mobile devices (phone or tablet) and this is the most common type of connection; ADSL connection is used by 44.9% of users. 79.6% of households have a broadband

internet connection (SORS, 2020). Differences are also observed when comparing the number of computers in urban and other settlements - 79.5% and 62.1%, respectively (Figure 5). Compared to 2018, this gap has slightly increased. The growing number of computers used support this conclusion. A growth rate of 1.3% is recorded in urban areas, while in other settlements we have a growth rate of 0.3% (SORS, 2019).

Significant differences are also identified when comparing the prevalence of internet connections in urban and other settlements (Figure 6): 85.8% versus 70.5%. Compared to 2018, the growth rate in urban settlements is 7.5%, while in other parts of Serbia it is 6.6%.

In Serbia, 79.6% of households in 2019 used a broadband internet connection, which is an increase of 7.1% compared to 2018. The representation of this type of connection is the highest in Belgrade region (89.0%), then in Vojvodina (81.7%), Šumadija and Western Serbia (75.0%) and Southern and Eastern Serbia (71.1%). Significant differences are also identified when comparing the prevalence of this type of internet connection in urban and other settlements: 85.6% and 69.5%, respectively (SORS, 2019).
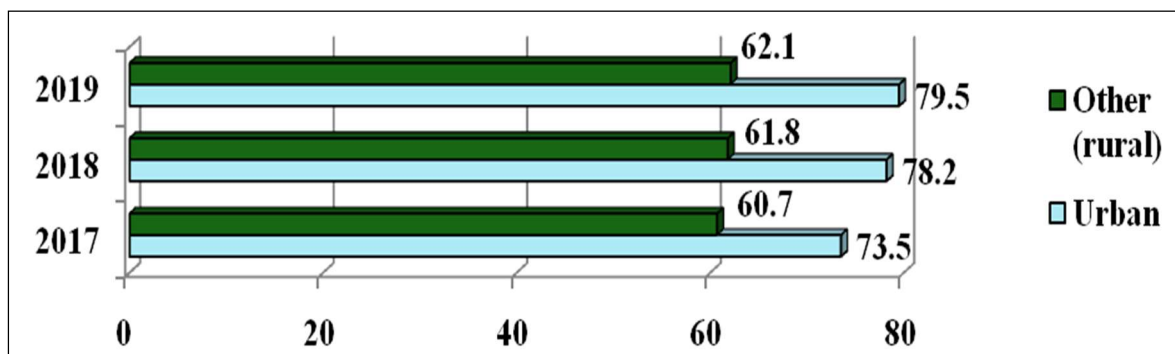

Figure 5 Percentage of households that own a computer per type of settlement - urban and other/rural settlements (%), 2017-2019
Source: SORS. (2019)
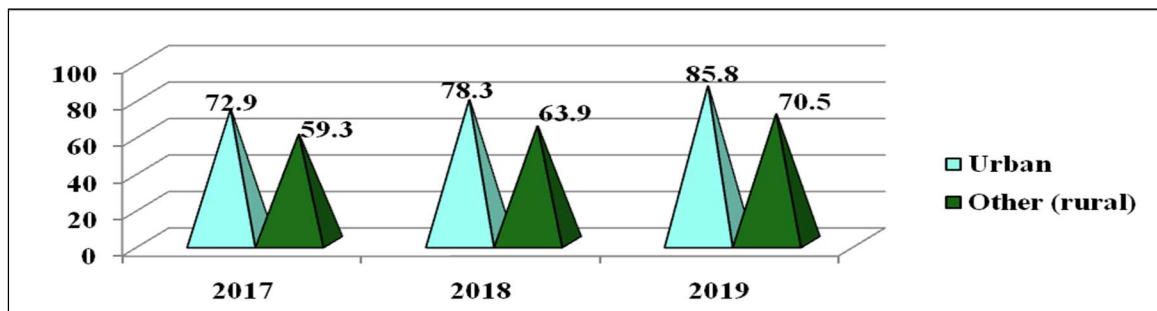
Figure 6 Households with internet connection per type of settlement (%), 2017-2019
Source: SORS. (2019)

CONCLUSIONS AND RECOMMENDATIONS

Smart villages are drivers of innovation. Therefore, fast and flexible support for innovative action/transition is of great importance. The issue of how to ensure that digital strategies benefit rural communities can be addressed by implementing the following (Soto, 2019):

- better targeting of investments in broadband infrastructure and connectivity;
- developing strategies for building digital skills;
- building rural digital ecosystems;
- promoting coordinated governance.

Smart villages development vision includes key connecting factors and benefits for rural communities, with a pragmatic understanding of the concept, in terms of finding practical solutions for the transformation of rural areas and their future development.

The initiatives to implement this concept include the entire rural environment, groups of rural settlements, small towns and connections of villages with large cities. While smart cities concept focuses on information and digital technologies, the concept of smart villages focuses on local communities. Action for smart villages implies an integrated approach, which will support all relevant rural stakeholders in their efforts towards development.

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DOES THE EURO AREA BELONG TO THE PPP CLUB?

Darja Boršič[*]

University of Maribor, Faculty of Economics and Business, darja.borsic@um.si

Jani Bekő

University of Maribor, Faculty of Economics and Business, jani.beko@um.si

Abstract: *Price competitiveness is one of the building blocks of every form of economic integration. This is in particular important for monetary unions. One of the oldest approaches for testing the mechanism of price competitiveness is the theory of purchasing power parity (PPP). The concept of PPP implies that the differences between domestic and foreign prices dictate the dynamics of exchange rates. Therefore, after calculating prices in common currency the national price levels should exhibit convergence. In this paper, we scrutinized the PPP hypothesis focusing on the eurozone. The analysis expands the existing PPP literature in three ways. First, we employ an updated data set covering the period from January 1999 to September 2020. Second, we explore the stationarity of bilateral real exchange rates with respect to three numeraire currencies: the US dollar, Japanese yen and Chinese yuan. And third, we run separate tests in order to dissect the importance of mean reversion in real exchange rates in the pre-Great Recession period and after the global contraction in economic activity. The panel econometric techniques presented in the paper produce support for the PPP proposition, although in many cases the results are heterogeneous depending on the selected numeraire currency and the targeted time period. Verification of the PPP suggests that the investigated real exchange rates are expected to retake constant equilibrium levels in the long run.*

Keywords: *Purchasing power parity, panel unit root test, euroarea economies.*

JEL classification: *C33, E31, F31.*

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[*] Corresponding author

INTRODUCTION

The theory of purchasing power parity (PPP) encapsulates the notion that the exchange rate between currencies is equivalent to the price level ratio of observed countries. More specifically, the idea is that changes in relatives prices affect the adjustment of exchange rates, the international arbitrage on markets for goods and services can therefore eliminate fundamental price disparities. Even under possible short-run deviations from equilibrium levels, the main theoretical conclusion is that at least in the long run exchange rates adjust to the PPP-determined levels. In spite of its intelectual appeal and theoretical relevance in international finance and trade, the empirical evidence about the PPP remains inconslusive.

Our study intends to scrutinize the empirical validity of the PPP proposition for 19 eurozone members by utilizing the following types of panel unit root tests: Levin, Lin and Chu test, Breitung test, Im, Pesaran and Shin test, Fisher ADF test and Fisher PP test. The analysis expands the existing PPP literature in three ways. First, we employ an updated data set covering the period from January 1999 to September 2020. Second, we explore the stationarity of bilateral real exchange rates with respect to three numeraire currencies: the US dollar, Japanese yen and Chinese yuan.

And third, we run separate tests in order to dissect the importance of mean reversion in real exchange rates in the pre-Great Recession period and after the global contraction in economic activity. The present paper is organized as follows. Section 2 focuses on a short review of relevant literature, while in Section 3 the econometric methodology and the database are explicated. The empirical results are discussed in Section 4. The key findings of the study are presented in Section 5.

LITERATURE REVIEW

The existence of PPP between the synthetic euro and eight major currencies was tested with the SURADF model for the period 1979–2003 by Koedijk, Tims and van Dijk (2004). At first the authors reported evidence about this exchange rate theory for the full panel of real exchange rates, but after allowing for heterogeneity in the rates of mean reversion, the stationarity could be confirmed only for Euro-Swiss franc exchange rate.

According to Lopez and Papell (2007), the rejection of the unit root assumption can be observed in the period 1996–1999 within the euro area and between euro area and other industrial as well as other EU countries. After studying national exchange rates per euro for 12 euroarea countries, Giannellis and Papadopoulos (2010) confirm that in 1980–2000 the majority of real exchange rates converged to PPP equilibrium. Nonlinear stationarity of real exchange rates for 8 out of 15 EU countries against the US dollar is also reported in Emirmahmutoglu and Omay (2014) for the sample period 1988–2013.

The results of study in Zhou, Bahmani-Oskooee and Kutan (2008) support the presence of nonlinear reversion in real exchange rates within the EU economies from 1975 onward. In the same study, the PPP evidence is even stronger for EU and non-EU economies after the adoption of the euro, when the period under observation is extended to 2006. An important piece of evidence in favour of PPP can be found in Bergin, Glick and Wu (2017).

The quoted researchers examined bilateral exchange rates of 9 original members of the euro area with respect to Germany for the period 1973–2016. Two findings stand out. First, the convergence of real exchange rates toward their long-run PPP equilibrium is significant and the estimated half-life of the real exchange rate is shorter after the introduction of the euro. Second, the distinction between shocks is crucial for identifying the change in half-life of the real exchange rates between various periods.

However, not all the reviewed empirical studies provide results consistent with the PPP proposition. Employing nonlinear unit root tests Zhou and Kutan (2011) proof that the stationarity of real exchange rates of EU economies is sensitive to selection of time period and numeraire currencies used. For the exchange rates of the original members of euro area against the US dollar the PPP could not be confirmed neither for the whole sample 1973–2009 nor for the post-1998-euro regime in Christidou and Panagiotidis (2010). Similar results are reported in Wu and Lin (2011) and in Huang and Yang (2015). Both studies used panel unit root test allowing for cross-sectional dependencies and confirmed the mean-reversion of real exchange rates against the US dollar before the introduction of the euro, but failed to reject the null hypothesis of unit root after the launch of the euro. The evidence of mean-reverting of real exchange rate is also weak in the study prepared by Su, Cheung and Roca (2014). The quoted researchers operated with monthly real effective exchange rates of 61 countries in the period 1994–2012. After examining the problems of heteroskedasticity and nonlinearity, the testing procedures reveal that the real effective exchange rates for the eurozone as well as for the most of other countries in the sample have nonstationary properties. Kavkler, Boršič and Bekő (2016) applied a nonlinear unit root test based on the ESTAR model to test the parity theory for 11 original eurozone countries between 1998 and 2012. Their presented results do not support the PPP dictum neither for the US dollar-calculated real exchange rates nor in the case of Japanese yen-calculated real exchange rates.

METHODOLOGY

Froot and Rogoff (1995) formally stated the PPP theory as:

$$e_t = \alpha_0 + \alpha_1 p_t + \alpha_2 p_t^* + \xi_t \qquad (1)$$

where e_t stands for the logarithm of nominal exchange rates, p_t denotes the logarithm of domestic price index and p_t^* is the logarithm of foreign price index, while ξ_t is the error term representing deviations from PPP. The nominal exchange rates are defined as the price of foreign currency in the units of domestic currency.

This paper examines the behaviour of real exchange rates allowing for $\alpha_0=0$, $\alpha_1=1$ and $\alpha_2=-1$ in Equation 1. Thus, we are testing the validity of the strict version of PPP, according to which the nominal exchange rates should adjust in order to eliminate changes in relative prices. Hence, the real exchange rates are supposed to be contant over the long-run. That means that the real exchange rates series are stationary and contain no unit roots (Parikh & Wakerley, 2000). In this paper the panel unit root procedures are applied in order to provide evidence for validity of PPP. As explained in Boršič and Bekő (2018) the empirical approach employs the AR(1) process for panel data, stated in Equation 2:

$$y_{i,t} = \rho_i y_{i,t-1} + X_{i,t} \delta_i + \varepsilon_{i,t} \qquad (2)$$

where i stands for N cross-section units observed over periods t=1, 2, ..., T_i, $X_{i,t}$ denotes any exogenous variables in the model (any fixed effects or individual trends), ρ_i represents autoregressive coefficients, while $\varepsilon_{i,t}$ are errors, which are assumed as mutually independent idiosyncratic disturbance. If the absolute value of ρ_i is less than one, the panel of y_i is weakly stationary. On the other hand, if the absolute value of ρ_i is 1, y_i contains a unit root. The preceeding empirical analysis utilizes several panel unit root procedures, which can be divided into two parts. First, Levin et al. (2002) and Breitung (2000) procedures assume common unit root processes, suggesting common autoregressive coefficients across cross-sections ($\rho_i=\rho$) for all i. Second, there are Im et al. (2003), Fisher ADF and Fisher PP tests (Maddala & Wu, 1999; Choi, 2001), which assume individual unit root processes, implying that ρ_i vary across cross-sections. A brief explanation of panel unit root tests applied in this paper is provided in Boršič and Bekő (2018).

Our current empirical analysis relies on monthly data ranging from January 1999 to September 2020 for 19 euroarea member states.

RESULTS AND DISCUSSION

The empirical results are divided into three parts. First, we examine the whole observed period (January 1999–September 2020). Second, the pre-economic crisis period from January 1999 to December 2007 istaken into account. And third, we analysed the post-economic crisis period ranging from July 2009 to September 2020. The NBER (2012) methodology for defining the US business cycles was applied in order to determine the structural break.

Table 1 Levin, Lin and Chu test

Sample	Reference currency	Bartlett kernel		Parzen kernel		Quadratic spectral kernel	
		Individual effects t* (p-value) [no. of lags]	Individual effects and individual linear trends t* (p-value) [no. of lags]	Individual effects t* (p-value) [no. of lags]	Individual effects and individual linear trends t* (p-value) [no. of lags]	Individual effects t* (p-value) [no. of lags]	Individual effects and individual linear trends t* (p-value) [no. of lags]
1999M1-2020M9	USD	-1.25314 (0.1051) [1]	0.45689 (0.6761) [1]	-1.01020 (0.1562) [1]	0.78127 (0.7827) [1]	-1.06342 (0.1438) [1]	0.71399 (0.7624) [1]
	JPY	-2.30030 (0.0107) [4]	-0.18262 (0.4275) [4]	-2.10538 (0.0176) [4]	0.27580 (0.6086) [4]	-2.22466 (0.0131) [4]	0.11502 (0.5458) [4]
	CNY	-1.29115 (0.0983) [2]	-1.78836 (0.0369) [2]	-1.12175 (0.1310) [2]	-1.55862 (0.0595) [2]	1.14521 (0.1261) [2]	-1.59846 (0.0550) [2]
1999M1-2007M12	USD	4.90199 (1.0000) [2]	-5.54791 (0.0000) [1]	5.24576 (1.0000) [2]	-5.29883 (0.0000) [1]	5.19000 (1.0000) [2]	-5.47828 (0.0000) [1]
	JPY	7.05376 (1.0000) [1]	-7.75256 (0.0000) [1]	7.15896 (1.0000) [1]	-7.79178 (0.0000) [1]	7.12195 (1.0000) [1]	7.85408 (0.0000) [1]
	CNY	-0.31838 (0.3751) [2]	-4.91405 (0.0000) [2]	-0.21986 (0.4130) [2]	-4.68343 (0.0000) [2]	-0.40160 (0.3440) [2]	-1.59846 (0.0550) [2]
2009M7-2020M9	USD	-1.62851 (0.0517) [7]	1.44636 (0.9260) [6]	-1.47228 (0.0705) [7]	1.79017 (0.9633) [6]	1.49176 (0.0679) [7]	1.77739 (0.9622) [6]
	JPY	0.43091 (0.6667) [1]	0.34430 (0.6347) [1]	0.62563 (0.7342) [1]	0.58340 (0.7202) [1]	0.49468 (0.6896) [1]	0.39797 (0.6547) [1]
	CNY	-4.15710 (0.0000) [1]	0.28723 (0.6130) [1]	-4.11195 (0.0000) [1]	0.56383 (0.7136) [1]	-4.03916 (0.0000) [1]	0.77940 (0.7821) [1]

Notes: The number of lags used in each cross-section ADF regression (p_i) was defined by the Schwarz information criterion. Computation was conducted with Newey-West bandwidth selection.

Source: Authors' own calculations

The source of data for consumer price indices (CPI) and the monthly averages of nominal exchange rates with reference currencies of US dollar (USD), Japanese yen (JPY) and Chinese yuan (CNY) is International Monetary Fund (2020).

Table 2 Breitung test

Sample	Reference currency	Schwarz information criterion	Akaike information criterion	Hannan-Quinn information criterion
		Individual effects and individual linear trends	Individual effects and individual linear trends	Individual effects and individual linear trends
		t-stat (p-value) [no. of lags]	t-stat (p-value) [no. of lags]	t-stat (p-value) [no. of lags]
1999M1-2020M9	USD	-2.85384 (0.0022) [1]	-2.76675 (0.0028) [13]	-2.83993 (0.0023) [8]
	JPY	-3.72607 (0.0001) [4]	-3.52643 (0.0002) [13]	-3.72607 (0.0001) [4]
	CNY	-3.11871 (0.0009) [2]	-2.67061 (0.0038) [8]	-3.01585 (0.0013) [2]
1999M1-2007M12	USD	1.82341 (0.9659) [1]	1.50475 (0.9338) [11]	1.53414 (0.9372) [2]
	JPY	0.74315 (0.7713) [1]	0.08354 (0.5333) [12]	0.47375 (0.6822) [1]
	CNY	-1.65115 (0.0494) [2]	-1.34361 (0.0895) [2]	-1.48476 (0.0688) [2]
2009M7-2020M9	USD	-3.87788 (0.0001) [6]	-4.52647 (0.0000) [7]	-4.17434 (0.0000) [7]
	JPY	-5.21191 (0.0000) [1]	-6.10549 (0.0000) [6]	-5.91644 (0.0000) [1]
	CNY	-2.49766 (0.0063) [1]	-3.14082 (0.0008) [9]	-2.99182 (0.0014) [7]

Source: Authors' own calculations

According to the results of Levin, Lin and Chu test (Table 1) PPP does not hold in case of USD reference currency for the whole period since the null of a unit root cannot be rejected in any of the versions of the test. There is relatively strong evidence in favour of PPP in case of JPY and CNY in the whole period, when individual effects, and individual effects and individual linear trends are taken into account, respectively. In the pre-crisis period, the validity of PPP is confirmed for all three reference currencies, when the

individual effects and individual linear trends are taken in account. In the post-crisis period there is strong evidence for PPP in the case of USD and CNY, when only individual effects are considered.

The Breitung test (Table 2) provides strong evidence for PPP in the whole period and in the post-crisis period for all three reference currencies, since the unit root hypothesis is rejected in all variations of the test. As for the pre-crisis period, the PPP holds only when real exchange rates refer to CNY.

Results based on Im, Pesaran and Shin test (Table 3) show weak evidence for PPP in the whole period. There is no proof for PPP in case of USD and very scarce support for PPP in case of JPY, where the null hypothesis of a unit root is rejected only when Akaike information criteria with individual effects was applied.

Table 3 Im, Pesaran and Shin test

Sample	Reference currency	Schwarz information criterion		Akaike information criterion		Hannan-Quinn information criterion	
		Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends
		W-stat (p-value) [no. of lags]	W-stat (p-value) [no. of lags]	W-stat (p-value) [no. of lags]	W-stat (p-value) [no. of lags]	W-stat (p-value) [no. of lags]	W-stat (p-value) [no. of lags]
1999M1-2020M9	USD	-0.70959 (0.2390) [1]	3.30078 (0.9995) [1]	-0.89784 (0.1846) [13]	3.18669 (0.9993) [13]	-0.86647 (0.1931) [8]	3.24710 (0.9994) [8]
	JPY	-1.18918 (0.1172) (4)	0.88296 (0.8114) [4]	-1.36296 (0.0864) [13]	0.95187 (0.8294) [13]	-1.18918 (0.1172) [4]	0.88296 (0.8114) [4]
	CNY	-1.67700 (0.0468) [2]	-0.34246 (0.3660) [2]	-1.02337 (0.1531) [8]	0.24998 (0.5987) [8]	-1.51086 (0.0654) [2]	-0.25504 (0.3993) [2]
1999M1-2007M12	USD	7.34405 (1.0000) [2]	-1.98039 (0.0238) [1]	7.56956 (1.0000) [2]	-1.83432 (0.0333) [11]	7.25298 (1.0000) [2]	-1.77855 (0.0377) [2]
	JPY	10.8597 (1.0000) [1]	-5.76208 (0.0000) [1]	10.8417 (1.0000) [2]	-6.64103 (0.0000) [12]	10.8417 (1.0000) [2]	-6.24179 (0.0000) [1]
	CNY	1.62841 (0.9483) [2]	-1.59055 (0.0559) [2]	2.14841 (0.9842) [2]	-0.87905 (0.1897) [2]	1.83638 (0.9668) [2]	-1.21493 (0.1122) [2]
2009M7-2020M9	USD	-0.55479 (0.2895) [7]	-2.31518 (0.0103) [6]	-0.30263 (0.3811) [9]	-3.40701 (0.0003) [7]	-0.38060 (0.3518) [7]	-2.49827 (0.0062) [7]
	JPY	1.19109 (0.1168) [1]	0.18262 (0.5725) [1]	1.96067 (0.0250) [6]	-0.77169 (0.2202) [6]	-1.72095 (0.0426) [1]	-0.43311 (0.3325) [1]
	CNY	-3.72919 (0.0001) [1]	-0.55942 (0.2879) [1]	-3.68598 (0.0001) [9]	-0.63489 (0.2628) [9]	-3.82641 (0.0001) [7]	-0.82999 (0.2033) [7]

Source: Authors' own calculations

Table 4 Fisher ADF tests (Maddala and Wu χ2 statistic)

Sample	Reference currency	Schwarz information criterion		Akaike information criterion		Hannan-Quinn information criterion	
		Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends
		χ^2 (p-value) [no. of lags]	χ^2 (p-value) [no. of lags]	χ^2 (p-value) [no. of lags]	χ^2 (p-value) [no. of lags]	χ^2 (p-value) [no. of lags]	χ^2 (p-value) [no. of lags]
1999M1-2020M9	USD	31.3881 (0.7672) [1]	9.52781 (1.0000) [1]	32.0446 (0.7405) [13]	9.20752 (1.0000) [13]	32.4693 (0.7226) [8]	9.54955 (1.0000) [8]
	JPY	35.2956 (0.5952) [4]	21.1044 (0.9879) [4]	36.9969 (0.5157) [13]	20.6142 (0.9904) [13]	35.2956 (0.5952) [4]	21.1044 (0.9879) [4]
	CNY	52.6502 (0.0574) [2]	34.8692 (0.6150) [2]	44.3271 (0.2223) [8]	28.6417 (0.8640) [8]	51.0633 (0.0765) [2]	34.3944 (0.6369) [2]
1999M1-2007M12	USD	3.10591 (1.0000) [2]	48.4165 (0.1199) [1]	2.43400 (1.0000) [2]	45.2254 (0.1958) [11]	2.94161 (1.0000) [2]	45.4450 (0.1896) [2]
	JPY	0.51211 (1.0000) [1]	98.2068 (0.0000) [1]	0.93886 (1.0000) [12]	112.267 (0.0000) [12]	0.51124 (1.0000) [2]	105.926 (0.0000) [1]
	CNY	22.5313 (0.9781) [2]	43.3975 (0.2521) [2]	19.6161 (0.9941) [2]	37.4691 (0.4938) [2]	21.8056 (0.9837) [2]	39.8674 (0.3870) [2]
2009M7-2020M9	USD	30.6015 (0.7976) [7]	50.7202 (0.0812) [6]	27.9376 (0.8844) [9]	61.0208 (0.0103) [7]	28.3884 (0.8716) [7]	51.2534 (0.0739) [7]
	JPY	36.0224 (0.5612) [1]	26.0569 (0.9290) [1]	43.9779 (0.2332) [6]	33.0898 (0.6957) [6]	41.1721 (0.3335) [1]	30.2516 (0.8105) [1]
	CNY	65.6268 (0.0035) [1]	32.9531 (0.7017) [1]	65.0437 (0.0041) [9]	32.8245 (0.7073) [9]	66.6853 (0.0027) [7]	34.3878 (0.6372) [7]

Source: Authors' own calculations

Table 5 Fisher ADF tests (Choi Z statistic)

Sample	Reference currency	Schwarz information criterion		Akaike information criterion		Hannan-Quinn information criterion	
		Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends
		Z (p-value) [no. of lags]	Z (p-value) [no. of lags]	Z (p-value) [no. of lags]	Z (p-value) [no. of lags]	Z (p-value) [no. of lags]	Z (p-value) [no. of lags]
1999M1-2020M9	USD	-0.60491 (0.2726) [1]	3.55460 (0.9998) [1]	-0.69907 (0.2423) [13]	3.65749 (0.9999) [13]	-0.74485 (0.2282) [8]	3.57705 (0.9998) [8]
	JPY	-1.12747 (0.1298) [4]	0.96707 (0.8332) [4]	-1.25531 (0.1047) [13]	1.13498 (0.8718) [13]	-1.12747 (0.1298) [4]	0.96707 (0.8332) [4]
	CNY	-1.65102 (0.0494) [2]	-0.31136 (0.3778) [2]	-0.88674 (0.1876) [8]	0.45188 (0.6743) [8]	-1.46253 (0.0718) [2]	-0.20248 (0.4198) [2]
1999M1-2007M12	USD	7.07375 (1.0000) [2]	-2.14256 (0.0161) [1]	7.34331 (1.0000) [2]	-1.92567 (0.0271) [11]	7.03289 (1.0000) [2]	-1.90286 (0.0285) [2]
	JPY	10.0260 (1.0000) [1]	-5.76822 (0.0000) [1]	9.47798 (1.0000) [12]	-6.58127 (0.0000) [12]	10.0275 (1.0000) [2]	-6.22911 (0.0000) [1]
	CNY	1.78848 (0.9632) [2]	-1.67263 (0.0472) [2]	2.36334 (0.9909) [2]	-0.85789 (0.1955) [2]	2.01127 (0.9779) [2]	-1.25338 (0.1050) [2]
2009M7-2020M9	USD	-0.42723 (0.3346) [7]	-2.40765 (0.0080) [6]	-0.09497 (0.4622) [9]	-3.43018 (0.0003) [7]	-0.18286 (0.4275) [7]	-2.56030 (0.0052) [7]
	JPY	-1.14861 (0.1254) [1]	0.17762 (0.5705) [1]	-1.96274 (0.0248) [6]	-0.80636 (0.2100) [6]	-1.73172 (0.0417) [1]	-0.49413 (0.3106) [1]
	CNY	-3.90925 (0.0000) [1]	-0.60780 (0.2717) [1]	-3.82545 (0.0001) [9]	-0.60020 (0.2742) [9]	-4.00038 (0.0000) [7]	-0.86539 (0.1934) [7]

Source: Authors' own calculations

In case of CNY the null can be rejected only when Schwarz and Hannan-Quinn information criteria were used, both with individual effects included. In the pre-crisis period the PPP is confirmed when individual effects are applied for USD and JPY. While for CNY only in the case when individual effects are used with one of the information criteria. Results for the post-crisis period exhibit evidence for PPP in case of USD with individual effects and individual linear trends, while in case of JPY and CNY the PPP is confirmed in almost all variations of the test, when individual effects are taken into account.

Table 6 Fisher PP tests (Maddala and Wu χ2 statistic)

Sample	Reference currency	Bartlett kernel		Parzen kernel		Quadratic spectral kernel	
		Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends
		χ^2 (p-value)	χ^2 (p-value)	χ^2 (p-value)	χ^2 (p-value)	χ^2 (p-value)	χ^2 (p-value)
1999M1-2020M9	USD	27.2149 (0.9032)	8.19973 (1.0000)	28.6805 (0.8629)	8.94866 (1.0000)	28.3211 (0.8735)	8.78926 (1.0000)
	JPY	32.5141 (0.7207)	17.3603 (0.9984)	31.9787 (0.7432)	17.3857 (0.9983)	31.0599 (0.7801)	16.2724 (0.9992)
	CNY	50.1393 (0.0899)	27.6241 (0.8928)	50.4685 (0.0849)	28.0663 (0.8808)	49.1699 (0.1059)	27.1084 (0.9058)
1999M1-2007M12	USD	1.81443 (1.0000)	55.8527 (0.0309)	2.36651 (1.0000)	55.8371 (0.0310)	2.31754 (1.0000)	55.8697 (0.0308)
	JPY	0.61670 (1.0000)	84.6064 (0.0000)	0.67465 (1.0000)	84.2106 (0.0000)	0.65054 (1.0000)	84.9536 (0.0000)
	CNY	23.1399 (0.9724)	49.1346 (0.1065)	24.5906 (0.9545)	49.7046 (0.0968)	24.2278 (0.9596)	49.1488 (0.1063)
2009M7-2020M9	USD	27.3653 (0.8994)	35.2624 (0.5967)	28.4384 (0.8701)	40.5044 (0.3604)	28.3443 (0.8729)	39.9841 (0.3821)
	JPY	38.2075 (0.4601)	27.3717 (0.8993)	41.5216 (0.3199)	30.1071 (0.8157)	40.3626 (0.3663)	29.0713 (0.8507)
	CNY	56.8476 (0.0252)	22.1334 (0.9813)	57.4698 (0.0222)	23.1978 (0.9718)	56.8816 (0.0251)	23.7963 (0.9651)

Source: Authors' own calculations

Fisher ADF procedure results in two test statistics: the Maddala and Wu χ^2 statistic (Table 4) and Choi Z statistic (Table 5). In the whole period they result in the same conclusion: there is some evidence for PPP only in the case of CNY, when individual effects are used. During the pre-crisis period PPP is confirmed in case of USD only by the Choi Z statistic when individual effects and individual linear trends are included. In case of JPY, the PPP is confirmed by both test statistics when individual effects and individual linear trends are incorporated. While only one version of Choi Z statistic provides proof for

PPP in case of CNY. In the post-crisis period the PPP can be validated for USD, when using individual effects and individual linear trends, as well as for CNY when using individual effects. And only two results of Choi Z statistic exhibit evidence for PPP in case of JPY.

The results of Fisher PP tests are also reflected in two test statistics, namely the Maddala and Wu χ^2 statistic presented in Table 6, and Choi Z statistic displayed in Table 7. The Maddala and Wu χ^2 statistic confirms the PPP in case of USD and JPY only during the pre-crisis period when individual effects and individual linear trends are utilized. While there is some evidence for PPP in case of CNY in all three periods examined, where the strongest support for PPP is provided during the post-crisis period.Table 4 Fisher ADF tests (Maddala and Wu χ2 statistic)

Table 7 Fisher PP tests (Choi Z statistic)

Sample	Reference currency	Bartlett kernel		Parzen kernel		Quadratic spectral kernel	
		Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends	Individual effects	Individual effects and individual linear trends
		Z (p-value)	Z (p-value)	Z (p-value)	Z (p-value)	Z (p-value)	Z (p-value)
1999M1-2020M9	USD	-0.03861 (0.4846)	4.01713 (1.0000)	-0.24150 (0.4046)	3.76840 (0.9999)	-0.18275 (0.4275)	3.83492 (0.9999)
	JPY	-0.78916 (0.2150)	1.68537 (0.9540)	-0.71623 (0.2369)	1.64508 (0.9500)	-0.59239 (0.2768)	1.85890 (0.9685)
	CNY	-1.35611 (0.0875)	0.73586 (0.7691)	-1.46720 (0.0712)	0.62380 (0.7336)	-1.37450 (0.0846)	0.71813 (0.7637)
1999M1-2007M12	USD	8.15660 (1.0000)	-2.79201 (0.0026)	7.56570 (1.0000)	-2.80365 (0.0025)	7.62190 (1.0000)	-2.79716 (0.0026)
	JPY	9.65061 (1.0000)	-5.08616 (0.0000)	9.58012 (1.0000)	-5.01581 (0.0000)	9.60988 (1.0000)	-5.10167 (0.0000)
	CNY	2.28687 (0.9889)	-2.32423 (0.0101)	2.00539 (0.9775)	-2.39275 (0.0084)	2.13482 (0.9836)	-2.32515 (0.0100)
2009M7-2020M9	USD	-0.04437 (0.4823)	-1.07691 (0.1408)	-0.19571 (0.4224)	-1.68471 (0.0460)	-0.18058 (0.4284)	-1.59959 (0.0548)
	JPY	-1.45328 (0.0731)	-0.11361 (0.4548)	-1.80055 (0.0359)	-0.48866 (0.3125)	-1.67583 (0.0469)	-0.35056 (0.3630)
	CNY	-3.27074 (0.0005)	0.73577 (0.7691)	-3.32306 (0.0004)	0.55644 (0.7110)	-3.27578 (0.0005)	0.45015 (0.6737)

Source: Authors' own calculations

During the whole observed period the Choi Z statistic (Table 7) provides proof for PPP in case of CNY when individual effects are taken into account. In the pre-crisis period, the PPP is verified for all three reference currencies when individual effects and individual linear trends are applied. During the post-crisis period the Choi Z statistic affirms PPP for USD in two cases when individual effects and individual linear trends are used, while it confirms PPP for JPY and CNY in all three cases when individual effects are included.

CONCLUSIONS AND RECOMMENDATIONS

This study reexamined the stationarity characteristics of real exchange rates of euroarea economies in order to gain plausible empirical results about the process of convergence toward PPP. The econometric exercise applied in the paper produced support for the PPP hypothesis, although in many cases the results are heterogeneous depending on the selected numeraire currency and the targeted time period. Three main findings can be derived from our research. First, considering the data from January 1999 to September 2020, the majority of unit root tests corroborate the PPP in case of the Chinese yuan, when we use the US dollar and the Japanese yen as base currencies the evidence of PPP is negligible. Second, for the post-Great Recession period the PPP holds for Chinese yuan and for the US dollar, smaller is the number of rejections of the null of the unit root under the Japanese yen. Third, for the USD dollar as well as for yen-based rates we are able to provide considerable evidence of PPP in the period prior to the outbreak of global financial crisis, while for the euro-yuan rates the mean reversion assumption is in the same period frequently violated. Following the presented results, it is apparent that a "one-size-fits-all" approach is not a productive way to tackle the PPP puzzle. In the future research, therefore, more attention should be devoted to specific factors and circumstances that hinder the functioning of the PPP apparatus.

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THE ROLE OF SOCIAL ECONOMY IN RURAL DEVELOPMENT

Tomasz Kusio[*]
Uniwersytet Ekonomiczny w Krakowie, kusiot@uek.krakow.pl

Anna Olszówka
Ośrodek Wsparcia Ekonomii Społecznej - Fundacja im. Hetmana Jana Tarnowskiego,
a.olszowka@fundacjatarnowskiego.pl

Abstract: *The presented paper focuses on the considerations on the role of third sector organizations in rural development in the regional context - Małopolska. The deliberations were based on a literature analysis, case study of one of the local NGOs, as well as on the analysis of empirical data collected during the survey. The survey was carried out using the CAWI method, while the analysis of the results was statistically processed. The obtained research material as well as the analysis of the case study sheds light on the issue of the importance of the third sector and social entrepreneurship from the perspective of stimulating the activity of rural residents. Thus, the possibility of preventing negative impacts of migration to cities, which are currently visible all over Europe, can also be emphasized here.*

Keywords: *social economy, entrepreneurship, innovation, third sector, rural areas*

JEL classification: *R 11, O20, O15*

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[*] Corresponding author

INTRODUCTION

The aim of this text is to contribute with acknowledging factors determining rural development. In particular, it is about identifying the factors that determine development processes in non-urbanized, rural areas. In the authors' intention, the social factor is a noticeable and important element in the descriptive characteristics relating to development in rural areas, and the main driving force behind pro-development activities in rural areas in the national context are currently local NGOs, which are set up to tackle local problems. The human factor can be considered to be the most causative factor in comparison to the elimination of barriers of e.g. bureaucratic nature. Moreover, what constitutes a developmental characteristic is not only the maintenance and growth of the existing resource level in terms of the number of plants and livestock, but also an increase in the level of intangible resources, which are influenced by NGOs. The role of NGOs is currently growing, although it may seem paradoxically related to the decreasing population of young people in rural areas. In order to answer the question of the importance of third sector organizations in rural development, a case of "GRUPA ODROLNIKA" (transl: *group from a farmer*) organization from the Małopolska province will be analyzed, as well as an analysis of the answers of respondents from the Małopolska province to the questions related to the issues of rural development.

Currently, as far as the European situation is concerned the rural population has fallen by 1.2% (2011-2016), while the overall EU-28 population has increased by 1.4%. GDP per capita in rural areas is 72.9% of the EU28 average. 18.8% of young people (aged 15-24) in rural areas (EU-28) were unemployed in 2016. A considerable part of migration in the EU is represented by an age group between 25-50. Migration from rural areas can be characterized as leaving to go to towns and suburbs or cities within the same EU MS, as well as migration to other EU MSs. (Eurostat). Therefore, the issue of migration of rural desertification while increasing the dynamics of urbanization can be considered a problem throughout Europe, not only in Poland. The cognitive gap concerns, among others, whether there are possibilities to change this trend, what factors could influence the change of this situation, but also what direction of change would be beneficial. What, however, is the subject of the authors' considerations is the question whether social entrepreneurship, whose institutional dimension is the functioning of social economy units, has any impact on rural development, both in the social and economic context.

LITERATURE REVIEW

The local as well as territorial development is considered, among others (Kudłacz, 2008): the process of positive changes, quantitative growth and qualitative progress, the process of creation of goods by mobilizing human, physical, natural and capital resources for the production of market goods and services, and one of the main objectives is to promote the maintenance of professional activity, among others, in providing employment opportunities. The development can also be considered a harmonized and systematic action of social, public authority and other entities operating in a given territorial unit, or a complex process in which local authorities, with their own resources and external partners, stimulate the economic and social development of the territorial unit. Among the components of local development one can distinguish such planes as: economic, social, cultural, political, ecological or spatial. In each of the presented development planes it is difficult to classify one of them as more or less important. The issue of how the development prioritization is presented in relation to a given development level results from the individual situation of a given region. In the description of development planes, development issues may refer to regional specificity and in this case, for example, socio-economic, socio-cultural, political-economic planes may be distinguished).

The relational factor, which is the level of intensified cooperation between the rural region and the cities, can also be related to resources. The possibility of obtaining knowledge transfer, whose potential is greater in urbanized areas is of great importance, because it influences the increase of knowledge resources in rural areas. Among the solutions proposed, or actually necessary to propose solutions to achieve a satisfactory level of development in rural areas, are also resource-based (Lazhentsev & Ivanov, 2020). The main focus is on a strategy to make the use of resources, mainly natural, that are located in the region more efficient. In addition to increasing the level of maximizing the use of natural resources, it is also important to achieve more efficient use of human potential. The processes of effective agricultural production in the field of plants and animals should be accompanied by support from, among other things, science, which is also reflected in the intensification of urban-rural relations.

In the literature it is possible to identify knowledge transfer concepts that reduce the problem of poverty to a technical level (Leach, 2015; Fernandez Baldor, 2012), where development issues in relation to rural areas are accompanied by solutions for the possibility of applying specific technical solutions (one problem - one solution) (Becerra et al., 2020). However, it seems that it is difficult to apply only technical instruments to fulfil tasks such as influencing cooperation between organizations, organizing learning processes, organizing models of production of goods or services (Becerra et al., 2020), although it seems that IT instruments can naturally support these processes. Besides, technology can be defined in different ways, even in retrospect (Winner, 1979). Influencing the growth of the resource base is both cooperation with urban areas and acquisition of knowledge resources in this area, as well as the acquisition of technology in the form of know-how or obtaining modern equipment in the material form. In the context of Poland's integration with the European Union, the positive effects of transferring knowledge and solutions to rural areas are clearly noticeable, if only considering the dramatic increase in the effectiveness of the human factor through the use of modern agricultural machinery. What also noticeably emphasizes the importance of knowledge transfer to rural areas is the aggregated approach to resource management in rural areas, both in relation to plant cultivation and animal husbandry. The institutional dimension of the aggregated approach to rural management is, among others, development strategies, which are also influenced by knowledge transfer. There are examples of creating the so-called multi-stakeholder teams, bringing together scientists, NGOs, business, public administration units, i.e. quadruple helix and other groups, which include, among others, local leaders, as well as representation of the local community. Community activities are aimed at working out solutions and attitudes according to the set goals, activities and methods of their implementation and expected results, leading to critical awareness and a change in approach to management and development of the region (Kidd & Kraal, 2005). In the national, Polish perspective, a similar course of action can be applied to the model of formulating regional development strategies. In shaping the desired directions of regional development, reference was made to such units as non-governmental organizations, because it constitutes, in this context, a new quality. Widely known and practiced reliance in the shaping of regional development on the representation of science, business, and public administration should be considered as the foundations of the process of intelligent regional specialization, which draws on the model of triple helix (Kusio, 2019). However, the participation of the third sector seems to have a particular impact on the process of strategic thinking and action in relation to the region, including in particular the rural region.

The importance of third sector organizations in rural development results, among other things, from their effectiveness in diagnosing local social problems. Moreover, these organizations have better knowledge of local social environment (Andrzejczak, 2020). According to the results of the research, third sector organizations in Poland are up to date with local social problems, but not only local ones. Although the level of professionalization of NGO's activities in the field of diagnosing social problems

in the environment may not be high, these activities are characterized by high frequency. It should be assumed that the higher the level of professionalization of the diagnostic activities of social problems, the better the adjustment of activities aimed at minimizing or eliminating these problems. Therefore, the activity and activities of third sector organizations should be recognized as an important factor in the development of local environment in which they operate. National third sector organizations, among the stakeholders they cooperate with, first of all, are state or local government offices, followed by other NGOs, business, schools and universities, media and church (Andrzejczak, 2020). The mentioned order of cooperation of NGOs results, among other things, from the fact of implementing projects that are financially supported by public funds, hence the public partner is mentioned in the first place. Mutual support of non-governmental organizations puts this group of stakeholders in second place, only in further positions are business and schools as well as church organizations.

Figure 1 Social Business Initiative actions for social innovation and social entrepreneurship development

Source: https://enrd.ec.europa.eu/sites/enrd/files/s4_rural-businesses-factsheet-social-innovation_0.pdf (accessed: 17.11.2020).

Cooperation with the business sector takes the form of barter - promotion in exchange for financial support, while cooperation with the education sector consists in organizing educational events. The subject of cooperation is therefore mainly resources, the characteristics of which for different sectors seem to be natural. Social sector organizations of the so called third sector are created in response to the insufficient realization of social tasks by both the public and private sector.

Currently, in discussions on the development of third sector organizations, attention is paid, among others, to the mentioned professionalization, which may take place in such perspectives as:

- marketing (orientation to stakeholders' needs),
- Planning (problem solving based on internal and environmental analysis),
- orientation on effectiveness and efficiency.

What matters for the quality of functioning of NGOs is their openness and sensitivity to changes in the environment, which are conducive to generating new values, standards and conditions to which they can respond (Baumbacher et al., 2018).

There are three main pillars of pro-development policy making:

- improving access to funding for social enterprises, a label for social investment funds operating EU-wide and a new financial instrument (fund of funds),
- improving the visibility and recognition of social enterprise, facilitate mutual learning and capacity building, and to promote skills development,
- simplifying European legal and regulatory frameworks.

Initiatives aimed at supporting social enterprises, i.e. entities which, apart from achieving social goals and including people who have been socially excluded, bring them back to the labour market and at the same time take care of the economic efficiency of the initiated business activity, gain particular importance. Social enterprises are thus filling a market gap.

METHODOLOGY

In order to outline the specificity of the functioning of social units, aimed at achieving economic efficiency, i.e. social enterprises, this text presents an example of the functioning of the association "GRUPA ODROLNIKA", whose objectives concern both the social and financial layer.

The next research section is an analysis of the results of an empirical study, which is a part of a broader study aimed at assessing the impact of social economy on rural development. Within the framework of the above mentioned research, carried out using the CAWI method, in 2020 on a sample of 43 people, data were collected as a result of answering closed questions. The answers were graded according to a descriptive five-point scale (strongly agree, rather agree, difficult to say, rather disagree, strongly disagree). The survey was attended by adults, representing NGOs, working people and learners, all participants of the survey were people with knowledge of development initiatives, in large part in relation to rural development.

All 43 responses to the survey were complete and suitable for statistical analysis. It is difficult to accurately estimate the number of people who were asked to take part in the survey due to the general nature of sending a link to the survey. People who were deemed to have adequate knowledge of rural development in the Małopolska province, as well as knowledge of financing innovative projects in rural areas, such as municipal offices and local action groups in the Małopolska region, were asked to complete the survey. Due to the above inaccuracy, it is difficult to give an exact answer to the participation rate. Moreover, it is also difficult to indicate representativeness due to the number of answers, however, the cognitive value of the survey results from the group of people who responded to the problems raised in the questionnaire.

The analysis of the case study and questionnaire data should allow answering the following research questions:

- Is the social factor a noticeable and important element in the descriptive characteristics relating to development in rural areas?
- Can local NGOs be considered as a driving force for pro-development activities in rural areas?
- Does social entrepreneurship in the formula of social enterprises constitute a discernible element of development in rural areas ?

RESULTS AND DISCUSSION

Case study: "groupa odrolnika" association - local leaders and propagators of rural development.

The GRUPA ODROLNIKA Association has been operating in the Pleśna (Małopolskie) municipality for over fifteen years. During this time it has managed to develop a nationwide brand called "PACZKA ODROLNIKA" and build a *Local Product Center* in Rzuchowa (the village in South-Eeast of Malopolska). The association itself is a representation of many groups, consisting of representatives of farmers, consumers, environmental activists, media representatives, as well as individuals. The organization is also a driving force for the local government with which it closely cooperates and carries out many initiatives together.

PACZKA ODROLNIKA initiative was rewarded in "Laurel of Thrift" competition organized by the European Fund for Municipal Development in the category of "Economy". "Inspirational Project of the Year 2011" category. The initiative called "PACZKA ODROLNIKA" is created and implemented by farmers engaged in the association. Its aim is primarily direct sale of agricultural products from small and family farms in order to enable their further existence. Within the project "PACZKA ODROLNIKA" the sale of organic food produced - under the supervision of the certification body, traditional food, produced on a small scale in an environmentally friendly way, but without the supervision of the certification body and products entered on the list of traditional products registered in the database of traditional products is carried out. Direct sales are conducted online (parcel from the farmer with delivery to the city), via post, stationary stores and at fairs of organic and local products, as well as on the farm (during open days) - the buyer has the opportunity to collect products directly from the field, collect them from the farm or buy them at the farm sales unit. In accordance with the assumptions, the initiative provides for the development of a network of direct sales of agricultural products throughout the country, combined with broadly understood rural tourism and regional cuisine (including culinary tourism). Huge interest in the initiative of farmers from the neighbourhood was a stimulus for further development of the activities of the association, which in 2017 established a non-profit company called GO Partners Ltd., whose association is the sole shareholder. The nature of the non-profit activity is related to the realization of social goals that the company pursues. The company allocates all its profit to the association's statutory activity. The company apart from servicing a stationary store in the Local Product Centre and selling organic food via the Internet, it also prepares catering, organizes study visits, conferences, family celebrations, etc.

Over the years, the association has developed many system solutions that allow it to carry out various social activities and in the sphere of commercialization of local products and social economy activities.

Some of interesting initiatives implemented by the Association are as follows:

- EkoFest - annual meeting and convention of organic farmers (under the project "Ecology! This is it! - cooperation of organic farmers in shortening the supply chain");
- "With head and taste - cooperation of organic farmers in shortening the supply chain". The main objective of the operation was to develop a bottom-up strategy for the development of organic farming in Poland by taking action to set directions for development through the active participation of organic farmers and producers;
- "Sustainable development of rural areas through high quality food with emphasis on local product". The main objective of the undertaking was to present the benefits and opportunities offered by the sustainable development of rural areas within the existing food quality systems, basing it on concrete examples of support for the promotion of these products and enabling

producers to directly present these benefits and the way in which they have overcome barriers to joining the system;

- "Małopolska Route of Ornamental, Utility and Educational Gardens" - the creation of the route was aimed at bringing closer the knowledge of plant life and the knowledge of the plants themselves, both decorative and edible, promotion of ornamental, utility and educational gardens, building the image of Małopolska as a region rich in natural resources and tourist attractions, increasing the tourist offer and the number of visitors to the region and the gardens themselves, including the extension of tourist stay in the region;
- The Garden of Old Varieties - gene bank was established at the Local Product Center in Rzuchowa. This initiative was and still is aimed at propagating and making available free of charge to all interested varieties of old plants. The initiative also has an element of social inclusion through the possibility of exchanging plants on a "seedling for seedling" basis.

The Association GROUPA ODROLNIKA is a group of people who constantly try to introduce regional products to the market through the cooperation of the producers themselves. It initiates new forms of collective marketing of regional products by all their manufacturers within the framework of cooperation and common offer addressed to individual customers and commercial networks. It integrates the food producer teams around the idea of promoting high quality products as well as ways of overcoming procedural barriers in obtaining valuable quality marks - confrontation of producers of titled products with producers and entities potentially interested in participating in the system. In its activities it uses regional products to develop culinary tourism by establishing cooperation with restaurants, catering companies and tour operators and thus also promotes sustainable development of rural areas. For years it has been working on the promotion of food quality systems as a guarantee of benefits for both parties (producers and consumers).

SELECTED RESULTS OF EMPIRICAL STUDY: "IMPACT OF THE SOCIAL ECONOMY ON RURAL DEVELOPMENT"

The results of the study on the impact of social economy on the development of rural regions show that the social inclusion of rural residents in particular in the activities of social enterprises has a moderate impact on the development of rural regions (Table 1). Only 5% of the respondents expressed their opinions on both categories, while 1/3 of them answered positively (rather yes and definitely yes). The form of social enterprises is not a widely known concept, which may also explain the above opinions of respondents.

Table 1 Opinion of people who recognize the positive impact of social inclusion of residents on the development of rural regions, on the impact of social enterprises on this development

I believe that social enterprises can be described as having an impact on the development of my region (municipality/poviat)	I believe that social inclusion of residents has an impact on the development of rural regions (municipality/poviat)				Total
	rather NO	rather YES	hard to say	definitely YES	
rather NO	1	4	2	1	8
rather YES	0	**7**	2	2	11
hard to say	1	7	3	4	15
definitely NO	0	3	1	1	5
definitely YES	0	2	0	**2**	4
Total	2	23	8	10	43

Source: Own elaboration

While comparing to the case study the initiative to establish and operate the association "GRUPA ODROLNIKA" is one of the few successfully existing actions on such a large scale. Thus, it is also confirmed by the statements of the respondents. Treating social inclusion as a not very effective mechanism in particular in relation to such a form of their involvement as social enterprises also shows a low level of knowledge in this area, which in turn highlights the low level of development of social entrepreneurship. It is as a result of the high involvement of social entrepreneurs that it is possible to establish companies such as the example presented in the case study.

The assessment of the impact of micro-business on the development of rural regions looks different (Table 2).

In the opinion of the respondents, the impact of micro-enterprises on the development of rural regions in Poland is presented in a quite decisive way. Of the majority who cautiously but positively (rather YES) believe that micro-enterprises operate dynamically in their region, all of them, as well as strong supporters, believe that micro-enterprises have an impact on the development of rural regions. Micro-enterprises can therefore be considered an important development factor in the context of building rural development strategies.

Table 2 The opinion of people who consider micro-enterprises in their region to be dynamic, on the impact of these micro-enterprises on rural development

Micro-business can be described as DYNAMIC in my region (municipality/poviat)	Microenterprises have an impact on the development of my region (municipality/poviat)					Total
	rather NO	rather YES	hard to say	definitely NO	definitely YES	
rather NO	1	1	1	0	0	3
rather YES	3	16	4	1	2	26
hard to say	0	0	2	0	0	2
definitely YES	1	4	0	0	7	12
Total	5	21	7	1	9	43

Source: Own elaboration

In a similar perspective, supporters of the opinion that associations are active in their region see the issue of associations' influence on rural development. The opinion on the impact of associations is more polarised due to the high number of strong answers (definitely YES) to the question of impact on rural development (Table 3).

Table 3 The opinion of people who consider associations in their region to be dynamic, on the impact of these associatons on rural development

Associations can be described as dynamic in my region (municipality/poviat)	Associations have an impact on the development of my region (municipality/poviat)					Total
	rather NO	rather YES	hard to say	definitely NO	definitely YES	
rather NO	1	2	2	3	0	8
rather YES	0	**11**	**2**	**0**	**4**	**17**
hard to say	2	2	3	1	0	8
definitely NO	1	0	0	0	0	1
definitely YES	3	0	1	0	5	9
Total	7	15	8	4	9	43

Source: Own elaboration

In the context of a positive assessment of the associations' impact on rural development, these results can be referred to the effective and distinguished activities discussed in the first part of the research section. One of the interesting observations that can be deduced from the respondents' answers is also a weak correlation between the low social engagement of the inhabitants and the recognition of training as a factor positively affecting the development of rural regions (Table 4).

Table 4 Opinion of people who recognize the positive impact of social inclusion of residents on the development of rural regions, on the impact of social enterprises on this development

I believe that offering training courses to residents has an impact on the development of rural regions (municipality/poviat)	I believe that small social involvement is a barrier to the development of rural regions (municipality/poviat)				Total
	rather NO	rather YES	hard to say	definitely YES	
rather NO	1	3	2	0	6
rather YES	0	**12**	**3**	**6**	**21**
hard to say	1	5	1	0	7
definitely YES	0	3	2	4	9
Total	2	23	8	10	43

Source: Own elaboration

Thus, it seems that both the activity of microenterprises and associations whose presence is recognized and considered to have a positive impact on the development of rural areas may mean that the activity of social enterprises may also be recognized over time, as it now seems to be hardly noticed.

CONCLUSIONS AND RECOMMENDATIONS

The authors at the outset decided that this social factor should now be considered as the main driving force in the development processes in rural areas. In order to achieve the initial goal of the work and to be able to refer to the importance of the social factor, the authors formulated three research questions. One of them concerned the possibility of recognizing NGOs as the driving force of development activities in rural areas. During the case study of the GRUPA ODROLNIKA association it can be considered that the adopted form of activity proved to be effective in the promotion of local agricultural products, and at the same time the association was able to be effective financially, in addition to receiving various awards during more than 15 years of operation. The nature of the association's activity directly confirms the support of rural development in the social layer. The association is a recipient for local food producers of organic products, which it distributes to regional, national and even international customers. Products distributed against payment by the association must meet appropriate certification criteria, which also means an indirect impact on the local production system of products by suppliers. The association, by carrying out activities associating the local manufacturing community, informally performs the functions of a cluster. Thus, the activity of this rural association clearly indicates that this type of social entity has a positive impact on rural development. A similar conclusion can be drawn from the results of an empirical study, which recognises that the associations both have an impact on the development of rural areas, but also operate dynamically in these areas.

Another research topic was to diagnose the impact of social entrepreneurship in the formula of social enterprises on rural development. The analysis of the GO Partners company, whose activity is an extension of the social dimension of the GRUPA ODROLNIKA association, shows that a similar formula may be a natural complement to activities supporting rural development. The company, which

results from the information presented, has chosen the social goal of its activity and allocates the entire profit earned to the objectives of the association. The company's activity, which due to the nature of its activities and financial orientation can be considered socially oriented, perfectly complements the association's offer. Thus, on the basis of this case, the next research question can also be answered in the affirmative. What is more, as a result of the analysis of the answers to the questionnaire, it can be concluded that microenterprises are recognizable as dynamic and have additional influence on rural development. Compared to the analysis of answers to the same questions relating to social enterprises, the role of micro-entrepreneurs is clearly higher. This may indicate a still low level of saturation with social enterprises and little knowledge about them. In order to obtain a more complete picture, the research should be complemented by additional elements such as knowledge of the definition of social enterprises. However, given both the social as well as economic purpose of social enterprises, it seems legitimate to consider social enterprises as a positive factor in rural development.

In the context of the third research question, the content of which refers to the already discussed two specific research questions, i.e. whether the social factor is a noticeable and important element in descriptive characteristics relating to development in rural areas, one can also answer in the affirmative. In addition to the examples of associations and social enterprises as institutionalized forms of social engagement, the results of the analysis of additional answers give rise to a similar conclusion. Most of the respondents considered small social involvement as a barrier to rural development, and additionally most of the people who responded in this way considered that the socially individualised activities in the form of a training offer improving the competences of rural residents would help in rural development. This means that the social factor, both in institutional and individual dimension, has, according to the respondents, an impact on rural development.

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EUROPEAN COUNTRIES' POPULATION WELL-BEING: A CLUSTER ANALYSIS

Jelena J. Stanković[*]
University of Niš, Faculty of Economics, jelena.stankovic@eknfak.ni.ac.rs

Žarko Rađenović
University of Niš, Innovation Centre, zarkoradjenovic@hotmail.com

Ivana Marjanović
University of Niš, Faculty of Economics, ivana.veselinovic@eknfak.ni.ac.rs

Abstract: *The significant growth in the size of the global economy that has characterized the past century has been accompanied by a significant increase in population. The population represents an important element for economic development since it determines the supply of human resources, one of the most important resources of an economy. However, the precondition for an adequate fulfilment of population's functions as human capital and its contribution to the economic development of a particular country, is that the country has to meet certain requirements of its inhabitants in terms of ensuring their well-being. Higher quality of life, job satisfaction, better material conditions ensure greater well-being of the population, which ultimately has a positive impact on the functioning and development of the economy. This paper aims to identify the clusters of European countries and to determine their basic characteristics as well as differences between clusters. The well-being is quantified using five indicators and statistical hierarchical cluster analysis is performed. The analysis has revealed that there are four distinct groups of European countries: Mediterranean countries, old European Union Member states, new European Union Member states and candidates for membership, and group with mostly non-European Union Member states. The results indicate that the group of old European Union member states achieve, in average higher well-being for their inhabitants compared to the other groups of countries. Additionally, the group of new European Union Member states and candidates for membership achieve, in average the lowest well-being for their inhabitants compared to the other groups of countries.*

Keywords: *Well-being, Population, Cluster Analysis, Quality of Life*

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[*] Corresponding author

INTRODUCTION

The population is one of the most important resources of an economy. In addition to the many functions performed by residents, residents also have certain expectations of the country in terms of ensuring their well-being. Higher well-being of residents leads to a higher level of their happiness and satisfaction, which has a positive effect on the development and functioning of the economy (Žmuk, 2015).

The analysis of the achieved well-being of the society so far has been predominantly based on economic indicators, primarily GDP, income or similar, in combination with some indicators of economic equality. However, in order to evaluate social progress, it is necessary to take into account the qualitative dimension of well-being, where subjective aspects such as the perception of the standard of living must also be considered when assessing the well-being of society (Ivaldi et al., 2016). The criticisms of GDP as a measure of well-being are related to the fact that GDP measures only monetary activities, does not take into account the income distribution, does not take into account the stocks of wealth in the economy and does not take into account environmental and social externalities (Döpke et al., 2017). In order to overcome these limitations, many authors have transcended purely economic indicators and entered the field of social well-being by considering aspects related to material well-being, education, environment, climate, health and participation in social activities (Jurado & Perez-Mayo, 2012). The analysis of the achieved level of well-being is an important issue for policy-makers as it pervades different aspects of society. Additionally, measuring and comparing the well-being of different countries is of interest for various policy-makers as it can provide useful indications during the development of well-being policies (Carboni & Russu, 2015).

However, comparisons between countries are difficult if country-level indicators are examined individually. One possible technique for reducing complexity and exploring relationships between countries is cluster analysis (Grein et al., 2010). This paper pursues to examine the similarities and differences of European countries using cluster analysis based on well-being indicators. The well-being is quantified using five indicators: mean equivalised net income, satisfaction with the financial situation, job satisfaction, overall life satisfaction and rate of people at risk of poverty or social exclusion.

The reason for assessing the well-being of European countries is reflected in the need to analyse and better understand the situation in which, in recent years, there has been a noticeable difference between the progressive countries of the north and the lagging countries of southern Europe (Ivaldi et al., 2016). Therefore, the main research hypothesis is that countries in Northern and Western Europe are similar according to the achieved well-being for their residents, and achieve higher well-being compared to other European countries.

The rest of the paper is structured as follows: Section 2 provides a brief literature review related to the origins of the well-being concept and its evaluation, Section 3 gives insights into methodology and data, while Section 4 offers research results and discussion. Concluding remarks are provided in the last part.

LITERATURE REVIEW

The term well-being refers to the overall assessment of the satisfaction of human needs, that is, a measure of satisfaction or dissatisfaction of an individual or group in various areas of life (Costanza et al., 2007). Two standpoints can be encountered in well-being research: research related to subjective well-being and research focused on measures of objective well-being. The former relies on the perception of happiness by individuals, while the latter considers well-being as a multidimensional phenomenon related to several dimensions of quality of life (Bonanno et al., 2020). The differences between subjective

and objective measures of well-being are provided by Sumner (1996) according to whom objective measures assume that indicators can be defined without reference to one's preferences, interests, ideals, values and attitudes, while subjective measures require that preferences, interests, ideals, values and the attitudes of individual's matter (Haq & Zia, 2013). Objective well-being measures generally focus on various economic, health, or social indicators which can be used single or combined as composite indexes (Vemuri & Costanza, 2006). Therefore, a multidimensional approach to the assessment of well-being implies that in addition to economic well-being, material living standards and health should also be considered (Peichl & Pestel, 2013). Various researches proposed a multidimensional measurement of well-being (Human Development Index, OECD Better Life Index; Eurostat Quality of Life; Žmuk, 2015; Lorenz et al., 2017; Peiró-Palomino et al., 2020).

Regarding subjective measurements, interviews or surveys are most often used as a basis for obtaining a subjective measure of well-being, where respondents give assessments of the importance and fulfilment of needs related to a certain aspect of quality of life. One of the main advantages of subjective indicators of well-being over objective ones is the fact that objective indicators only assess the possibilities that individuals have to improve the quality of life, while subjective indicators assess the current level of well-being of individuals or groups. In other words, the application of only socio-economic indicators for the evaluation of well-being is done under the assumption that economic growth and development has enabled individuals a better quality of life (Haq & Zia, 2013). However, one of the main disadvantages of subjective measures of well-being is reflected in the fact that people assess their well-being compared to peer groups, and not in absolute terms (Costanza et al., 2007). Several studies provide a comprehensive overview of the application of subjective well-being measures (Larsen et al., 1985; Schwarz & Strack, 1988; Diener et al., 1999; Kahneman & Krueger, 2006; Diener, 2009; Diener et al., 2018).

A large number of econometric and statistical techniques have been applied in previous research and well-being measurements in order to overcome the limitations of existing well-being measures. Several studies proposed methodologies focused on integrating subjective and objective approaches (Costanza et al., 2007; Jurado & Perez-Mayo, 2012; Ivaldi et al., 2016; Haq & Zia, 2013). Additionally, the identification of homogenous groups of countries according to the achieved well-being level was in the focus of several studies. Carboni and Russu (2015) applied data envelopment analysis and cluster analysis on a sample of 20 Italian regions from 2005 to 2011 to evaluate the well-being performance and cluster regions into similar groups using 12 indicators related to neighbourhood relationships, labour market conditions, economic conditions and the environment.

Žmuk (2015) applied statistical hierarchical cluster analysis, by using quality of life indicators and compared the differences in quality-of-life levels among European countries using seven socio-economic indicators. His findings indicate that the old European Union member states achieve in average higher quality of life level than the new European Union member states, proving that level of quality of life is connected with the level of economic development. Boitan and Costica (2020) applied cluster analysis on a sample of European Union countries using the data on eight dimensions of the overall assessment of the quality of life in European Union defined by European Commission and discovered that the highest dissimilarity between countries is present for the natural and living environment indicators and material living conditions indicators.

However, the lack of the presented studies is that they do not take into account subjective perceptions related to the various aspects of well-being. To overcome the stated limitation, this paper applies cluster analysis on a sample of European countries using a set of indicators that cover both, objective and subjective measures of well-being.

METHODOLOGY AND DATA

Cluster analysis is used to identify the structure in a set of objects, by organizing data into homogeneous groups, to minimize the differences between objects within a group while maximizing differences between groups of objects (Carboni & Russu, 2015). Cluster analysis refers to a set of multivariate techniques whose primary purpose is to group objects based on their similarities. Multi-variation is a feature of cluster analysis related to its ability to simultaneously and jointly analyses multiple variables from a single data set. Cluster analysis has most frequently been employed as a classification tool (Punj & Stewart, 1983).

Unlike the classification analysis in which the number of groups is known and the goal is to reassign each observation to one predefined group, in cluster analysis the number of groups is unknown and will be determined based on similarities between objects. The agglomerative hierarchical approach represents an accumulative bottom-up approach that starts from single objects and systematically combines objects into groups until each of the objects is in a group or cluster. Cluster analysis consists of two main steps (Boitan & Costica, 2020): (a) evaluation of the proximity or distance (in terms of similarity) between individual objects, and (b) evaluation of the proximity between groups of objects. In this paper, the distance between objects (countries) is measured using the squared Euclidean distance algorithm, while the distance between groups of objects is evaluated based on Ward's method.

The cluster analysis is applied on a set of 30 European countries. In order to determine similarities and dissimilarities between countries five indicators related to well-being were assessed: median equivalised net income (MENI), satisfaction with the financial situation (SFS), job satisfaction (JS), overall life satisfaction (OLS) and rate of people at risk of poverty or social exclusion (AROPE). The descriptive statistics of the stated indicators are presented in Table 1.

Table 1 Descriptive statistics of indicators

	N	Min	Max	Mean	Std. Deviation
MENI	31	2739	43013	17060.48	11265.345
SFS	31	4	8	6.38	.940
JS	31	6	8	7.32	.467
OLS	31	5	8	7.22	.695
AROPE	31	12	34	21.95	5.809

Source: Author's calculation

RESULTS AND DISCUSSION

The main goal of the cluster analysis is to identify and group countries according to their similarity. The number of clusters is evaluated based on the biggest change in the agglomeration scheme (black rectangle in Table 2). Column Coefficients represents the value of the calculated squared Euclidean distance between the given countries.

As a result of the cluster analysis, a tree-like diagram (dendrogram) is obtained, which shows the entire hierarchical process of merging objects and groups of objects (Figure 1).

The vertical axis of the dendogram gives the ordinal number of the state. Countries that are more similar to each other are grouped at a lower level, while countries that deviate more from each other are at a higher level of the dendogram. The partition of objects into a certain number of groups and the number of groups can be assessed in the dendogram using the vertical line. The number of horizontal lines which

Table 2 Agglomeration scheme

Stage	Cluster Combined		Coefficients	Stage Cluster First Appears		Next Stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	9	18	33.370	0	0	12
2	11	21	3665.050	0	0	7
3	14	25	12059.060	0	0	10
4	7	20	44833.570	0	0	11
5	3	22	78160.885	0	0	18
6	2	23	124983.700	0	0	14
7	11	15	176720.100	2	0	17
8	1	19	231175.630	0	0	13
9	5	10	352701.045	0	0	16
10	8	14	497221.815	0	3	17
11	7	27	658599.092	4	0	19
12	9	13	862473.175	1	0	20
13	1	26	1182641.938	8	0	19
14	2	31	1507447.770	6	0	27
15	16	29	1853576.660	0	0	23
16	5	28	2523597.978	9	0	24
17	8	11	3590418.097	10	7	21
18	3	6	4729288.362	5	0	25
19	1	7	6644640.358	13	11	24
20	9	24	8872083.393	12	0	22
21	8	17	11369691.063	17	0	25
22	9	12	15629364.927	20	0	28
23	16	30	22282220.797	15	0	29
24	1	5	34929323.454	19	16	26
25	3	8	50990425.119	18	21	27
26	1	4	86657267.538	24	0	29
27	2	3	133647578.959	14	25	28
28	2	9	383769941.448	27	22	30
29	1	16	1009657817.827	26	23	30
30	1	2	3807240737.497	29	28	0

Source: Author's calculation

are intersected by a vertical line (black dashed line on Figure 1) indicates the number of clusters. It can be noticed that there are four distinct groups of countries in the analysed data set (Table 3): mostly Mediterranean countries, old European Union Member states, new European Union Member states and candidates for membership, and group with mostly non-European Union Member states.

Further analysis of obtained results can be performed using different statistical techniques to interpret and to confirm the validity and correctness of results.

The descriptive statistics of clusters (Table 4) indicates that the average value of median equivalised net income differs substantially between clusters, with the value of 24438.30 for the Mediterranean countries, 6675.46 for the new European Union Member states and candidates for membership, 14998.00 for the non-European Union Member states and 40907.00 for the old European Union

Member states. Accordingly, it can be concluded that the old European Union Member states are in a far better position compared to the new European Union Member states and candidates for membership.
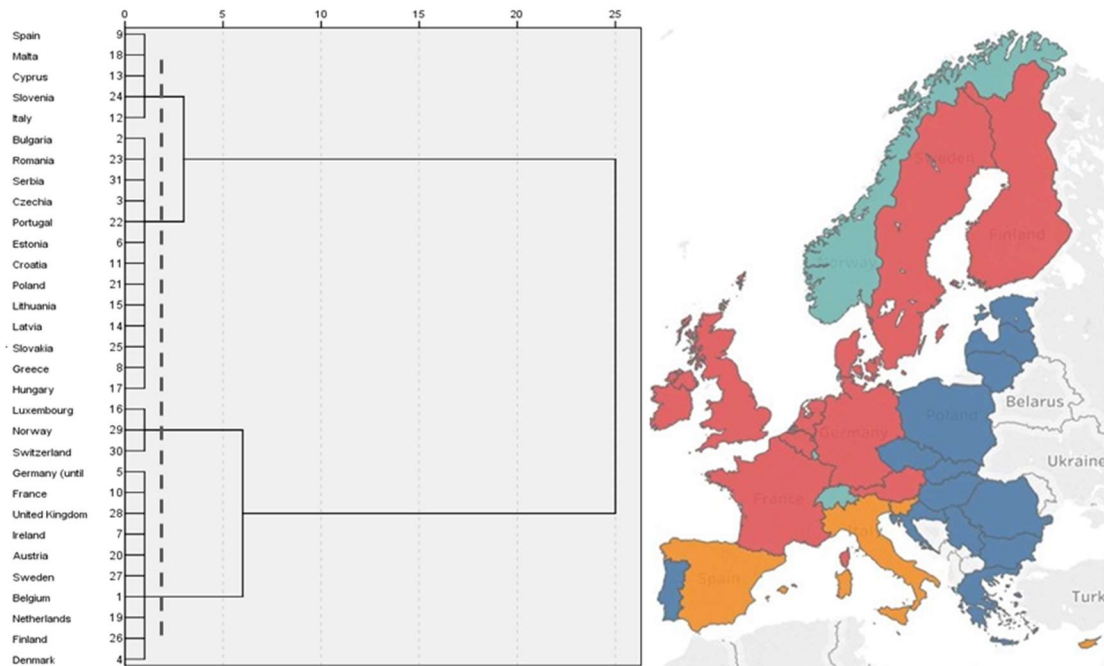

Figure 1 Dendogram and clusters' map

Source: Author's preview

Table 3 Division of European countries into cluster

Cluster	Countries
Mediterranean countries	Spain, Malta, Cyprus, Slovenia, Italy
new European Union Member states and candidates for membership	Bulgaria, Romania, Serbia, Czech Republic, Portugal, Estonia, Croatia, Poland, Lithuania, Latvia, Slovakia, Greece, Hungary
non-European Union Member states	Luxembourg, Norway, Switzerland
old European Union Member states	Germany, France, Britain, Ireland, Austria, Sweden, Belgium, the Netherlands, Finland, Denmark

Source: Author's preview

Table 4 Indicators' mean within clusters

Cluster	Mean				
	MENE	SFS	JS	OLS	AROPE
Mediterranean countries	24438.30	7.22	7.57	7.74	18.64
new European Union Member states and candidates for membership	6675.46	5.55	7.00	6.66	25.07
non-European Union Member states	14998.00	6.38	7.36	7.26	22.50
old European Union Member states	40907.00	7.23	7.77	7.87	18.50

Source: Author's calculation

Regarding satisfaction with the financial situation, the Mediterranean countries and the old European Union Member states are almost equal, while non-European Union Member states are in a better

position compared to the new European Union Member states and candidates for membership. A similar situation can be observed when job satisfaction and overall life satisfaction are analysed.

Regarding the rate of people at risk of poverty and social exclusion the Mediterranean countries and the old European Union Member states have similar rates, while non-European Union Member states outperform the new European Union Member states and candidates for membership. It can be concluded that the group of old European Union member states achieve, in average higher well-being for their inhabitants compared to the other groups of countries.

Additionally, the group of new European Union Member states and candidates for membership achieve, in average the lowest well-being for their inhabitants compared to the other groups of countries.

Table 5 ANOVA results

Indicators		Sum of Squares	df	Mean Square	F	Sig.
MENE	Between Groups	3.674E9	3	1.225E9	247.386	.000
	Within Groups	1.336E8	27	4949882.272		
	Total	3.807E9	30			
SFS	Between Groups	18.279	3	6.093	20.006	.000
	Within Groups	8.223	27	.305		
	Total	26.502	30			
JS	Between Groups	2.562	3	.854	5.795	.003
	Within Groups	3.980	27	.147		
	Total	6.542	30			
OLS	Between Groups	8.021	3	2.674	11.151	.000
	Within Groups	6.473	27	.240		
	Total	14.494	30			
AROPE	Between Groups	273.265	3	91.088	3.328	.034
	Within Groups	738.952	27	27.369		
	Total	1012.217	30			

Source: Author's calculation

The ANOVA procedure can be used for checking the statistical significance of differences in the average values of variables between clusters, as well as the variance homogeneity test or the so-called Levene's test. The results of the ANOVA procedure (Table 5) show that there are statistically significant differences in the average values for the variables ($p < 0.05$ for all indicators).

The test of statistical significance of differences between group means for individual variables is carried out by the test of homogeneity of variance, or so-called homoskedasticity. The best test for this is the so-

called Levene test, which starts from the null hypothesis that the variance is the same in all samples. The acceptance of the null hypothesis indicates that the variance is equal for at least one pair of samples. Formally hypothesis can be stated:

$$H_0 : \sigma_1^2 = \sigma_2^2 = \ldots = \sigma_k^2$$
$$H_1 : \sigma_1^2 \neq \sigma_2^2 \neq \ldots \neq \sigma_k^2$$

The results of the Levene's test are shown in Table 6 and indicate that there are no statistically significant differences between the variations of the given groups of countries. This further implies that the null hypothesis is accepted, that is, the variance is homogenous for all indicators across groups.

Table 6 Levene's test statistic

	Levene's Statistic	df1	df2	Sig.
MENI	.539	3	27	.660
SFS	2.903	3	27	.053
JS	1.209	3	27	.325
OLS	3.318	3	27	.055
AROPE	5.167	3	27	.056

Source: Author's calculation

CONCLUSIONS AND RECOMMENDATIONS

An increasing number of studies in the field of well-being assessment has emerged as a result of the need to find new, reliable measures to more objectively assess the level of social and economic development of the country, given the perceived shortcomings of existing macroeconomic indicators. The inclusion of objective and subjective measures in the evaluation process provides a more realistic and broader picture of countries' well-being.

Therefore, the paper aimed was to assess the similarities and differences in the achieved level of well-being based on different objective and subjective measures of well-being, in order to group countries with similar characteristics. Using hierarchical cluster analysis four clusters of countries were recognized: mostly Mediterranean countries, old European Union Member states, new European Union Member states and candidates for membership, and group with mostly non-European Union Member states. The results of the analysis revealed that the group of old European Union member states achieve, in average higher well-being compared to the other groups of countries. Furthermore, the group of new European Union Member states and candidates for membership achieve, on average the lowest well-being compared to the other groups of countries.

The study faces several limitations. Firstly, only 30 European countries were included in the analysis, due to the unavailability of the data for the rest of the countries in Europe. Secondly, the data for a single year were analysed, therefore it is not possible to follow the dynamics and trend of well-being indicators. Thirdly, the selection of indicators plays an important role in the obtained results and the application of other indicators may point toward a different grouping of countries.

Further research in this area may be directed towards the addressing of the identified shortcomings by encompassing more countries in the analysis and by analysing more periods. Additionally, it is possible to examine the impact of different sets of indicators on the identified grouping of countries.

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THE IMPACT OF COVID-19 PANDEMIC ON GIG WORKERS IN SERBIA: PRELIMINARY ASSESSMENT

Vladan Ivanović* **

University of Kragujevac, Faculty of Economics, vivanovic@kg.ac.rs

Zoran Kalinić

University of Kragujevac, Faculty of Economics, zkalinic@kg.ac.rs

Abstract: *Parallel to the disruptive technological change, popularly labelled Industry 4.0 or 4th Industrial revolution, we are witnessing the dramatic change in the way the labour market operates and the rise of digital work via platforms. The unprecedented growth of digital labour force in past several years is interrupted by the pandemic of Covid-19 which has produced one of the hardest exogenous shocks in world economy in the past century. While the impacts are still not clear completely, especially long-term ones, and the data are still largely missing, this paper tries to access the impact of Covid-19 outbreak on digital labour force in Serbia based on Gigmetar project developed by Centre for Public Policy Research. Gigmetar is the first algorithm developed to track systematically key characteristics and development of gig workforce in Serbia and in the countries of South and East Europe. In the analysis impacts of Covid-19 on the average and median incomes of gig workers are observed. Both variables are to be analysed in more details on three levels: gender level, level of different professional occupations of gig workers and on the NUTS3 level capturing specific reginal impact. Comparing the data from pre- and during the Covid-19 period, preliminary results are suggesting that the digital workers suffered significant loss in earnings. It is argued in discussion, contrary, that the long-term perspective in the time of disruptive technological change and radically changing conditions in which traditional businesses are operating, offers rather optimistic view about the future of this type of work.*

Keywords: *Gig economy, Covid-19, Platform work, Platform economy, Gigmetar, Freelancing*

JEL classification: *D26, J01, J44, 03*

INTRODUCTION

At the outbreak of first Industrial revolution, Swiss economist Simon de Sismondi wrote that the change in the economy and society will be so big that it is not possible to predict all the consequences of this event in the future (Ivanović, 2019). He was right. If there is such a parallel to this extraordinary event it is a moment, we are living in. Disruptive technological change, usually labelled 4th Industrial revolution causes dramatic changes in all aspects of life. Very vibrant changes are present in industry, in education, advertising, administration, health care, housing. Almost every domain changes dramatically or shows such a tendency.

Currently, alterations are especially remarkable in the domain of the labour market. The rise of platform work in a few previous years in the form of digital platforms confirms it undoubtably. According to the Report of Freelancing in USA (Upwork, 2019), a constantly increasing number of workers see online work as a best tool for long term professional and career development. It is almost half of the workforce in USA today with this stance. The value of this market reached in 2019 in USA 1 trillion US $ (5% of GDP). Propensity toward online form of work is especially pronounced within the younger generations, which makes additionally gig work a future form of work.

Already now 53% of the generation Z sees gig work a form of work within they will be engaged. Not only the attitudes on the side of the workers are changing in favour of digital work. Digital labour markets are basically technology-based markets, and the development of new technologies and improved efficiency and accessibility of existing technology will make gig work additionally favourable as a form of future work. Transformation of market economies toward knowledge-based economies and increasing share of educated population will additionally strengthen this trend.

Obviously, online labour platforms are attractive for both sides on the market, employers and employees, providing for them some advantages traditional labour market are not capable to. Employers got access to global pool of talents and better economizing with costs, while employees got access to income, professional development opportunities and experience out of the places they are living in. Platforms as intermediaries are making a business by taking the fractions of the value exchanged. Moreover, platforms are not only successful business models by themselves, than they basically significantly improve matching results on both sides of the exchange, i.e. employees and employer. In the consequence general efficiency is improved.

There are, however, some caveats as well. For employers it may be the quality of the work, although there are strategies to hold it under the control. For employees those are the risks related to the rights they are usually missing, such as social insurance, unemployment benefits or benefits during maternity leave. All those rights may be from great importance after the outbreak of Covid-19 pandemic. This is one of the reasons why numerous activities on national and international level are currently oriented toward the development of a regulatory framework.

Regardless of the challenges related with the gig work, it is plausible to expect future growth in online labour markets in volume, diversity, and complexity. One of the reasons for that is the fact that the modus operandi of a gig work becomes a standard in present crisis even for work in much more traditional branches – such are administrative work or trade. Distance work after the Covid-19 outbreak turns into an integral part of the work schedule for huge number of workers in many economies around the globe. According to Payoneer report (2020) this trend will only accelerate in future.

The aim of our paper is to show how the outbreak of pandemic in early phase influenced the average and median income of people engaged in work on the dominant labour platform in Serbia. More

precisely the aim is to estimate the influence of pandemic on the individuals who were active (working or searching for job) over the period December 2019 up to May 2020.

The paper is structured as follows. After determining what gig economy is and overview of pros and cons of gig work, we introduce in third part the methodology we are employing in our analysis. Forth part is dedicated to the presentation and discussion of the results, while in fifth, final part we are summarizing the main findings and recommend possible future directions toward which research activities may be oriented.

GIG ECONOMY AND GIG WORK: WHAT IT IS ABOUT?

It is new phenomena, effectively getting on significance in last half of a decade. As such it is labelled in different ways, such as "sharing economy", "new economy", "crowdsourcing", "peer economy" or "collaborative economy". Although there is no unique, from analytical and theoretical point of view, definition, it may be stressed that gig economy refers to labour market place, where the supply of and demand for the labour goes over digital, algorithmized market place (platform) and the matching between employees and employers is determined by price mechanism.

Regarding the platforms, we may make distinction on several grounds. We may make a distinction based on the level of service complexity which is exchanged via the platform. In this regard we may distinguish platforms used for executing low complexity tasks, such as food delivery apps. On the other hand, there are platforms which are used for matching workers and employers where the exchange is about more complex services. This categorisation is similar to the two categories defined by De Stefano (2015). He makes distinction between crowdwork systems and work-on-demand systems. First type of labour platforms refers to the jobs which are executed online, while the second encompasses more traditional jobs where the exchange means physical contact.

Regarding the labour platforms where the exchange is about more complex services, there are huge number as well as variety of these platforms. Some of the platforms are global, some are having local or regional character. However, we may identify two broad groups of labour platforms. General purpose labour platforms (GPLP) are referring to the virtual marketplaces where a variety of services are exchanged – from professional services, marketing, or software programming. And there are specialized labour platforms (SLP) over which much narrowed spectrum of services are exchanged. An example could be a specialised platform for teaching foreign languages, such is Thinkific.

From the perspective of worker, we may say that digital work has several unique features compared with (more) traditional labour arrangements. Stewart and Stanford (2017) offered five distinguishing characteristics. First, gig workers face irregular work schedules. This may be the result of fluctuating demand for their services or their own choice coming from personal life circumstances or work attitudes and preferences. Second, supporting work equipment is supplied by the worker and not employer. In a case of a low skilled digital work, the equipment may be the car or bicycle, and in a case of skilled workers it usually encompasses hardware devices and software used in the work process. Similar, especially for the highly skilled gig workers, they provide working space by their own. Fourth, majority of works realized are paid on task basis, not time basis. This is only partly true, because of two reasons. First, the practices of different platforms are different. On some platforms are dominating hourly-based earnings. In Serbia, this practise is (partially) employed in a case of law skilled workers.

High skilled gig workers are usually on the most popular GPLPs (such as Freelancer, Upwork) are having price "required" for their services which are defined on hourly base. Even if they do some job for a fix price, this prise may not be totally independent for the prise they require for a working hour. Fifth, which

is in the essence of the gig economy, the exchange is organized via platform which is a mediator. At the current state of development of platform work we are prone to add two more characteristics over those introduced by Stewart and Stanford (2017). One of them refers to the fact that the state regulation is absent or extremely hard to be (efficiently) implemented. It has huge influence on the workers protection and provision of number of rights provided under traditional labour contracts. This aspect emerges as especially important after the outbreak of Covid-19. Additionally, employees are predominantly not tight with single source of income, i.e. single employer. It makes them more resilient to the shocks usually one is exposed to working in a single firm.

WHAT ONLINE LABOUR MARKET REALLY MEANS? PROS & CONS OF ONLINE LABOUR MARKETS FROM WORKER PERSPECTIVE

Although the topic is quite new, number of studies, research reports and policy papers are published aiming to identify reasons of continuously rising number of gig workers all around the globe. In the same time, the first attempts are made toward the deeper understanding which advantages as well disadvantages new development creates for a labour force.

Generally, we may assume two motivations why individuals are taking part in the gig economy. Huws, Spencer & Syrdal (2018) identify two main (group of) reasons explaining human motivation according to self-determination theory. One group of factors refers to intrinsic, in self-interest, deeply rooted motives. By taking a part in some activities one maximizes his utility function (for example, income). The other group consists of factors related to extrinsic factors. Person is motivated by intangible reward or recognition. Individual is taking part in some (work) activity for instrumental reasons. Instrumental reasons may be an important driving force by the gig workers as well (Burbano, 2019).

If we look upon concrete motives behind gig work, we may identify numerous reasons why individuals choose to work via platforms. First, it is about incentives. Digital labour platforms offer many attractive job opportunities for young and well-educated individuals. This is of special importance where traditional markets do not function properly, i.e. where the youth unemployment rate is high, or the salaries are relatively low. Second, gig work has a specific inclusive character. Namely, the nature of gig jobs makes them suitable for those individuals with specific personal life circumstances (for example, health or family issues).

Gig work may be preferable option because it offers more job security, although it may sound at first glance counterintuitive. Hayed Brown, CEO of Upwork (Sheppard, 2020), suggest that we may need to reformulate job security. Security may not depend in the future from security of a single job, then more from the number of work options one has on the disposal. Generally, what is the most plausible assumption, gig workers are motivated by a combination of intrinsic and extrinsic reasons. Gandhi *et al.* (2018) finds that competence, interest, need to success, need to independence, economic motivation, and social influence are among the factors why individuals choose to work via platforms, where flexibility and freedom gig work brings in for an individual are the main reasons influencing decision to work as a gig worker. In the context of a crisis it may be interpreted that nature of gig work, fluidity and flexibility of work relations, makes them more resilient and makes more probable their efficient accommodation on turmoil they confronted with.

Countervailing factors which make gig work challenging are present as well. Online labour market is global, which means that the competition is much stronger than on regional or even national level. Not only that the competition is global, then the market is highly fragmented and the choices for the worker are much narrower than it is usually assumed for platform markets. When there is oversupply of gig

workers in some segment, which is the case usually for tasks of lower value added, the resulting price will be too low and with other conditions, for example deadlines, this may lead to precarious work. Not only that the equilibrium price will be too low, then there are no lags in accommodating to oversupply. One more risk, gig workers may be confronted with refers to the tasks which are under the strong pressure of automatization. In this regard, especially for the low skilled online workers, there is even a short and especially medium-term threat that their skills will be obsoleted. One should add to this the fact that there are no unions and dominantly no social insurance coverage for gig workers making them considerably more vulnerable to the risks of losing their jobs in near future. Further, there are usually much less communication and coordination, which makes gig work much more demanding for the worker and may be negatively correlated with his productivity. Although there are some attempts to create regulatory framework for gig workers, especially at the EU level, which would protect them from the risks they are exposed to, there is no effective solution for now. At least there is no such solution carried into effect.

DATA DESCRIPTION AND METHODOLOGICAL APPROACH

We base our research on the work of Public policy research centre (PPRC) and its project Gigmetar (see more Anđelkovic *et al.*, 2020). The Gigmetar measures the main characteristics of highly skilled labour force in Serbia and neighbouring countries. It officially tracks geographic origin, gender, professions, demanded price per hour of gig workers and gross income they earn.

To estimate the influence of the Covid-19 pandemic on gig workers in Serbia, we observe the changes of (gross) income of the gig workers in Serbia in six-month period, i.e. between December 2019 and May 2020. There are three measurement periods: December 2019, February 2020, and May 2020. We observe only the gig workers working during the whole period. The population of gig workers who are active on platform on periodical basis or who are new, without completed jobs, are much larger. Income represents a gross income gig worker has earned before tax and fee paid to platform. Although it is not the perfect measure of the net income, it is a good proxy. The summary statistics and list of variables are presented in Table 1.

Table 1 Gig workers in Serbia: Descriptive statistics

Variable	Mean	Median	Std. dev.	Min	Max
Income_df	2,728$	1,580$	9,801$	5$	287,356$
Income_mm	1,293$	850$	2,499$	2$	46,986$
Gender	0.33	0	0.47	0	1
Region	1.77	2	0.69	1	4
Profession	3.47	3	1.35	1	6
N=1246					

Source: Authors calculations based on Anđelković, B. *et al.* (2020). Gigmetar, *Centar za istraživanje javnih politika*, http://gigmetar.publicpolicy.rs/.

To determine how Covid-19 pandemic influenced gig work, we have observed the difference of revenues (gross income) of gig workers in pre-pandemic period, i.e. December-February 2019, and the period after the outbreak of pandemic, i.e. March-May 2020. The period between March and May is basically overlapping with the lockdown in Serbia, which is introduced on March 15th and finished on May 6th. To determine the income in both periods, it is necessary to observe the labour force working constantly on

platforms, between December 2019 and May 2020, and excluding those who are new or occasional workers. The variable Income$_{df}$ refers to the income of gig worker in first period, i.e. between December 2019 and February 2020, while variable Income$_{mm}$ refers to the second period observed, between March and May 2020. Gender describes whether the gig worker is female (1) or male (0) in our sample. Region depicts regions on NUTS2 level where we have four regions in our sample: Belgrade (1), South and East Serbia (2), Šumadija and West Serbia (3) and Vojvodina (4).[*1] Based on variable Profession we observe occupations of gig labour force in Serbia, where the gig workers are classified in six occupations according the methodology introduced by Oxford Internet Institute (Kässi & Lehdonvirta, 2018). Those six occupations are professional services (1), clerical and data entry (2), creative and multimedia (3), sales and marketing support (4), software development and technology (5), and writing and translation (6).

HOW COVID-19 PANDEMIC IMPACTED DIGITAL ONLINE WORKERS IN SERBIA: PRELIMINARY ASSESSMENT

The first and striking fact is that the gig workers in Serbia were severely affected by the Covid-19 pandemic. The fall of average income in first two months after the outbreak of pandemic is dramatic and counts 42.08%. The fall in median is less pronounced, but still significant and counted for 26.75%. Income in both periods, in average and median values, are presented on the Figure 1.
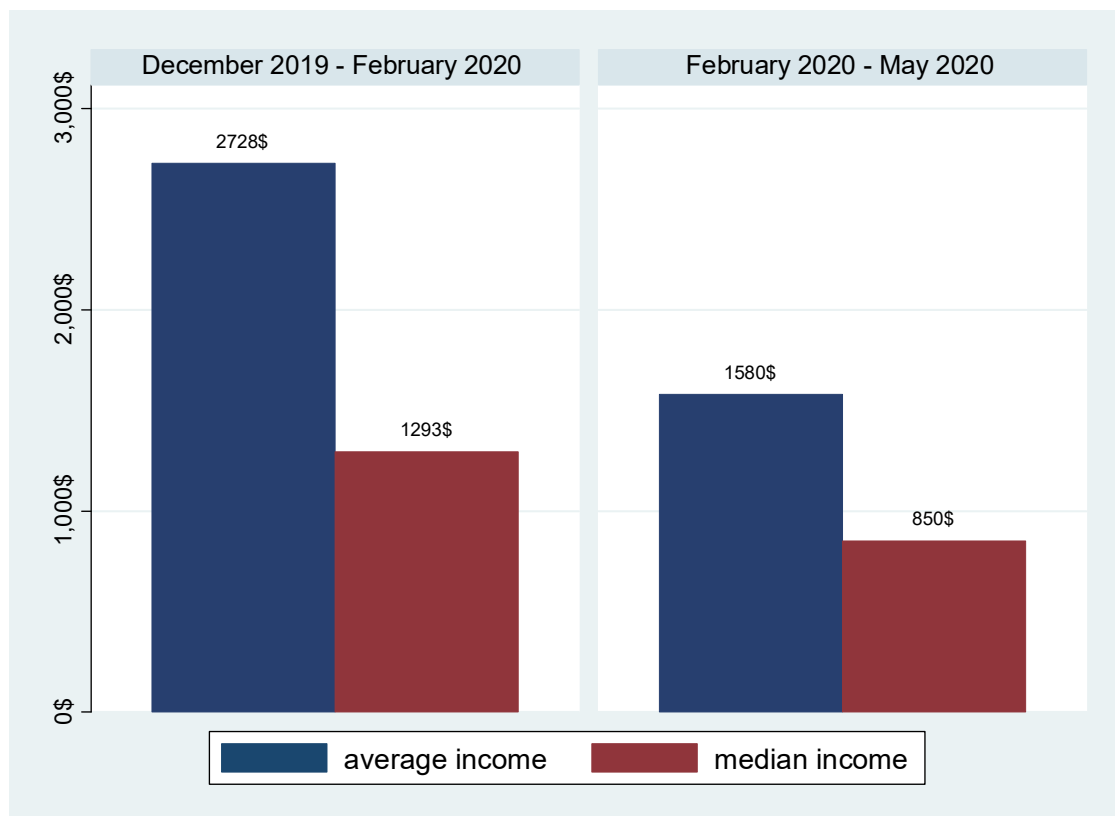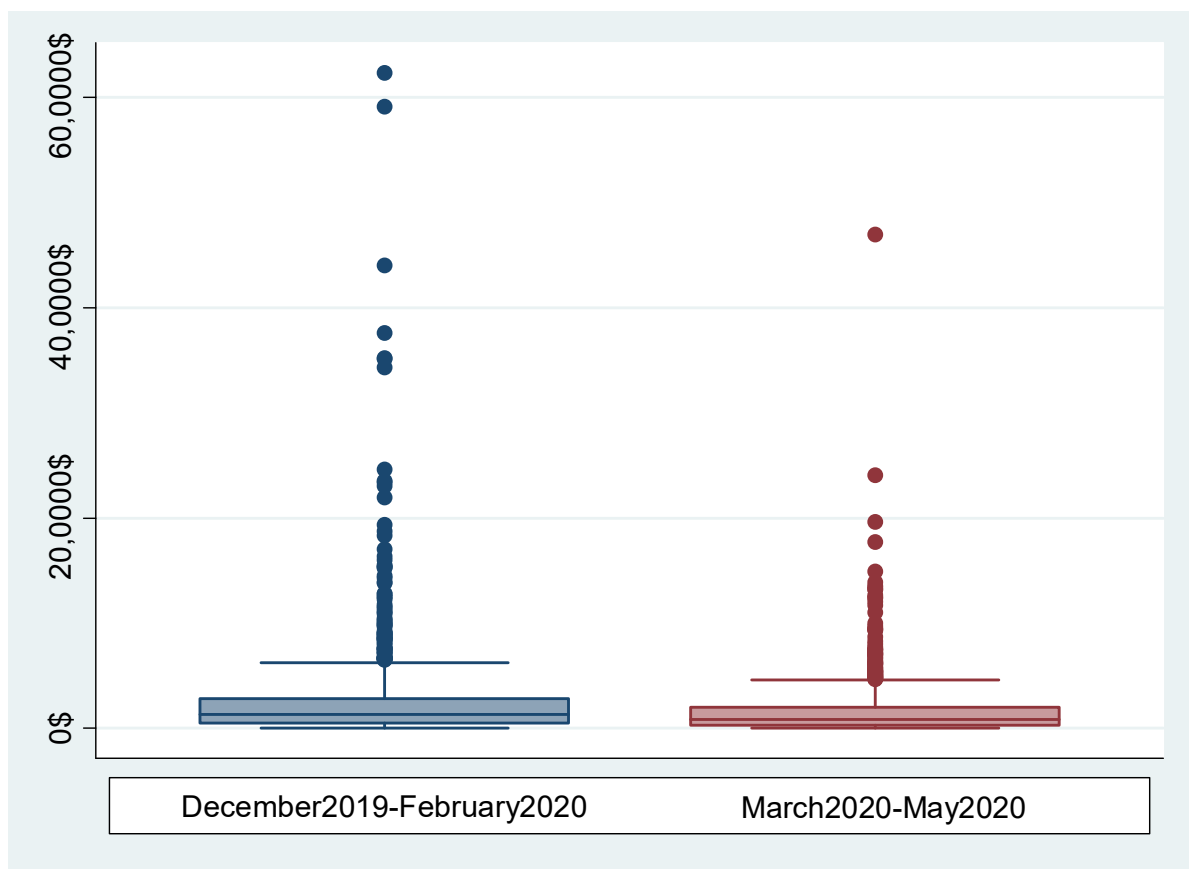

Figure 1 Average and median income of gig workers in Serbia (in USD $)

Source: Authors calculations based on Anđelković, B. *et al.* (2020). Gigmetar, *Centar za istraživanje javnih politika*, http://gigmetar.publicpolicy.rs/.

∗ Officially Serbia is according to NUTS2 classification divided in five regions. Fifth region encompasses Kosovo and Metohija. Because of unavailability of data, we have not observed this region in our analysis.

It is obvious that the shock and uncertainty created by Covid-19 has exacerbated the situation on digital labour market in initial two months after the outbreak. The negative trends traditional industries are experiencing, obviously instantly spread over digital labour markets. This is an expected tendency: when the conjuncture is good, it is good for everyone, when it comes to downturn, it is bad for everyone. Although the gig workers selling (more advanced) services online, as it is case in our sample, they are not physically prevented from doing their work, which was the case, for example, for gig workers delivering the food and which was the cause of the income fall (Apouey *et al.*, 2020). But, gig workers in por sample faced less demand for their services which is to be seen in falling average and median incomes in period prior and after the outbreak of pandemics. It is a natural consequence where the firms relaying in their business operations on gig work reacted by slowing or stopping projects in which gig workers were engaged due to combined influence of budget restrictions and uncertainty.

Figure 2 Boxplot of average income of gig workers in Serbia (in USD $)

Source: Authors calculations based on Anđelković, B. *et al.* (2020). Gigmetar, *Centar za istraživanje javnih politika*, http://gigmetar.publicpolicy.rs/.

It is interesting, however, that the workers under median income are experiencing less severe fall than the workers in upper half of the population in relative terms. The fall of average income for workers under the median income is 36%, where the contraction in income for those above the median income is 43%. This equalizing effect could be seen on the boxplots for both periods presented in the Figure 2. Although the difference is not exorbitant, it confirms basic economic reasoning of firms in the period of crises: services needed for normal business operation are less elastic to the negative circumstances than the services needed for research and development, i.e. those supporting innovations and strategic change within corporations. Additional consideration leads to the conclusion that the pandemic in an initial phase has produced some equalizing impact on the distribution of income between platform workers

making more worse off those who earn more than those who earn less. It is interesting to point out that the volatility of income is generally high by gig workers even in regular economic circumstances (Farrell & Greig, 2016), where the majority of gig workers, especially young and in the bottom income quantile, experience in average more than 30% month-to-month change in income. The difference with our finding is that for the most gig workers in our sample the income trend is downward.

The results are even more striking, if we observe only the gig workers experiencing the fall of income. Namely, 28.5% of gig workers obtained higher income during the last two months. If we solely concentrate to those whose income declined, the figures are the following: median income tumbled 53.7%, while average income dropped 58.1%.

When we discuss about workers and their skills who are employed over digital labour platforms, as it is a case in our sample, we should make some general considerations. In average and/or compared with median or representative Serbian worker with traditional labour contract in offline world they are highly skilled workers.

A proxy for that is the high level of foreign language, mainly English. On the other hand, not all the work over digital platforms could be classified as highly skilled. This is reflected, among other things, in differences in incomes they earn. Some skills are more common and thus less paid, some are more proficient. The very nature of the skills in digital labour space is the fact that there are no guaranteed comparative advantage and skill premium for any worker over a longer time horizon. Some skills will be or are being already displaced by automatization process and some by other, more advanced skills or more complicated set of the skills.

If we observe the relationship between different professions and fall of average income, we may conclude that there are considerable differences. The hardest dropdown experienced professional services and software development, 63% fall in income and 52% respectively. Multimedia experienced as well considerable fall in average income – 43.75%. Average income dropped 30.95% for clerical and data entry jobs, while writing and translation recorded 24.57% fall in income. Interestingly, average income for for marketing and sales contracted the least – 11%. We may argue that different domains experienced different falls because different functions expenditures on those services are having in enterprises.

Namely, the hardest fall are recorded in services important for innovations and strategic development of firms, i.e. professional services and software development. Those items are the first to be cut when the crises hit an enterprise. On the other side, sales and marketing sector showed the greatest robustness simply because those functions are continuing to be essential for maintaining regular business operations. Additionally, constraints imposed by emergency state caused by corona, pushed a lot of firms from the offline to the online market seeking the mitigate the fall of revenues. Supporting sale and marketing services are crucial in this regard.

Additionally, observing the difference between women and men, the results are somewhat mixed, depending whether we observe average or median income. In absolute terms, male gig workers experienced more dramatic fall – 1205$ during the March and April, while female recorded the fall in average income of 1,029$ in the same period. Women earned significantly lower income before the Covid-19 outbreak compared with male workers – the difference between average income was 21% in favour of men. During the lockdown, the difference even worsened –female gig worker was now earning in average 25% less than male counterparts. It is interesting that the influence was quite in other direction when it is about the median income. Namely, median female worker was earning 20% less than median male worker before the Covid-19 outbreak, while in Covid-19 time the difference dropped to 7.9%.

Since the global nature of the Internet based gig work, we may assume that the space or location of the worker should not play an important role impacting the earnings of gig workers, controlling for the other factors. Median worker in Belgrade should not be in better position than a median worker in Šumadija and West Serbia or Vojvodina. However, the results point in other direction, which indirectly points out to importance of other factors for gig worker concentration and performance, which are nested in offline world. According to the average income, in Vojvodina are settled the best paid gig workers, and the Covid-19 outbreak did not change this fact, although the average income declined most severely, i.e. more than a half (54.3%). In other regions the change was approximately one third of the pre-crisis level with small differences between them. It is highly interesting that median income is highest in Šumadija and West Serbia, the region with the lowest number of gig workers in Serbia in both observed periods, although the contraction in average income was significant – 24.4%.

The worst drop of median income was in region of South and East Serbia, where median worker recorded fall of more than 45%. It is, however, interesting that the average income in all the regions is despite the fall still around average (gross) income of workers employed by traditional labour contracts in Serbia and captured by official statistics (SORS, 2020).

CONCLUSIONS

The development of online labour platforms brought new job opportunities which were before that mainly available on local or, in best case, on national level. As a skilled workforce in Serbia lacks challenging and lucrative job opportunities on domestic market, global labour platforms offer efficient mechanism for overcoming shortages in this regard. The other option is migration.

However, although there are numerous reasons why the work via the online labour market could be preferable for growing number of people all around the world, including financial, technological, educational, and privately related factors, there are some shortages as well. The Covid-19 outbreak showed the most visibly those related to absence of social protection and other labour rights.

The impact of pandemic in our sample shows undoubtedly that the gig workers in Serbia experienced during the lockdown period a significant fall in income, whether we speak about average or median income. Average income declined 42.08%, where the fall in median income was much modest and counted 26.75%. Although the income(s) fall, the distribution of the income become more equal.

The influence of pandemic on female gig workers is ambivalent. Before the crisis average male income was 1/5 higher than female, and in first two months after the outbreak of crisis the difference deepened to 1/4. The influence is mixed here as well if we consider the changes in median income. On the other hand, representative (median) female worker now earns 7.9% less than male gig worker compared with difference of more than 20% before the crisis started. Regionally observed, gig workers in South and East Serbia experienced the hardest hit of crisis, while in Šumadija and West Serbia happened the smallest drop in income.

Because of great potential and predictable further growth and development of online labour markets, numerous important questions may be interesting for further investigation. Because it is relatively new and growing market available for labour force in Serbia future research could be oriented toward the more precise and detailed identification of main trends it is characterized by. Determinants why and how Serbian labour force may use more the opportunities available on global labour market as well as how domestic regulatory framework should be shaped to bring labour rights of gig workers in line with labour rights of workers employed under traditional labour contracts will continue to be very attractive fields for research in the future.

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PERSPECTIVES OF SERBIA'S INTERNATIONAL TRADE AFTER 2020[*]

Nataša Stanojević[**]
Institute of International Politics and Economics, Belgrade
natasa.stanojevic@diplomacy.bg.ac.rs

Slobodan Kotlica
Faculty of Economics and Informatics Dositej, Belgrade
kotlica@gmail.com

Abstract: *This paper analyzes the key trends in the global economy: decline in international trade, rising protectionism and shortening of global production chains. The specific aim is to investigate the impact of these current trends on Serbian foreign trade. The proposed hypotheses are 1) Decline in the volume of Serbian foreign trade can be expected to be sharper than global indicators and 2) The reduced volume of trade both in Serbia and globally will tend to continue for many years to come. Using statistical analysis for different types of data, linear regression and case study, the research has confirmed the first hypothesis. By applying linear regression, a high correlation between the foreign trade of Serbia and the world of over 90% was determined. The obtained coefficients were applied to the WTO projections for global trade in 2020 and 2021. It was found that the expected decline in Serbia's foreign trade is almost twice the world average. The second hypothesis proposing that trade performance shall remain at a lower level in the long term in the future is not quantitatively provable. It is indicated by the analysis of the economic causes of the main global trends, which have proven to be structural to the greatest extent.*

Keywords: *international trade, global value chains, foreign value added, Serbia.*

JEL classification: *F14, F62*

INTRODUCTION

Since the beginning of the transition process, all Serbian governments (as well as other Balkan countries) adopted policies to integrate into the world economy as quickly as possible, regardless of the consequences. Among other things, this implies an increase in the share of the services sector at the expense of the share of the real sector in the economy, which affected the deindustrialization of the Serbian economy (Micić, 2015, 20-21). As this was not the result of the maturity of the economy, as in the case of developed countries, and given that the decline of industry was sudden and intense, it can be concluded that the deindustrialization in Serbia was premature (Micić, 2015, 21). This is one of the key reasons why Serbia, like other transition economies, has small exports, and has become dependent on imports and foreign capital, which owns vital parts of the economy. The results of the full opening up of an economy are: enormous trade deficit, shutdown of domestic production, takeover of domestic companies by foreign companies, and numerous other economic consequences arising from such conditions.

During the suspension of main supply chains due to the Covid-19 epidemic, the consequences of excessive dependence on imports, whether of finished products or products within global value chains (GVCs) became apparent. It turned out that Serbia does not produce a large number of key products, not even those for which it has the conditions, capacities, technology, labor and which it had produced and even exported before the transition.

Dependence on trade in general and trade within GVCs in itself is not necessarily and has not been a problem during the previous decades of intense globalization. However, after decades of growth, all aspects of world trade began to decline after the Global Financial Crisis (GFC) in 2008. The specific aim of the paper is to investigate the impact of current global trends on Serbian foreign trade. These trends are: world trade decline, rising protectionism and the withdrawal of global production chains. The hypotheses are as follows. The first is that in the short term the fall of Serbia's foreign trade may be sharper than global parameters, as a consequence of its excessive openness, and thus the sensitivity of Serbian economy to external changes and disturbances. The hypothesis is further supported by the previous experience of the Global Financial Crisis (GFC), which had stronger negative effects on the Serbian economy than on most of the countries where the crisis arose. For example, during the GFC in the world the growth rate in 2009 was -1.68%, while in Serbia it was -2.73%, even the United States, where the GFC originated, had a slightly lower negative growth of -2.53%. (World Bank, 2019).

The second hypothesis is that the Serbian economy can expect a long-term lower level of total exports and also in trade within the global production chains in which it is involved. This statement is supported by the longevity of these trends and their causes. Namely, global economic trends, such as the slowdown in trade growth, the withdrawal or reduction of the activities of multinational companies (MNCs) in many countries and the growth of protectionism, have been going on for many years. The recent restrictions on international interactions due to the pandemic of Covid-19 are not considered the cause of these phenomena, but they have greatly accelerated these processes.

The research uses methods such as statistical analysis of different types of data, and linear regression to detect the degree of connection between Serbia's foreign trade and world trade. To determine the consequences of the withdrawal trend of GVCs on Serbia, a case study of the automotive industry of Serbia, as a representative of international production, is used.

The review of the literature, i.e. the previous results of research on the causes of declining global trends and its future trends, is followed by a detailed description of the methodology used in the paper. The

main chapter *Results and Discussion* is divided into three parts, each of which analyzes the impact of the above key trends in world trade on Serbia's foreign trade.

LITERATURE REVIEW

Contemporary declining trends in the international economy have been explored by Constantinescu, Mattoo and Ruta (2015), Lewis and Monarch (2016) and Boz, Bussière and Marsilli (2015). These authors concluded that decline in international trade cannot generally be explained by cyclical economic factors. Constantinescu, Mattoo and Ruta (2016) have revealed that one of the structural sources of declining global trade is slower pace of the process of vertical specialization through global supply chains.

In the empirical model set by Boz, Bussière, and Marsilli (2015), common cyclical factors were estimated: reduced demand, import prices, and a crisis-induced change in orientation towards domestic rather than import procurement. It was concluded that they accounted for only a half of the causes of international trade decline. Constantinescu, Mattoo and Ruta (2015) also found that only a half of the decrease in international trade volume can be explained by the weakening of economic activity, i.e. a decrease in GDP. Lewis and Monarch (2018) tested a possibility that the decline in trade volume was a reflection of a weakness in certain sectors of the world economy. They created a model in which imports were analyzed as a function of consumption, investment and real exchange rates on the sample of several major economies. The results of these studies summarize all the cyclical causes of the decline in international trade and suggest that much of the decline in world trade since 2010 is not and *cannot* be explained by common economic causes.

According to Georgieva, Loayza & Mendez-Ramos (2018) the decline in trade growth since the GFC can be explained by two distinct but interconnected factors: transitory and structural. They point out to global value chains as a main structural factor, which initially as a new pattern fostered a steep rise in trade growth but. "Lately, however, the maturation and slower pace in growth of global value chains has contributed to the overall trade slowdown." (Georgieva, Loayza & Mendez-Ramos, 2018, p. 1).

These studies reliably eliminate many phenomena that could potentially lead to a *temporary* reduction in the volume of foreign trade. Despite the undivided view on slowing down of the world economy integration, authors have very different perceptions of the future direction of the change. Bordo (2017) notes widespread changes in the world economy: a decrease in the volume of foreign trade and foreign investment, withdrawal of GVC, an increase in regulation, but he concludes that it is just a break in the process of global integration. In contrast, Jacoby (2018) and Evenett (2019) analyze the current trend of mass trade protectionism, which they consider to be a symptom of serious disturbances in the international economic system and the beginning of deglobalization.

METHODOLOGY

Each of the key current trends in international economic relations will be analyzed at the global level, and then their effects on Serbia will be explored. The dependence of Serbia's foreign trade on trends in the world economy is determined by applying linear regression analysis by using the least squares method. Linear regression model has a general form:

$$Y = \alpha + \beta X \qquad (1)$$

In the research of the relation between global and Serbian trade trends, it has the following forms:

$$St`_1 = \alpha + \beta Wt`_1 \qquad (2)$$

$$St`_2 = \alpha + \beta Wt`_2 \qquad (3)$$

where St` is a dependent variable for Serbian trade in 2020, $Wt`$ is World trade projected for 2020, $_1$ is an optimistic and $_2$ a pessimistic scenario for Serbian and World trade. The data for the shares of trade, exports and imports in GDP covers the period 1995-2019 and its source is World Bank indicators (2019).

In the research of the relation between globally growing protectionism and restrictive measures imposed on Serbia, linear regression takes the next form:

$$Ps = \alpha + \beta Pw \qquad (4)$$

where *Ps* is a dependent variable for a number of restrictive measures imposed on Serbia; *Pw* is the total number of trade restrictive measures introduced globally.

Protectionism in this research includes: subsidies (excluding export subsidies), export-related measures (including export subsidies), tariff measures, contingent trade-protective measures and trade-related investment measures. The source of this data is Global Trade Alert, the organization that has been monitoring this phenomenon since the GFC.

The strong connection between the global phenomenon of the receding of GVCs and Serbian trade within production chains will be analyzed in the case study of the Serbian automotive industry. It is chosen for several reasons. First, it has been exposed to a number of trade restrictions in recent years, both in terms of the sector as a whole and its products (tables 4 and 5). Second, this product group is a typical representative of exports based on involvement in production chains. Third, this is one of the most important groups of Serbian export products. Fourth, according to the WTO (2020b), this sector has suffered the greatest consequences of the Covid-19 epidemic, and the automotive products index (79.7) was the weakest of all, due to the collapsing of car production and sales in major economies.

RESULTS AND DISCUSSION

Slowdown in international trade and its impact on Serbian foreign trade

The rapid growth of international trade was a key feature of the globalization of the world economy in the aftermath of World War II. The share of trade in the world economy averaged 24% in the 1960s, 35% in the 1970s, exceeded a half of the world GDP in the early 21st century and reached a historic high of 61% in 2008 (figure 1).
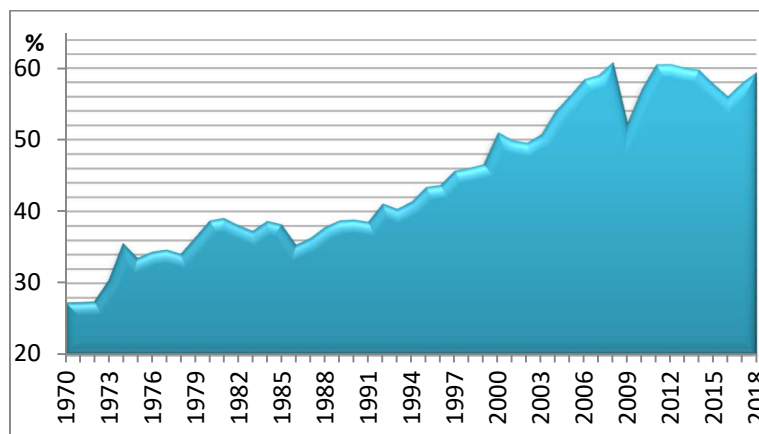

Figure 1 Share of international trade in GDP, 1970-2018

Source: Author according to the World Bank data (2019)

In 2009, the GFC halted the growth of international trade. In the two years following the crisis, the volume of foreign trade temporarily increased, but then further decreased, so that even a decade later trade never returned to its previous trend (figure 1). The reduction of international trade share in the world economy was not extremely high. Trade was reduced to about 57% of global GDP in 2018 compared to 61% of GDP before the GFC.

The sensitivity of the Serbian economy to global trends ensues from its high degree of openness in the last two decades. The openness is indicated by the data showing that the share of world trade in global GDP was 58%, while the share of Serbian trade in GDP was 110% in 2019 (World Bank, 2019). Excessive sensitivity to trends in the world economy shows a very strong correlation between Serbia's foreign trade and World trade (table 1).

Table 1 Correlation of international trade variables between World and Serbia

	Trade (bill. $)	Exports (bill. $)	Imports (bill. $)
Coefficient of determination (R^2)	0.95	0.91	0.93
Probability (p value)	0.00	0.00	0.00
Standard Error	3.61	2.45	2.35
Coefficient of variable	0.0012	0.0011	0.0012
Intercept	-8.86	-4.89	-3.99

Source: Author

As the results show, the degree of harmonization between Serbian and global changes and trends in international trade is very high. The determination coefficients are above 90% in imports, exports, and overall trade. This does not mean that changes in global trade affect 90% of changes in Serbian exports. Correlation generally does not prove the influence of one phenomenon on another, but their relationship. It can be the result of the influence of one variable on another, but more often, as it is the case here, this is the result of exposure to the same factors and influences outside the observed variables. The effects of the previously described global changes on the international trade of Serbia and the world trade are largely similar.

In order to estimate the future volume of Serbia's foreign trade, the obtained coefficients will be applied on two forecasted WTO's global trade scenarios, optimistic and pessimistic, in 2020 and 2021.

Table 2 Projections of World trade in 2020 and 2021

	Optimistic scenario		Pessimistic scenario	
Year	2020	2021	2020	2021
Projected change of trade (%)	-12.9	21.3	-31.9	24.0
Projected value of trade (billion USD)	43308	52532	33850	41974

Source: Projected change of trade (%) - WTO (2020b). Projected value of trade - Author's calculation.

These estimates were published in April 2020, so they include the former trade slowdowns from 2018 and 2019, as well as the consequences of the epidemic Covid-19. In 2020, world trade is expected to decrease by 13% under the optimistic version and by 32% under the pessimistic one. Significant trade growth is projected for 2021, by 21% and 24%, respectively (table 2).

In the optimistic version of the WTO, the growth for 2021 would slightly exceed the already reduced level of trade from 2019, but even in that case, the growth trend is far below the level in the post crisis

period. Under the pessimistic scenario, the growth of 24%, although very high, after a decline of 32% would not provide even the approximate values of trade from the previous period (Figure 2).
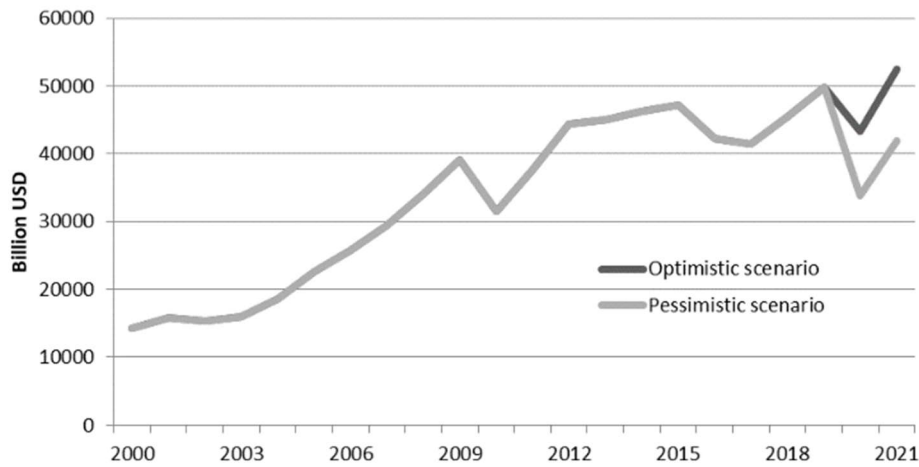

Figure 2 World trade projections2020-2021

Source: Author according to WTO data (2020b)

By applying the previously obtained coefficients to both scenarios, we get the expected amounts of Serbian trade for 2020 and 2021 (in billion USD).

The obtained results for 2020 are:

$$St`_1 = -8.86 + 0.0012 \times 43308 = 42.75 \tag{5}$$

$$St`_2 = -8.86 + 0.0012 \times 33850 = 31.48 \tag{6}$$

Serbian trade in 2019 amounted to 56.69 billion USD, so the expected decrease is -24.59% in the optimistic variant and -44.47% in the pessimistic one. We see that Serbia in 2020 can expect twice higher rates of negative growth than global ones. Statistically, this is related to the fact that the Serbian economy is also twice as open as the world average.

The results for 2021 are:

$$St`_1 = -8.86 + 0.0012 \times 52532 = 54.18 \tag{7}$$

$$St`_2 = -8.86 + 0.0012 \times 41974 = 41.51 \tag{8}$$

Compared to the calculated values for 2020, this is an increase of 26.58%, or 32.36% in 2021. Under no circumstances can the volume of trade in 2021 reach the value of 2019.

The rise of trade protectionism

A phenomenon that could explain a significant part of the process of weakening global trade is the sudden rise of economic protectionism. Protectionism can be analyzed through numerous trade restrictive measures with a direct impact on the declining of world trade, but also, it is a sign of deeper changes in the world economy. Protecting national economies from the environment rather than integrating into it reflects an important structural change in the international trade system. The weakening of economic activity during the GFC initiated a number of restrictive trade measures of developed and developing economies.

A number of measures such as increasing tariffs, imposing quantitative restrictions and tightening customs rules escalated between 2008 and 2018. The World Trade Organization (WTO) estimates that

import restrictions, imposed only in the period from October 2017 to October 2018, resulted in a decrease in international trade by $480 billion and restrictions in the period from October 2018 - May 2019 by $336 billion (WTO, 2019). New restrictive measures on imports, introduced by the G20 economies during this period, are three and a half times higher than the 2012 average, since when the WTO calculates the scope of trade restrictions. According to the Global Trade Alert (GTA), which also includes trade remedies (anti-dumping and other instruments counteracting countries that are considered potentially harmful to the domestic economy) the number of these measures is far greater.

According to GTA (2020), there are more than 1000 new restrictive measures each year, or more than 2000 in 2018. The 2019 WTO report states the following as a general feature of foreign trade: "During this period, trade tensions continued to dominate as a major feature and contributed to the uncertainty of international trade and the world economy… A record level of new restrictive measures was introduced in the previous period" (WTO, 2019, p. 2). The most affected countries by trade restrictions (at the end of 2019) were: China, with over 6,000 restrictions, Germany with more than 5,000, followed by Italy, the USA, France, the United Kingdom, the Republic of Korea, Spain and the Netherlands with about 4,000 restrictive measures (GTA, 2020).

During and after the Covid-19 pandemic, trade protectionism escalated. All countries, despite a number of formal restrictions provided by the WTO and especially the European Union, during 2020, have also provided massive subsidies to large companies, airlines, banks, etc., to save them from bankruptcy.

The number of new restrictive measures imposed on Serbian exports each year after the GFC, ranged between 59 and 170 (GTA, 2020). The number of newly introduced measures in 2019 fell to 88, but this is not encouraging. With former measures still in force, the total number of restrictions on Serbian exports is over 1100.

Table 3 Number of new trade restrictive measures imposed per year on Serbia (2009-2019)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Serbia	70	61	59	79	105	109	151	127	130	170	88

Source: Global Trade Alert (2020)

More than 200 of them refer to the export of cars and parts and accessories for cars, and this has been the most important export product of Serbia in the last few years. About 90 measures relate to steel exports (the second export product of Serbia) etc.

Table 4 Sectors and products in Serbia most affected by harmful trade interventions

Code	Name	Intervention
491	Motor vehicles; parts and accessories thereof	214
412	Products of iron or steel	93
352	Pharmaceutical products	91
8708	Parts and accessories of the motor vehicles of headings	175
3004	Medicaments	83

Source: Global Trade Alert (2020)

Moreover, most of these measures are not directed against any particular country, not even Serbia, but are a part of other countries' general restrictive packages in the era of wide economic deglobalization. For example, 60 measures imposed on corn exports from Serbia are a part of the general package of EU import duties from 2017.

Table 5 Correlation between the number of trade restrictive measures imposed on Serbia and worldwide

SERBIA	WORLD			
	R^2	Coefficient	Standard error	Probability
	0.64	5.55	161.39	0.003

Source: Author

This is also indicated by the high degree of correlation between the number of newly introduced restrictive trade measures per year at the global level and in Serbia (table 6).

Shortening of global supply chains

One of the key aspects of modern globalization is the international segmentation of production processes. This is the core activity of modern MNC. Almost all exporting companies, with or without the participation of foreign capital, are parts of global value chains (GVC), also called production chains or supply chains. The main indicator of economic integration in international production is foreign value added (FVA). This is the value of an imported semi-finished product that is ready for further processing and export. So, it is a part of trade, but the part that implies much wider changes in the world economy than the decline of trade. FVA, like most economic indicators, fell sharply in 2008 and 2009 due to the GFC, and again it has been declining since 2015 in a large number of countries. FVA was globally reduced in 10 years from 31% in 2008 to 27% in 2018.

In terms of participation in production chains, Serbia is also too dependent on imports. All the largest exporters of Serbian products are companies that are at the same time large importers. They have a small margin between exports and imports or they are net importers. It means that Serbia's position is downstream within GVS's, i.e. products are only assembled in Serbia while almost all components are imported. This is a relatively unfavorable position because domestic added value is very small.

The import of foreign sourced components prevails over Serbian car exports, thus the position of this industry is markedly downstream. In recent years, imports of this industry's products have been increasing, while exports have been declining sharply. These two processes have led to the fact that in 2019 the import and export of motor vehicles, including station wagons (code 8703) have almost the same value, while the import of parts and accessories of the motor vehicles (code 8708) far exceeds the export during the whole period (table 6).

Table 6 Serbia's trade in motor vehicles, parts and accessories (2014-2019)

Year	Code (HS)	Export (mil USD)	Import (mil USD)	Code (HS)	Export (mil USD)	Import (mil USD)
2014	8703	1780.31	-	8708	179.02	1425.94
2015	8703	1300.53	-	8708	182.14	1062.40
2016	8703	1231.07	537.52	8708	189.88	873.47
2017	8703	1058.12	446.41	8708	210.58	840.56
2018	8703	896.06	589.38	8708	214.82	785.35
2019	8703	592.17	591.61	8708	207.94	510.33

Source: UN Comtrade

The global trend of withdrawing production of many MNCs from a large number of countries is strongly reflected in Serbia. A sharp decline in the exports of the automotive industry indicates the withdrawal of this production chain. The representative of this industry in Serbia, Fiat Chrysler, has not introduced a single new production line for several years, and is gradually shutting down and removing production

from Serbia. To illustrate further the shortening of GVCs and its effects on Serbia, we will state that on a global level, the Peugeot group merged General Motors and Citroen in 2012, then Opel in 2017, and in 2019 Fiat joined this group. This means excluding a large number of manufacturers from the production chains of these companies, or, at best, reducing the range and scope of their participation in the group.

The shortening of GVC was caused by reduction in international investments. Multinational companies, as the largest global investors, are retreating into national contexts partly because of the global market volatility, caused by the GFC, and partly due to the mentioned changed conditions, which no longer provide extreme profits. With the convergence of international input prices, too long GVC no longer justifies high transportation costs.

CONCLUSIONS AND RECOMMENDATIONS

The results of the research indicate the importance and directions of changes in the global economy and the exceptional sensitivity of the Serbian economy to these changes. The first hypothesis about the pronounced sensitivity of the Serbian economy to the global trends has been confirmed, and the results show that the expected decrease in trade is almost twice as high as the global ones.

Another aspect of this research is the assumed permanence of these changes. As the former recent research cited in the literature review has shown, the cause lies only partly in common cyclical changes. The current decline in international economic interaction seems to be a long-term phenomenon, because the basic reasons are structural by its nature. These are the saturation of global markets, general economic uncertainty caused by the GFC, the global convergence of labor prices and technological ranges between developed and growing economies, and so on. These causes then gradually led to the growth of trade protectionism. In addition, the economic upheavals of the Covid-19 pandemic, besides their temporary dramatic effects, also reinforce these downward trends. Due to the pandemic, the borders have been closed for too long so that many trade arrangements cannot be resumed. Furthermore, the pandemic caused a real explosion of protectionism. Huge government interventions suddenly become a common and indisputable right, even an obligation of every state. The protective approach of large economies will further reduce trade.

Reducing all aspects of international economic relations is not necessarily negative for Serbia, i.e. it does not have to be only negative for the Serbian economy. Short-term losses are inevitable, but if the lessons of this period are learned, with a proactive approach, the Serbian economy could develop on a somewhat stronger foundation in the future and establish a more stable structure. This refers to a certain degree of reindustrialization and strengthening of the agricultural sector, in order to reduce the very high share of foreign trade in GDP, and thus alleviate the pronounced sensitivity and instability of the economy. Economic crises are cyclical and inevitable. However, with more significant reliance on domestic economic resources, Serbia would be less exposed to the elements of global currents over which it has no influence.

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CONCEPT OF FINANCIAL RESILIENCE IN TURBULENT TIMES - ROLE OF FINANCIAL EDUCATION AT THE INTERNATIONAL POLICY LEVEL

Sladjana Sredojevic, PhD[*]

Head of Bank Training Center and Specialist for International Cooperation, IFIs and Education in the Association of Serbian Banks, Belgrade, Republic of Serbia, sladjana.sredojevic@ubs-asb.com

Sophia Ziakou, PhD

Special Advisor at the Hellenic Bank Association, Athens, Greece, ziakousofia@gmail.com

Abstract: The paper aims to analyze recent trends and developments at the international policy level in the financial education. First part of research will focus on the Financial Resilience Concept and its definition and measurement. Second part is dedicated to the policy context of the financial education, role of the international organizations (OECD, EBA, EBF) and key trends in financial education initiatives at the international level. Third part will identify main trends in financial education for financial resilience, among national initiatives on the international level. Objective of the paper is to recognize the current developments in the financial education at the policy level, having in mind rapid development of the work done in this area, as well as growing importance of the concept of financial resilience and the role of financial education in it. Contribution of the research is twofold: a) to ensure better understanding of the important trends and aspects of financial education for financial resilience in turbulent times (global context) and to b) identify which areas will be the subject of future research or implementation in the field of financial education such as sustainable finance, financial technology, digital finance, as well as to open further questions relevant to the financial resilience and financial well-being of all relevant population groups.

Keywords: Financial Education, Financial Resilience, International Organizations, Financial Services Sector, Banking

JEL Classification: A20, H52, J13

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[*] Corresponding author

INTRODUCTION

Financial Education can positively help individuals in their decision-making process on choosing relevant, appropriate, and sustainable financial services or products. Beside transferring the knowledge and skills, the focus of Financial Education in this process is also to ensure that people are more motivated, better equipped and empowered with proper attitude while making decisions on their own in turbulent and post turbulent times. This is at the same time the foundation of the financially resilient individual.

Financial education, financial consumer protection and financial inclusion are defined at the highest policy level as three essential pillars for the financial empowerment of individuals and the overall stability of the financial system. This is recognized also through three sets of high-level principles endorsed by G20 leaders: Innovative Financial Inclusion (2010); Financial Consumer Protection (2011); and National Strategies for Financial Education (2012).

Aim of Financial education is to make individuals better prepared at managing their money, reaching their financial goals and avoiding stress related to financial problems, thus ultimately improving their financial well-being (OECD, 2020a, pp37). Financial education policy is widely recognized as a core component of the financial empowerment and resilience of individuals, as well as contributing to the overall stability of the financial system.

OECD/INFE definition of financial literacy: 'A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial well-being', indicates that the goal of financial education is to boost financial literacy, which in turn would enable individuals to enhance their financial well-being. The OECD/INFE developed also Toolkit that defines financial well-being as the ultimate objective of financial literacy and includes a number of statements that seek to describe it.

CONCEPT OF FINANCIAL RESILIENCE

Recent crisis caused by Covid 19 pandemic affected promptly daily reality and demonstrated the importance of the resilience of each individual in the broad sense; when it comes to the individuals as the financial services consumers (current and potential clients), the concept of financial resilience in turbulent times is becoming the "new norm/normality" and standard for financial education activities even in regular times. A sustainable future seeks/demands/requires a financial education that is able to create a better understanding of the economy, economic development and financial stability, since individual resilience is part of the resilience of the system.

It is needed to ensure individuals can cope with the predictable financial choices and difficulties in life, such saving enough over a very long period of time for a comfortable retirement, but also with unpredictable and highly unexpected shocks such as the current COVID-19 pandemic. Therefore, financial resilience is an essential characteristic for citizens everywhere. According to the OECD/INFE, individual financial resilience can be thought of as composed of six elements:

Keeping control over money: keeping a regular watch on one's financial situation and avoiding indebtedness can minimise the risks of financial stress.

Taking care with expenditure: a mark of financially prudent and thus resilience individuals is taking a good care with expenditure and considering the need and affordability of purchases.

Availability of financial cushion: the availability of savings and the ability to support oneself for a period of time without income is important. Individuals are likely to experience periods when they have to live on their savings and while some are planned (periods of study or training, for instance), others like the currently unfolding economic crisis caused by the COVID-19 pandemic are unplanned and likely to result in loss of income for segments of societies globally. Coping with a financial shortfall: the frequency of experiencing a shortfall and the worry about one are revealing of the financial resilience of individuals.

Planning individual finances: actively saving and pursuing long-term financial goals tend to be actions that boost the financial resilience of individuals.

Fraud awareness: being aware of financial scams and possible fraud and taking care not to fall victim to one is a characteristic of a financially resilience (and literate) individual (OECD, 2020a, pp 36).

Among various above mentioned elements of financial resilience, one of key elements is the availability of financial cushion or savings that can support the livelihood of individuals if their incomes cease. We talk about a resilient and a less resilient groups by splitting the individuals who report having savings or financial cushion to sustain their lives for longer than three months or less than three months, if their incomes suddenly stop. Especially in times of unexpected economic crises, some of the most vulnerable people in general tend to be those with lower incomes and little or no wealth, and who, for whatever reason, are not able to save. Financial resilience is therefore becoming new goal of financial education, and for all target groups.

Objective of the paper is to recognize the current developments in the financial education at the policy level. Accordingly, methodology of research will be based on application of methods of analysis and synthesis, methods of comparison and analogy, and method of description.

FINANCIAL EDUCATION IN BUILDING FINANCIAL RESILIENCE - OVERVIEW OF POLICY PAPERS AND REPORTS

Undoubtedly when increasing the level of financial literacy of an individual simultaneously the financial resilience of that specific individual increases as well. On policy level, as already been stated in section 1 and 2 of this paper, OECD has published several toolkits to help us not only identify both concepts but also to address the issue with specific guidelines. On the research level, OECD still has the leading role in data collection on financial literacy, but also European Banking Authority (EBA) and European Banking Federation (EBF) as financial sector institutions have published relevant reports. This section of the paper will focus on the OECD International Survey of Adult Financial literacy and the PISA results on students, the EBA and the EBF reports on financial education.

OECD

International Survey of Adult Financial Literacy

Second International survey of financial literacy competencies using the globally recognised OECD/INFE toolkit, was conducted in a sample of 26 countries and economies (of which 12 OECD member countries), drawn from Asia, Europe and Latin America. Special importance was given to the elements that provide insights into the financial resilience of individuals. Responses were analyzed from people aged from 18 and above, while in total, 125 787 adults were interviewed using the same core questions. Main findings of the survey are:

- A Financial literacy is low across the sampled economies: The overall financial literacy score, as computed using the OECD/INFE scoring methodology and defined in the OECD/INFE 2018 Toolkit (OECD, 2018), measures a set of basic financial skills, behaviors and attitudes, scoring

the maximum of 21 which effectively means that an individual has acquired a basic level of understanding of financial concepts and applies some prudent principles in their financial dealings. Individuals across the entire sample on average scored only 12.7 or just under 61% of the maximum financial literacy score, which represents a basic set of knowledge concepts and financially prudent behaviors and attitudes. These scores suggest that there is a room for improvement across all the elements of financial literacy: knowledge, behavior, attitude.

- Product awareness is relatively high across the surveyed 26 countries and economies; however, use is relatively low - less than half of the respondents purchased a financial product or service. Payment products are the most widely used, while insurance products the least.

- Large groups within many economies have limited financial resilience: Availability of savings is important to meet any financial shocks during the lifetime of individuals. The survey suggests that one-third or some 28% of adults across the entire sample report only having a financial cushion of about one week, if they lose their main income.

- Financial stress is common: Across the sample, 42% of individuals noted that they worry about meeting their everyday living expenses. Around 40% are concerned about their financial situation and 37% report they are just getting by financially.

- The average financial well-being average score of all the participants is below 50% of the maximum (47.4% for the total sample and 49.4% for OECD member countries). This suggests that on average the surveyed individuals do not consider their financial situation to contribute positively to their well-being, but rather to add stress and worry.

- The split into possible vulnerable groups that may constitute policy targets for financial education is as follow:
  - On average across the entire sample, men appear to have statistically greater financial knowledge and financial well-being scores
  - Young people (aged 18-29) seem to have lower financial literacy and financial attitude scores than the rest of the sample consistently and significantly. They also tend to have lower financial knowledge and less prudent financial behavior.
  - Individuals who use digital devices or services have consistently and significantly, higher financial literacy, knowledge, behavior and well-being scores.
  - Individuals who report availability of savings of more than three months have consistently and significantly higher scores across the board – across all economies and each of the financial scores.

These findings indicate that large groups of citizens are lacking the necessary financial literacy and financial resilience to deal effectively with everyday financial management. This is particularly important during the time of the unfolding crisis because of the COVID-19 pandemic, which brings a probability of significant economic and financial pressures on individuals and test their ability to preserve their financial well-being.

PISA

PISA stands for the Programme for International Students Assessment which is conducted every three years by OECD in member and non-member nations. According to OECD data (https://www.oecd.org/pisa/data/) PISA was first implemented in 43 countries and economies (OECD, 2000) while the last assessment reached 79 countries and economies (OECD, 2019a). PISA is unique because it assesses students' literacy -their capacity to apply their knowledge and skills in key areas and to analyze reason and communicate effectively as they identify, interpret and solve problems in variety of situations.

Specifically, PISA measures the ability of 15-year old to use their reading, mathematics and science knowledge and skills that are essential in order to meet and cope with the challenges in modern life.

The OECD Directorate for Education believes that students' literacy in above mentioned themes is a sound indicator for future economic health and subsequently for healthy economies. Throughout the years PISA has incorporated in the assessment, as optional, new innovative areas, such as problem solving and financial literacy (OECD, 2013), financial literacy and collaborative problem solving (OECD, 2017), financial literacy and global competence (OECD, 2019b) and financial literacy, creative thinking and ICT (2020d).

As it is displayed, financial literacy, since PISA Assessment 2012, has become a recurring theme as a result of its importance as an essential life skill which affects economic and financial stability and development. PISA financial literacy assessments have provided us with evidence on the increasing engagement of young people with financial issues and on their skills to address the rapid challenging landscape (e.g. digitalization, global connectivity, demographic changes, and sudden crisis). Due to its importance OECD decided to postpone the PISA 2021 assessment to 2022 in order to reflect post-COVID difficulties and identify individuals' financial resilience.

In the last optional PISA financial literacy assessment 13 OECD countries and economies and 7 partner countries participated, with 117000 15-year-old students taking the test, representing around 13.5 million students. Main findings of the assessment are (OECD, 2020c):

- On average, students in Estonia outperformed students from all other countries/economies in financial literacy, followed by performance in the Canadian provinces and Finland.
- Some 85% of students, on average across OECD countries/economies, attained at least Level 2 proficiency in financial literacy (Level 1 lowest –Level 5 highest). At a minimum these students can apply their knowledge of common financial products and commonly used financial terms to situations that are immediately relevant to them, and can recognize the value of simple budget.
- Some 10%, on average, of students attained the highest level of proficiency in financial literacy (Level5). These students can apply their knowledge to context that may only become relevant to their lives later on, can analyze complex financial products, and can take into account features of financial documents that are not immediately obvious.
- On average the performance of the contestants in financial literacy did not change significantly between 2012 and 2018, although it improved by 20 score points between 2015 and 2018.
- Boys scored a small but significant 2 points higher in than girls, and
- Immigrant students scored 30 points lower than non-immigrant students.
- Concerning students' behaviors and attitudes towards money, the assessment reported that more than 8 in 10 students can interpret important details in everyday financial documents. 94% reported that they get information about money matters from their parents. 54% of students hold an account at a bank, building society, post office or credit union, and 54& of students hold a payment card or a debit card. 73% reported that they had bought something online (either alone or with the help of a family member), and 39% of students reported that they had made a payment using a mobile phone, during the previous 12 months.
- Roughly 4 in 5 students, on average, reported that they could decide independently what to spend their money on, scoring 27 points higher in the financial literacy assessment.

These findings clearly imply that many students, in countries and economies at all levels of economic and financial development need to improve their financial literacy as most young students already use (digital money) and financial services and soon will have to make decisions for their lives with long-

term consequences. Especially those who live on tight budgets and have little resilience in financial mistakes or experiencing external shocks like Covid-19 crisis.

EBA Report on Financial Education

The European Banking Authority EBA has developed its Financial Education Reports in 2018 and in 2020 in line with Article 9(1)(b) of the EBA's Founding Regulation, which requires the Authority "to take a leading role in promoting transparency, simplicity and fairness in the market for consumer financial products or services across the internal market, including by reviewing and coordinating financial literacy and education initiatives by the competent authorities" (EBA, 2020). Second edition of the Financial Education Report (FER) is based on the EBA financial education repository, which consists of 123 financial education initiatives taken by the national authorities responsible for supervising the financial services and products that are within the EBA's scope of action (hereafter national supervisory authorities or NSAs), primarily during 2018 and 2019. FER brings an overview of the numerous initiatives referring in particular to four main characteristics of the initiatives: subject matter, format, target group and type of output produced. FER also presents the lessons learned and experiences gained by NSAs when carrying out the financial education and financial literacy initiatives. In this report, the EBA also decided to focus specifically on financial innovation, mainly on financial education initiatives related to Financial Technology (FinTech), as set out in the EBA FinTech Roadmap, looking at digital financial literacy, crypto-assets, cybersecurity and disclosure to consumers via digital means. In addition, the report provides a general overview of the policy context and the key trends in financial education and financial literacy initiatives. The main trends identified in the financial education initiatives include the interplay between financial education, financial conduct regulation and supervision of the financial system. Eventually, it highlights the increasing role of financial innovation and the growing focus on specific target groups, such as children and youth and elderly people and identifies a number of developments that could influence future financial education initiatives, including behavioural economics, sustainable finance, and advanced analytics and big data.

EBF Report on Financial Education

The European Banking Federation (EBF) published on 3rd November 2020 a Financial Literacy Playbook for Europe. Despite the intriguing title -Playbook- this publication is more than just presenting the EBF's widely recognized projects such as European Money Week and European Money Quiz. As EBF CEO Mr. Wim Mijs explains: "What a playbook certainly does -and that is applicable in this case- is to describe the work and actions already going on, the development happens on a specific field: financial education. Creating such an overview is exactly what the EBF financial education community set out to do when it embarked the project.".

Actually, this Playbook is the result of a survey conducted across national banking associations in 35 European countries during the first half of 2020 by the Financial Education Group (FEPG) of EBF and is the second survey conducted on the subject. The survey asked the National Banking Associations-Members of EBF to present an overview of the different types of partnerships they have in their country in order to promote financial education and to share information on national policies on the issue. Thus the Playbook brings together a comprehensive overview of the banking industry's financial education initiatives (125 national initiatives) and can be used both as a country-by-country reference quide, and as a complement to the several reports already published on financial education in Europe (EBA, OECD, EU CMU Action Plan). EBF with this publication aims to raise awareness as digitalization of financial services, crypto currencies, instant online payment and sudden shocks are issues that need more than ever to be addressed and financial literacy is the relevant life skill required.

CONCLUSIONS AND RECOMMENDATIONS

Each of the report presented in the paper demonstrated the need for further engagement in financial education of all target groups in order to support further their financial resilience: pupils and youth (OECD PISA, 2020c), adults (OECD, 2020a), industry involvement (EBF, 2020), supervisors and regulators role (EBA, 2020), national authorities policies (EBA, 2020). Also, the importance of research, studies and surveys on financial education and literacy is addressed and it is growing.

The overviews of various reports in this paper provide an opportunity for national authorities to share and compare experiences, and for other organizations and individuals interested in financial education to learn about, and possibly build on, the work carried out so far in this area. This is also confirmed during the 2020 OECD Ministerial Council Meeting when the Recommendation on Financial Literacy was adopted by the OECD Council. It presents "*a single, comprehensive, instrument on financial literacy to assist governments, other public authorities, and relevant stakeholders in their efforts to design, implement and evaluate financial literacy policies*" (OECD, 2020b).

It is part of a bigger picture where financial-consumer issues, financial literacy, together with improved financial access, adequate consumer protection, and regulatory frameworks, are expected to support financial resilience and well-being. Besides addressing the needs of vulnerable groups, increased importance of digitalization of finance and role of research, the Recommendation covers three main areas:

- 1.National strategies for financial literacy
- 2.Financial literacy and the various sectors of the financial landscape
- 3. Effective delivery of financial literacy programmes.

Policy makers could use the opportunity of the current crisis and put attention to some of the potential directions:

- promoting basic financial literacy concepts (budgeting, planning and saving). They could utilise effective communication channels, digital tools and innovative techniques (such as behavioural insights) to provide financial education programmes tailored to their citizens' needs.
- Respond to the urgency of the COVID-19 induced crisis by providing timely and appropriate advice and counselling services to those that are worst affected.
- Accessible and effective communication channels: Digital channels have been rapidly adopted and individuals are already following a steady stream of government advice. Policy makers may encourage the use of existing online financial education resources to support citizens in the current crisis, to help them build longer-term financial resilience and to further support financial inclusion
- Cooperate and coordinate with peers from the financial education community who may have experienced similar challenges and already tested and/or implemented innovative solutions. The OECD and its INFE are a platform committed to such activities.

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THE LINK BETWEEN INSURANCE ACTIVITIES AND ECONOMIC GROWTH: SOME EVIDENCE FROM EMERGING EUROPEAN COUNTRIES

Vladimir Stančić

University of Kragujevac, Faculty of Economics, vstancic@kg.ac.rs

Nemanja Lojanica[*]

University of Kragujevac, Faculty of Economics, nlojanica@kg.ac.rs

Abstract: The paper examines potential interdependence of the economic growth and parameters in insurance sector. Time framework of observation covers the period 2003-2019. The research is limited to European continent and its focus is on the emerging markets. More specifically, the research will include Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Serbia, Slovenia, Slovakia, Turkey, and Ukraine. By descriptive analysis it has been established that insurance market is more developed in countries with higher level of economic growth. By using Granger test one-way causality of parameters on the insurance market and economic growth has been shown. One-way causality from economic growth to the insurance sector was confirmed on the examples of Bulgaria, Czech Republic, Hungary, Romania, Slovenia, Croatia, and Slovakia. On the other side, one-way causality from the insurance sector to economic growth was established on examples of Poland, Serbia, Russia, and Turkey. Bearing in mind the diversity of the economic structure and overall level of development of financial system of analyzed economies, establishment of the relationship between economic growth and parameters on the insurance market provides a useful framework to the economic policy makers in formulating further directions aimed at sustainable economic growth of the emerging markets on European soil.

Keywords: Insurance, Economic growth, Causality, Emerging markets

JEL Classification: C22, G 22,

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[*] Corresponding author

INTRODUCTION

The first thought when mentioning insurance industry is the compensation of damages occurred due to accidents caused by human activity or destructive forces of nature. It is the function of protection that is basic in that activity, along with mobilizing-allocation (of monetary funds) and social function. Insurance enables the continuation of the life of individuals or business activities of business organizations after adverse events, which in a broader sense ensures the continuity of the functioning of the entire social community, with the absence of depletion of state social funds. Thus, the insurance activity is equally important for individuals, entrepreneurs, corporations, but also for state authorities, and economic policymakers.

Therefore, it is reasonable to assume that the insurance business has a positive impact on the economic growth of a national economy. More specifically, since the economically largest countries have the most developed insurance markets in the world, it could be assumed that there is a strong feedback loop between the two variables. The USA has the most developed insurance market, which realized in 2019 a total gross premium of 2.460 billion USD. The second place is occupied by the fastest growing economy of today – China with 617 billion USD, and the third is Japan with 459 billion USD. The best positioned European country is the United Kingdom (UK), which is, with 366 billion USD, in the 4th place in the world.

The mentioned countries are the leaders of geographical units, whose participation in the world insurance market, according to the criterion of total premium in the last (2019) year of the period that will be covered by the research in the paper, is shown in Table 1.

Table 1 World insurance premium in 2019

	Life ins.	Non-life ins.	Total ins.
Americas	25,92%	59,07%	43,71%
EMEA	35,87%	22,24%	28,55%
Asia and Pacific	38,21%	18,70%	27,74%
Total	100,00%	100,00%	100,00%

Source: Authors calculation according to Swiss Re Institute Sigma

The largest part of world premium is realized on American continents, with a distinct dominance of only two countries, mentioned USA and Canada, which participate with 41,21% on world market, while Central and Latin America realize only the remaining 2,5% of the world premium. By translating the aforementioned absolute amount of gross premium to the field of relative shares, the primacy of the USA in the world market is reflected in the leading position when it comes to participation in the total world premium (39.10%), as well as life and non-life insurance premiums (21.55% and 54.25%, respectively). The second place is held by the area marked by Swiss Re Institute as EMEA, and which encompasses Europe, Near East, and Africa. Within it, developed European countries have the largest share, which participate with 25,48% in total world premium, i.e. with 33,32% in premium of life and 18,71% in premium of non-life insurance. In the nominally last place, but with a relative share at the level of EMEA countries, are Asian and Pacific countries, predominantly due to the fact that China and Japan belong to them, which cumulatively participate in the world premium with 17.11%. On the other hand, this geographic area is the leader in sector of life insurance, providing 38.21% of the world premium of that type of insurance, which is not surprising taking into account that the most developed countries of the world in terms of life insurance, right behind the USA, are Japan and China with 11,70% and 11,30% of share in world premium, respectively.

Planned focus of work is on the significance test of the relation between the insurance market development and economic growth for European markets classified as developing by Swiss Re Institute. More specifically, the research will include Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Serbia, Slovenia, Slovakia, Turkey, and Ukraine, which together occupy 1,19% of the world insurance market. Serbian insurance market is treated as low developed, and it is also positioned to the very bottom of the scale of developing countries of EMEA area. According to the share in total world premium, in 2019 Serbia occupied 81st place, i.e. the last one in selected sample.

In the following table, a review of sampled countries with the display of their positions in the world according to total realized premium for year 2019, is given.

Table 2 Position of sampled countries on world insurance market in 2019

World position (gross prem.).	Country	Volume (mil. USD)	World %
28	Russia	22.856	0,36
34	Poland	15.869	0,25
39	Turkey	10.933	0,17
45	Czech Republic	7.215	0,11
52	Hungary	3.909	0,06
54	Slovenia	2.819	0,04
55	Romania	2.604	0,04
57	Slovakia	2.490	0,04
59	Ukraine	2.222	0,04
62	Bulgaria	1.641	0,03
65	Croatia	1.583	0,03
81	Serbia	973	0,02
	Total	75.114	1,19

Source: Authors calculation according to Swiss Re Institute Sigma

Planned research can be useful for institutions and regulators of financial systems, economic analysts, and other interested subjects in analyzed countries, in order to identify and value trends on markets and possible predictions of their further developments and their encouragement. The research will examine the nature of the relation between economic growth and total insurance market, but also segmented into sectors of life and non-life insurance.

LITERATURE REVIEW

Most researches in the last two decades, which dealt with the issue of relation between financial system development and economic growth, were related to financial markets and banking sector. In recent years, the importance and direction of the relation between economic growth and the development of the insurance market has become increasingly important. The researches have been conducted at various levels of observation and from various points of view – from the whole world to individual national economies and from the entire insurance markets to their narrower individual segments. Thus the results also vary, especially taking into account the differences such as socio-economic development, social system, structure of financial sector or degree of the development of financial and capital markets of sampled countries or wider geographical areas, but also due to diversity of applied methodology and

time range of observing the researches themselves. It is proven, for example, by Chang et al. (2013) who established, on a sample of 10 OECD countries in period 1979-2006, by using Bootstrap panel Granger causality for the sectors of life and non-life insurance, different behavior of these sectors in various countries. Also, Din, Abu-Bakar and Regupathi (2017) examined the impact of insurance industry on economic growth of 6 countries whose degree of economic development is significantly different (USA, UK, China, India, Malaysia and Pakistan) in period 1980–2015, having discovered significant positive relation of non-life insurance and economic growth in all countries in the short-run. On the other hand, sector of life insurance showed the same relationship in India, Pakistan and UK, while in the USA, China and Malaysia it also has significant relation with economic growth, but of a negative nature.

At the level of the whole world, but taking into account the representation of at least some countries that will be included in the research in this paper, several papers stand out. Arena (2008) examined at sample of 55 countries in period 1974-2004 the impact of life and non-life insurance on economic growth by GMM model, having established that both sectors significantly influence the economic growth in the way that non-life insurance influences the economic growth of both low-income and high-income countries, while the life insurance sector influences the economic growth only in high-income countries. Lee and Chiu (2012) examined the relation of the insurance premium level and real income in 36 countries in period 1979-2007 by using PSTR model.

They have established that non-life insurance shows elasticity in relation to real income, while life insurance shows the opposite relation, thanks to the fact that life insurance business is considered as a luxury good, while non-life insurance belongs to the domain of necessity good. Zouhaier (2014) conducted a research on 23 OECD countries in period 1990-2011 observing total insurance market as well as segmented to sectors of life and non-life insurance, by using static panel data model with fixed effect. He established that the sector of non-life insurance, measured with penetration rate has positive impact on economic growth, but measured with insurance density shows opposite, negative influence. He also discovered that the insurance market as a whole, and measured with insurance density, has negative impact on economic growth.

Various researches have also been conducted at the level of European continent itself. Haiss and Sümegi (2008) considered 29 European countries in period 1992-2004, by using panel data analysis, having established that the sector of life insurance significantly influences the economic growth in 15 developed EU countries, while non-life insurance has a significant impact in less developed EU. Using the same methodology, but on a sample of 43 European countries in period 1995-2006, Ćurak et al. (2009) established significant positive relation of life insurance and economic growth, while in the relation between non-life insurance and economic growth no significant relation was established. The same authors, Ćurak et al. (2009) conducted another research, but on a sample of 10 transition EU countries in period 1992-2007, using fixed effect, having discovered that the development of insurance sector encourages economic growth. Some countries covered by the research in this paper are also included in researches conducted at regional level, and those related to Balkans are especially interesting to us. Thus Njegomir and Stojić (2010) researched the relation between economic growth and insurance market in the countries of former Yugoslavia in period 2004-2008, using Granger test and country-specific fixed effects models for panel data, having concluded that the development of insurance sector has significant positive influence on economic growth. Novović Burić et al. (2017) have researched the impact of the main economic factors on demand for products of life insurance on sample of 6 countries of Western Balkans in period 2005-2015, using panel data model. Their results suggest that GDP and level of wages have significant positive influence on the level of demands for the products of life insurance, while the impact of unemployment rate and interest rates is negative.

Despite the obvious fact that the relation between insurance sector and economic growth was recognized as significant, it is clear that there is no consensus on the nature, significance, and direction of that relation. Emerging markets are especially interesting thanks to the fact that scientific discoveries have a certain possibility of use and suggestive action on encouragement of their development.

METHODOLOGY

Research methodology is based on indicators that show the degree of insurance market development, on one side, and the economic growth, on the other side, in mentioned European emerging markets, as treated by *Swiss RE Institute*, whose statistical base, enclosed in publication *Sigma*, represents the basic source of data for variables related to the insurance sector. One of the most often used indicators of insurance market development is realized insurance premium per resident, better known as insurance density. In the paper, three variables related to insurance density were used: total gross premium per capita (*T_DENS*), gross life insurance premium per capita (*L_DENS*) and gross premium of non-life insurance per capita (*NL_DENS*), and their values are expressed in American dollars (USD). As the approximation of economic growth, gross domestic product per capita was used (*GDPPC*), and data on its flow are taken from the World bank (*WDI*, 2020) and measured by the parity of purchasing power in international dollars. In the analysis annual data are used, which encompasses period from 2003 to (last available) 2019. In the continuation of the paper, a detailed description of quantitative approaches that were used is given as well as the order of operations that were applied in the model. The results of descriptive statistics are shown in Table 3. They are based on the presentation of average values of analyzed variables within the analyzed period. It is noticeable that the average *GDPPC* varies significantly by countries, and in Ukraine it is at the lowest level (9.382,76 USD), while in Czech Republic its value is the highest (29.814,53 USD). Average value of this indicator is for the majority of analyzed economies in the range of 18.000-25.000 USD. Level *T_DENS* also varies quite a bit. The average for Ukraine is only 59,75 USD, while in Slovenia it is 20 times larger and amounts 1.209,52 USD. Similar tendencies are noticeable when it is about *L_DENS* and *NL_DENS*. Based on such results, it can be emphasized that the countries with higher level of premium per capita, also have higher level of *GDPPC*. To confirm this relation, the degree of quantitative relationship of variables in analyzed countries was calculated, and the results are shown in Table 4.

Table 3 Descriptive statistics results

Country	Mean, 2003-2019			
	GDPPC	T_DENS	L_DENS	NL_DENS
Bulgaria	15780.86	145.19	21.12	124.01
Croatia	21105.17	340.33	96.12	244.09
Czech Republic	29814.53	642.42	265.43	376.99
Hungary	23219.28	366.21	185.51	180.70
Poland	22259.77	398.63	174.22	224.47
Romania	18443.15	110.90	22.25	88.71
Russian Federation	20823.94	183.74	18.80	164.88
Serbia	13259.87	99.38	17.26	82.12
Slovenia	29782.75	1209.52	361.07	848.39
Slovakia	25016.89	431.28	186.95	244.26
Turkey	19542.46	120.36	17.29	103.02
Ukraine	9382.76	59.75	3.04	56.71

Source: Authors' calculations based on WDI (2020) and Swiss Re Sigma

The results in Table 4 show that a positive link between indicators of economic growth and insurance market is present (the exception is relation of *L_DENS* and *GDPPC* in Poland, as well as the relation of *T_DENS, NL_DENS* and *GDPPC* in Ukraine).

Table 4 Correlation coefficients (gross domestic product and insurance parameters)

Country	Correlation with T_DENS	Correlation with L_DENS	Correlation with NL_DENS
Bulgaria	0.91	0.92	0.89
Croatia	0.57	0.84	0.39
Czech Republic	0.41	0.16	0.62
Hungary	0.10	0.08	0.12
Poland	0.46	-0.02	0.89
Romania	0.61	0.59	0.62
Russian Federation	0.22	0.38	0.12
Serbia	0.90	0.99	0.81
Slovenia	0.49	0.42	0.51
Slovakia	0.66	0.50	0.78
Turkey	0.84	0.77	0.84
Ukraine	-0.33	0.56	-0.38

Source: Authors' calculations

The degree of correlation is significantly high in Bulgaria, Serbia, and Turkey, while it is at moderate level in Croatia, Czech Republic, Poland, Romania, Slovenia, and Slovakia. The data for Hungary, Russia, and Ukraine do not imply some significant dependence of these parameters. Therefore, based on the results of descriptive analysis and correlation dependence of variables, a conclusion is imposed that the idea on examining connection of economic growth parameters and insurance market has absolute practical sense and coverage.

In order to examine the causality direction among economic variables in empirical studies, Granger (1969) and Sims (1972) tests are used very often. Granger developed a relatively simple test that defines causality in the following way: for variable y_t can be claimed that it causes x_t, if x_t can be predicted with higher preciseness by using past values of y_t variable, than in case when these values are not used, by assuming that all other variables stick to *ceteris paribus*. Econometric studies have shown that these tests give priority to time, not to causality. For that reason, they are especially weak for establishing relation between variables that are *forward-looking*.

Since these tests are based on asymptote theory, they are valid only for stationary series. In case a series is non-stationary, the order of integration one (i.e. I(1)), the evaluation in VAR model is performed in the first difference.

This is where the problem arises, because unit root tests for testing null hypothesis on stationarity have lower power in relation to alternative hypothesis of stationarity trend. Similar problem can also occur when establishing potential co-integration of variables due to the problem of sensitivity of tests to values of trend and constant. In this regard, at first, each time series will be tested in order to determine order of integration.

ADF traditional unit root test was applied in the paper. To derive the inherent characteristics of time series, Akaike information criterion (AIC) is used when determining sizes of series delay. ADF test starts from H0: variables possess unit root. Dickey and Fuller (1981) showed that this statistics does not follow

the conventional Student's t-distribution, so that they derived asymptotic results and simulated critical values for various tests and sample sizes. Assuming that the dependent variable follows an autoregressive process and where k is delay size, ADF tests the regression in the following way:

$$\Delta y_t = \beta_0 + \beta t + \sigma y_{t-1} + \delta_1 \Delta y_{t-1} + \delta_2 \Delta y_{t-2} + \cdots + \delta_k \Delta y_{t-k} + e_t \qquad (1)$$

The next step is setting a VAR model. Since economic subjects do not react simultaneously, one of the basic concepts in analysis of time series is the delay. When determining the optimal lag length, five various information criteria were used, as well as diagnostic tests confirming the selection. It is very important that VAR model is appropriately specified, i.e. that the residuals are not auto-correlated as well as that they are normally distributed. Granger test can be implemented by using the following regressions:

$$\Delta y_t = \alpha + \sum_{i=1}^{p} \beta_i \Delta y_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta x_{t-i} + e_t \qquad (2)$$

RESULTS AND DISCUSSION

In Table 5 we can see the results of ADF unit root test, which serves for determining the order of integration of variables. For statistical reasons, variables are converted into logarithm form and after that they were marked with small letters. When calculating values of the appropriate tau-statistics, in case of *gdppc*, as deterministic components, constant and trend were used, while in variables related to the insurance market the constant was used.

Table 5 ADF unit-root test results

Country	Level			
	gdppc (Intercept & Trend)	t_dens (Intercept)	l_dens (Intercept)	nl_dens (Intercept)
Bulgaria	-3.52***	-2.71***	-3.97*	-2.77***
Croatia	-3.42***	-2.70***	-4.55*	-2.79***
Czech Republic	-3.32***	-3.32**	-2.89***	-2.77***
Hungary	-4.60*	-3.78*	-3.49*	-3.69*
Poland	-3.93**	-2.93***	-3.04***	-2.93***
Romania	-3.89**	-3.83**	-5.03*	-3.42**
Russian Federation	-3.47***	-3.32**	-2.71***	-3.33**
Serbia	-3.64***	-3.07**	-6.66*	-2.87***
Slovenia	-3.92**	-3.39**	-4.13*	-2.78***
Slovakia	-3.76**	-3.32**	-3.66**	-4.41*
Turkey	-3.93**	-4.24*	-3.01***	-4.25*
Ukraine	-4.32**	-2.70***	-2.7***	-2.87***

Source: Authors' calculations. *Denotes the significant at 1% levels. **Denotes the significant at 5% levels. *** Denotes the significant at 10% levels.

When selecting delay, AIC criterion was used. The results show that variables of interest do not possess unit root, i.e. that they are stationary with error risk of 1, 5 or 10%. Based on stated, it can be concluded that all four variables are of null order of integration (i.e. I(0)), and that Granger test of causality on stationary data will be used in the paper.

Table 6 The results of the Granger non-causality test

Null hypothesis	Chi square	df	Probability
Bulgaria			
t_dens does not Granger cause gdppc	5.27	2	0.07***
l_dens does not Granger cause gdppc	5.78	2	0.05***
nl_dens does not Granger cause gdppc	5.13	2	0.08***
Croatia			
t_dens does not Granger cause gdppc	6.69	2	0.03**
nl_dens does not Granger cause gdppc	7.57	2	0.02**
Czech Republic			
t_dens does not Granger cause gdppc	8.75	2	0.01**
l_dens does not Granger cause gdppc	6.08	2	0.04**
nl_dens does not Granger cause gdppc	11.56	2	0.00*
Hungary			
t_dens does not Granger cause gdppc	29.96	2	0.00*
l_dens does not Granger cause gdppc	33.48	2	0.00*
nl_dens does not Granger cause gdppc	12.24	2	0.00*
Poland			
gdppc does not Granger cause l_dens	9.14	2	0.01**
gdppc does not Granger cause nl_dens	5.91	2	0.06***
Romania			
t_dens does not Granger cause gdppc	6.64	3	0.08***
l_dens does not Granger cause gdppc	9.77	3	0.02**
nl_dens does not Granger cause gdppc	6.42	3	0.09***
Serbia			
gdppc does not Granger cause l_dens	12.51	3	0.00*
Russian Federation			
gdppc does not Granger cause l_dens	11.11	2	0.00*
Slovenia			
t_dens does not Granger cause gdppc	10.87	2	0.00*
l_dens does not Granger cause gdppc	7.29	2	0.03**
nl_dens does not Granger cause gdppc	13.02	2	0.00*
Slovakia			
l_dens does not Granger cause gdppc	5.89	3	0.09***
Turkey			
gdppc does not Granger cause t_dens	5.87	3	0.09***
Ukraine			
gdppc does not Granger cause t_dens	19.82	3	0.00*
gdppc does not Granger cause nl_dens	18.69	3	0.00*

Source: Authors' calculations. *Denotes the significant at 1% levels. **Denotes the significant at 5% levels. *** Denotes the significant at 10% levels.

Three models were examined for each country. In the first model potential causality of gdppc i t_dens are examined, in the second one the relation between gdppc and l_dens is examined, while in the third model the relation between gdppc and nl_dens is examined. Before applying Granger

causality test, the appropriate VAR models were evaluated in which no autocorrelation of residuals is present, where the residuals are normally distributed and where the condition of stability is met (the solutions of the inverse characteristic equation lie within the unit circle). The results of causality test are in Table 6, where, for better visibility, the relations that are statistically significant for the analyzed countries are singled out.

The results displayed in Table 6 show that there is one-way cause-and-effect relationship in terms of Granger that goes from total premium per capita to economic growth in Bulgaria, Croatia, Czech Republic, Hungary, Romania, and Slovenia. More precisely, with the level of test significance of 10% this relation exists in Bulgaria and Romania, with the level of test significance of 5% in Croatia and Czech Republic, while with the level of test significance of 1% it exists in Hungary and Slovenia. In other countries no such type of causality was established.

Changes in sector of life insurance influence the changes in economic growth in Bulgaria, Czech Republic, Hungary, Romania, Slovenia, and Slovakia. More precisely, with the level of test significance of 10% this relation exists in Bulgaria and Slovakia, with the level of significance of 5% in Romania and Czech Republic, while with the level of significance of 1% this relation exists in Slovenia and Hungary.

The changes in sector of non-life insurance influence the changes in economic growth in Bulgaria, Croatia, Czech Republic, Hungary, Romania, and Slovenia. More precisely, with the level of test significance of 10% this relation exists in Bulgaria and Romania, with the level of test significance of 5% it exists in Croatia, while with the level of significance of 1% it exists in Czech Republic, Hungary, and Slovenia.

On the other hand, the remaining five countries are characterized by one-way causality of variables that goes from economic growth to parameters of insurance markets. One-way cause-and-effect relationships in terms of Granger that go from economic growth to total premium per capita were established in Turkey (level of test significance 10%) and in Ukraine (level of test significance 1%).

One-way causalities from economic growth to life insurance premium were established in Poland (level of test significance 5%), Russia (level of test significance 1%), and Serbia (level

of test significance 1%). The changes in economic growth cause the changes in sector of non-life insurance in Poland (level of test significance 10%) and Ukraine (level of test significance 1%).

CONCLUSIONS AND RECOMMENDATIONS

Basic objective of this paper is the analysis of the relationship between economic growth and parameters of insurance sector in emerging markets on European continent. Bearing in mind that the observed variables are of the order of integration null, interdependence was examined by Granger causality test.

It has been established by descriptive analysis that the insurance market is more developed in countries with higher level of GDP per capita such as Czech Republic, Slovenia, Slovakia, Hungary, and Poland. Analogously, Serbia and Ukraine that realize lower level of GDP per capita are also characterized by less developed insurance markets. Positive relation between economic growth and parameters on insurance market was also shown by the appropriate correlation coefficient, which is in some countries (Bulgaria, Serbia, and Turkey) at extremely high level. Granger test has shown the existence of one-way causality of changes of all 3 insurance market parameters and changes in economic growth of Bulgaria, Czech Republic, Hungary, Romania, and Slovenia. Similar situation is in Croatia, with exception of life insurance, which does not show the mentioned causality, while in Slovakia only this sector of insurance influences the changes in economic growth. On the other hand, one-way causality from economic growth to insurance market was established in Poland, Serbia, Russia, and Turkey.

Empirical results are not unambiguous, which can be ascribed to specifics of national economies that are related to differences of economic structure and overall level of financial system development. Such obtained results carry with them the appropriate implications because the establishment of the relation between economic growth and parameters on insurance market provides a useful framework to economic policymakers in formulating further directions towards sustainable economic development of emerging markets on European soil. In the context of future research, it would be interesting to include some more parameters of insurance market development (for example, penetration rate or the structure of insurance portfolio and insurance culture) and economic development of economy (for example, unemployment rate, interest rate) in analysis and to reexamine the obtained results by additional econometric techniques.

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THE IMPACT OF 2019-20 CORONAVIRUS PANDEMIC ON PENSION INSURANCE SECTOR

Stevan Luković[*]
University of Kragujevac, Faculty of Economics, slukovic@kg.ac.rs

Milka Grbić
University of Kragujevac, Faculty of Economics, mgrbic@kg.ac.rs

Abstract: The 2019-20 coronavirus pandemic would affect pension funds differently in most parts of the world depending on the frameworks that shape the pension insurance sector. The impact could be perceived in the pension regulation, decreasing exposure to risky asset classes, fixed income becoming dominant in portfolio and increasing exposure to alternative asset classes. The impact of pandemic on pension plans' financial position has been reflected in terms of contribution levels, volatility of return rates and provisional withdrawals authorized by governments to increase income of persons that experienced financial consequences of Covid-19. This is particularly crucial for occupational pension plans, given their importance in developed countries. These pension schemes provide retirement income through the accumulation of contributions and investment returns less the operational costs of maintaining the plan. Hence, if investment returns fall, the pension fund growth would be negatively affected. The impact would be perceived at both the pension plan level and also the individual (pension plan members) level. This paper attempts to provide a comprehensive review of the adverse effects of the pandemic and containment measures on financial position of pension plans in the United States, United Kingdom and the continental Europe.

Keywords: Pension Insurance Sector, Pension plans, Coronavirus pandemic, Investment portfolio

JEL classification: G11, G17, J26, J32

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[*] Corresponding author

INTRODUCTION

The pandemic and the containment measures used to put it under control have closed down most of the sectors of economies around the world in 2020, causing sudden contractions in GDP growth, economic activity and employment. Global GDP is estimated to have declined by around 3% in the first quarter of 2020, even though containment measures were introduced during the course of March in many countries. While the COVID-19 is primarily a health issue that challenges nations around the globe, the financial market fluctuations caused by the pandemic have raised long-lasting concerns for pension plan sponsors. Equity market crash that occured in March 2020 meant that for many pension plan sponsors the assets put aside to pay retirement benefits dropped 20% in a matter of weeks. At the same time government bond yields have fallen throughout the world, while in Europe many governments have been issuing negative yield long-term bonds. The interest rates for high quality corporate bonds have demonstrated surge in volatility since March 2020. The financial market disruption caused by pandemic will significantly hurt the pension plan funding position, at least in short term, while the long-term effect will depend on the length of crisis and the speed of the subsequent recovery.

There are many factors that impact the pension plan funding position. If corporate bond yields finish the year at the higher level than at the beginning of 2020, this will reduce pension liabilities and improve the funding position. Since the actuary recognizes interest rate changes almost immediately for discounting purposes, even a temporary increase, such the one that occurred in the middle of March 2020, can be beneficial for pension plan sponsors. Vice versa, if corporate bond rates continue to fall in the second half of 2020, an even larger drop in the funding ratio will occur. The other problem faced by pension plan sponsors is the negative impact of the furloughs and lay-offs of employees on the financial position of pension plans. These actions have significantly reduced the number of active participants in pension plans, thus decreasing the regular contributions and corresponding pension fund financial inflows.

Based on the above, the paper is organized in the following manner. The second part focuses on the analysis of the post covid-19 outbreak market fluctuations. The third part considers the financial position of pension plans in the United States during 2020, while the fourth part is dedicated to the analysis of the financial position of European pension plans, with the focus on Great Britain and the selected countries in Continental Europe. In the final section, conclusions are given.

MARKET FLUCTUATIONS CAUSED BY COVID-19 PANDEMIC

According to OECD (2020), the data show a deep recession in the first quarter of 2020 followed by gradual recovery in all OECD member countries. In the second quarter of 2020 the level of global GDP has declined by 12.25% compared to the fourth quarter of 2019, while the Euro Area GDP has dropped by over 18% (Graph 1). Projections for the scenario with the second pandemic wave in the fourth quarter of 2020 show the decline in global GDP by 7.75% in 2020, followed by 2.75% increase in 2021.

Risk aversion in financial markets that has risen at the beginning of the Covid-19 outbreak due to pandemic escalation and containment measures adopted by governments around the world has prompted massive sell-offs and the declines in financial asset prices. On February 12, the Dow Jones Industrial Average, the NASDAQ Composite, and S&P 500 Index all finished at record highs (while the NASDAQ and S&P 500 reached subsequent record highs on 19 February). However, from February 24 to February 28, stock markets worldwide reported their largest one-week declines since the 2008

financial crisis, thus entering the market correction. Global markets into early March became extremely volatile, with large fluctuations occurring. On March 9, most global markets reported severe downturns, mainly in response to the COVID-19 pandemic and an oil price war between Russia and the OPEC countries led by Saudi Arabia. This became colloquially known as „Black Monday". At the time, it was the worst drop since the Great Recession in 2008.
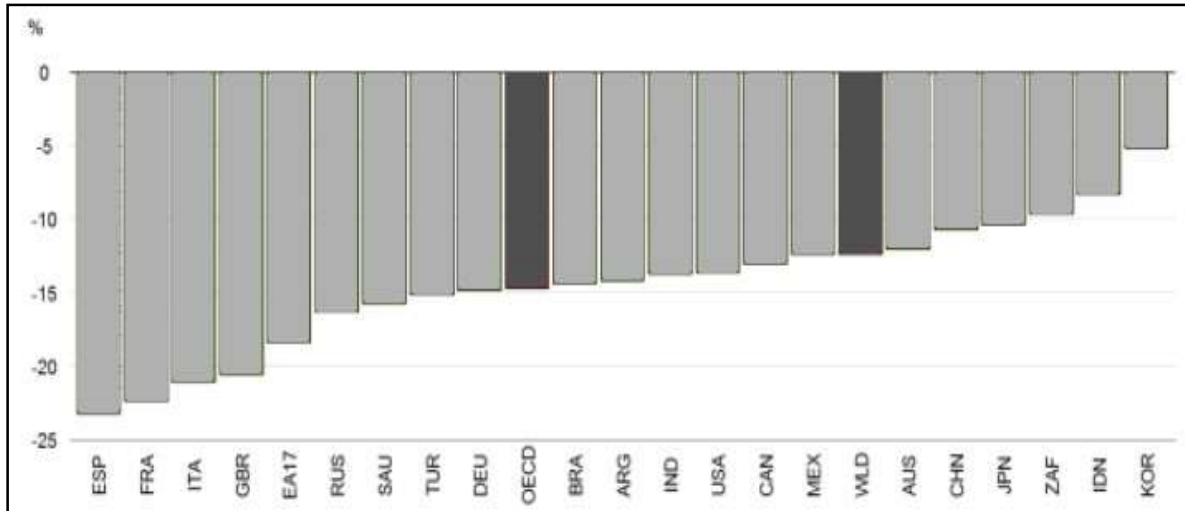
Graph 1 Per cent change in GDP between 2019Q4 and 2020Q2

Source: OECD, (2020), OECD Economic Outlook, Vol. 20. Iss. 1, OECD Publishing, p. 24

The S&P 500 index started well over 3,200 and closed at approximately 3,400 on February 19. Subsequently, in less than a month, it lost over a third of its value, dropping to 2,200 on March 23. While the index has experienced strong upward trend since March 2020, at the middle of June it was still lower.
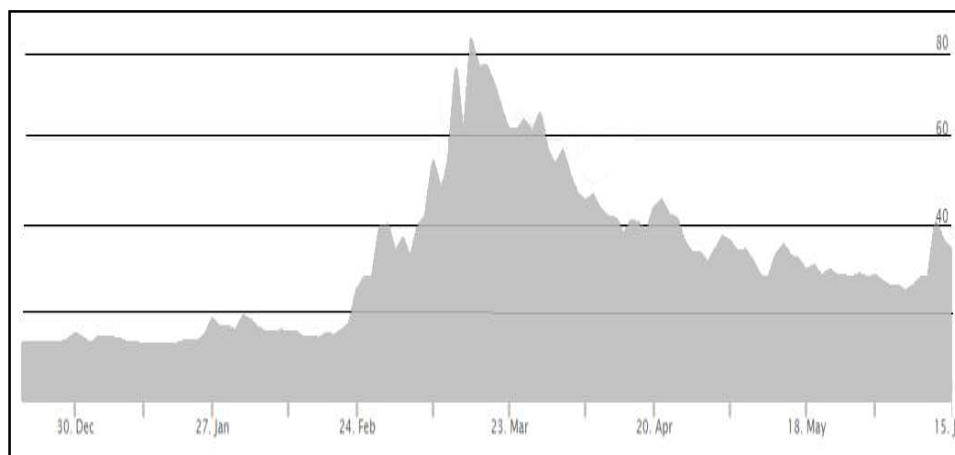
Graph 2 CBOE Volatility Index Changes (Year-end 2019 - June 2020)

Source: CBOE, http://www.cboe.com/delayedquote/advanced-charts?ticker=VIX

On March 16, 2020, the VIX (real time market index that represents the market's expectations of 30 day forward-looking volatility) closed at 82.69, the highest level since the 2008 financial crisis and the highest level since its inception in 1990 due to a combination of the 2020 Russia–Saudi Arabia oil price war and the COVID-19 pandemic (Graph 2).

At the start of 2020, yields for both long-term government bonds and high-quality corporate bonds were at low levels compared to historical averages. The Graph 3 below shows the relative yield change for AA US corporate bonds and a corporate pension plan discount rate based on a corporate bond yield compared

to their 2019 year-end yields. In January and February, both yields went lower, but fell even further et the beginning of March as the COVID-19 crisis erupted in the United States and the Federal Reserve cut interest rates. Since early March 2020, the spread between corporate bond and government bond yields has widened. At the end of March the Treasury bond yield was 1% lower than at the beginning of 2020, while the pension plan discount rate was the same as the starting point, although it remained higher for much of the second half of the March. Since higher discount rates decrease the present value of pension liabilities, it should offset some of the asset value drop due to equity prices downfall. The impact of Covid-19 on public pension schemes is less obvious, but is still causing worries. The pandemic has triggered a shockwave in the capital markets, and pension plan assets have been damaged by stock market fluctuations and interest rate cuts.
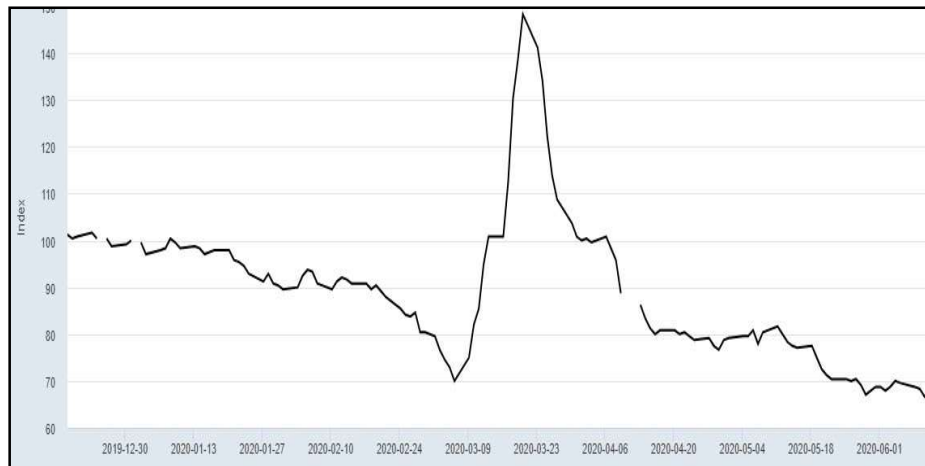
Graph 3 AA US corporate index effective yield, from the 2019 year-end to June 2020 (2019-12-31 =100)

Source: Ice Data Indices, LLC, ICE BofA AA US Corporate Index Effective Yield, Retrieved June 15, 2020, from FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/BAMLC0A2CAAEY#0

In most countries, the regular retirement benefit adjustments depend on the development of the average wage level. With job losses and number of working hours decreasing during the crisis, the average wage level in 2020 is probably going to be lower than in 2019. Thus, in the optimistic scenario, pensions are not going to increase in 2021. In countries where there is no indexation, this will leave retirees with real purchasing power losses. Future retirees might also be affected by this sudden drop of the average wage level, if their future pension is linked to the average income level. Thus, if no corrective measures are carried out, in the United States middle-income worker born in 1960 could have his annual Social Security benefits in retirement reduced by around 13%, with losses over the retirement period of $70 thousand due to this effect (Biggs, 2020).

The pandemic also affects the tax and contribution payers. In order to meet the pension obligations, in the short-term, higher tax subsidies will be necessary to cover the declines in contribution income of the national retirement agencies due to higher unemployment rates and shorter-time work. However, if labor markets do not recover in the following period, increasing contribution rates will become inevitable (Allianz Research, 2020).

According to Willis Tower Watson (2020), one in eight pension plan sponsors in the United States have taken actions to suspend or reduce matching contributions (employer matches a defined amount of an employee's elective-defferal contributions) while 6% of employers have suspended non-elective contributions (directed by employers toward their eligible workers' employer-sponsored retirement plans regardless if employees make their own contributions). Also, approximately 13% of defined benefit plan sponsors have been taking, planning or considering actions to suspend or reduce retirement

benefits while 8% have been considering to eliminate DB pension benefit accruals for current participants. Also, 5% of employers are considering the option to close DB plan to new entrants.

THE FINANCIAL POSITION OF PENSION PLANS IN THE UNITED STATES IN 2020

In the United States, a relief package was passed by lawmakers in March 2020. CARES (Coronavirus Aid, Relief, and Economic Security) Act, is a law that addresses the COVID-19 recession in the United States, passed by the Senate. The legislation is the largest economic stimulus package in history and amounts to approximately 10% of total GDP of the United States (approximately $2 trillion). This estimate includes (Congressional Budget Office, H.R. 748, CARES Act, Public Law 116-136):

- A $988 billion increase in mandatory outlays;
- A $408 billion decrease in revenues and
- A $326 billion increase in discretionary outlays, stemming from emergency supplemental appropriations.

The CARES Act provides special treatment for coronavirus-related distributions in several respects (Atlas et al., 2020):

First, such distributions are exempt from the 10% penalty for early distribution, which otherwise may apply to any qualified plan, 403(b) plan, or IRA (Individual Retirement Account);

Second, the in-service distribution prohibitions are waived for 401(k), 403(b), and 457(b) plans – but they are not waived **for** other qualified plans;

Third, such distributions are not subject to 20% mandatory federal income tax withholding that otherwise applies to cash lump sum distributions from qualified, 403(b), and governmental 457(b) plans.

The CARES Act also authorized retirement plans to make changes to the participant loan rules for qualified individuals as described above. For those individuals, retirement plans may:

- Increase the maximum participant loan limit for loans granted between March and September 2020 from the lesser of $50,000 or 50% of the participant's vested account balance, to the lesser of $100,000 or 100% of the participant's vested account balance;
- Delay any repayments of outstanding loans due from end of March, 2020 to December 31, 2020 for a period of up to one year, after which the loan would be adjusted to reflect the delay and the interest accruing during that period.

Perhaps the most popular feature of the CARES Act was the $1,200 stimulus payment it produced, but another notable feature is the option to withdraw from a 401(k) or IRA (Individual Retirement Account) without penalty if the person has been impacted by the pandemic. Normally, withdrawing funds from a 401(k) or IRA prior to age 59.5 results in a 10% penalty on the removed sum, but under the CARES Act, that penalty is waived provided the person can prove it has been influenced by COVID-19 and the withdrawal is limited to $100,000 (Pension Policy International, 2020).

As a result of the CARES Act, many companies made adjustments to sponsored defined contribution (DC) pension plans, such as the increase of in-service distributions from participant's DC plan accounts, increase of the maximum loan from participant's DC account, defferal of DC plan loan repayments or the waive of 2020 RMD (Required Minimum Distributions). These actions will weaken the financial position of pension plans, so corrective actions have to be taken by companies in the future.

Defined benefit (DB) plans around the world have been facing rising underfunding in the past decades, mainly due to an aging population and a shrinking active population that pays contributions. Many plan

sponsors have underestimated retiree longevity, and some have failed to anticipate the need for the rising contributions. The fact that the elderly are spending more years in retirement has resulted in worsening pension plans' funding position, since the assets accumulated to support payouts have fallen below those required to support solvency in the long run. World Economic Forum (2017) estimated that the retirement savings gap will grow by 5% each year to $400 trillion by 2050. This means an additional $28 billion of deficit each day.

In DC plans the amount to be contributed to a retirement account is specified as a percent of salary and is often matched by an employer contribution. Assets are invested as decided by employees in U.S. 401(k) plans, and in some cases employers or governments select the asset mix. Workers who contribute steadily and invest prudently can expect retirement benefits paid as lifelong annuity (income for life), a lump sum, or a phased withdrawal pattern. Of the total $47 trillion in global pension assets in 2019, it was estimated that DC plans held over half of the total assets under management, surpassing global DB assets for the first time (Willis Towers Watson 2020).

In view of the long-term decline of DB plans around the world, DC plans are likely to remain the engine of growth in the future, and several features are likely to become more popular in a post COVID-19 world. There has already been widespread adoption of automatic enrollment of new workers into DC plans, as well as annual auto-escalation of contribution rates.

The automatic enrollment makes compulsory for the companies to enroll eligible employees in a pension plan. Once enrolled, the employee has the alternative to opt-out of the scheme after defined period of time. If the employee decides to stay in the plan, automatic enrollment allows a company to automatically deduct elective-defferal contributions from an employee's salary and direct them in the 401(k) pension plan. Automatic escalation of contribution rates represents the gradual increase of contribution rate with the passage of time until it reaches the preset maximum.

The feature that further complicates the prospects for both DB and DC plans is that interest rates have been very low for the past several years. This reality has contributed to serious DB plans underfunding, particularly when realized returns were far below those assumed when calculating contribution obligations. DC pension plans, which have become the most popular pension scheme in many countries, are also facing complex challenges, since they do not have explicit funding targets, yet they also suffer when capital markets underperform.

A related topic refers to whether DC participants will alter their investment portfolios in the wake of the COVID-19 market shock. Bu et al. (2020) analyzed changes in risk preferences in twelve China regions first subject to the pandemic, finding that survey respondents displayed far more risk aversion in February of 2020, compared to state before the containment measures were introduced in October 2019. It is also worth noting that granting pension participants early access to their retirement assets may lead to problems with liquidity management in pension plans. For instance, the pension liquidity needs due to unexpected early withdrawals may force pension plan investment managers to sell assets at a loss.

This practice can also hurt portfolio managers' long-term investment strategies. Moreover, if contributions are temporarily halted, this also makes it difficult to pay promised retirement benefits.

The funding ratio for the largest public pension plans in the United States dropped to 66% from 74.9% over the course of the first quarter of 2020, according to Milliman (2020a). This represents the largest quarterly drop in the history of the firm's Public Pension Funding index. Market volatility caused by the coronavirus pandemic resulted in a $419 billion loss in the market value of pension plans' assets, which in aggregate had investment returns of -10.8% in the first quarter. The funding position of 100 largest U.S. public pension plans as measured by the Milliman 100 Public Pension Funding Index improved to

71.3% at the end of May 2020, up from 69.8% at the end of April 2020, with a significant improvement from 66,0% at the end of March 2020. Only four plans were at least 90% funded as of March 31, down from twenty at the 2019 year-end. Meanwhile, nine plans fell below the 60% funding ratio in the first quarter, bringing the total number of plans with a funding ratio below 60% to 35, up from 26 as of December 31, 2019. The total pension liability rose to an estimated $5.355 trillion at the end of the first quarter, up from $5.313 trillion at the end of the previous quarter, while the deficit rose to distressing 1.819 trillion at the end of March 2020, up from 1.334 trillion at the end of December 2019. However, most sectors of the market continued their Covid-19 recovery from April into May, offseting in some degree the financial impact of the March market downfall.

Overall, U.S. Social Security system is projected to be able to pay only 75% of future retirement benefits within the following decade, but the pandemic might additionaly worsen that contraction. Because of rising unemployment, many employers are permitting their workers to take out larger loans from their DC plans. In the United States, pension plan member can take out as much as $100,000, as regulated by CARES Act. Half of american employees have already pulled out or plan to pull the assets out of their DC pension plans. Some employers are reducing or stopping their 401(k) matches, and as many as 200,000 companies may terminate their DC plans completely. Because COVID-19 has exposed so many persons to expensive health issues, financial advisers are now reccomending that retirees withdraw 2.4% of their assets in each year, against the previous rule of 4% yearly. The cost of retirement (the amount of money one would need to save to generate a payment of $1 a year for 25 years) has risen by 14%, from $21 in 2019 for a target retirement date in 2040, to nearly $24 in March 2020 (Mitchell, 2020, 14). The employees can offset these losses by working longer and postponing a potential retirement date. However, that may not be possible in the future, due to the potential new wave of unemployment, and those who choose the early retirement are likely to receive considerably reduced benefits.

The funding position of the 100 largest corporate defined benefit pension plans worsened by $17 billion during May 2020 from $289 billion at the end of April to $306 billion at the end of May (Milliman, 2020b). As of May 2020, the funding ratio fell to 84.0% down from 84.5% at the end of April 2020, and from 88.0% in May, 2019. The primary reason for the worsening of the pension plans' funding deficit has been a decline in discount rates over the past 12 months. During that period, discount rates decreased, moving from 3.61% as of May 31, 2019 to 2.76% a year later. According to Milliman (2020b), discount rates used to calculate pension plan liabilities that follow high quality corporate bond yields, decreased during 2019, thereby increasing pension liabilties. The average discount rate decreased to 3.06% from 4.00% at the end of 2018. Also, discount rates have been continuously declining from the beginning of century from 7.63% level at the end of 1999. Over the last decade, discount rate has risen only in three years (2013, 2015 and 2018).

THE FINANCIAL POSITION OF EUROPEAN PENSION PLANS IN 2020

As for the United Kingdom, volatility in the stock market has been adversely impacting the value of DC accounts for individuals, and the funding position of DB plans for scheme sponsors. The British stock market, as stock markets around the world, has experienced significant falls and volatility after the Covid-19 outbreak. By the end of March 2020, the FTSE 100 index had experienced its worst quarter since 1987, reporting a reduction of 25%, while the FTSE 250 experienced an even larger downfall of 31% (Graph 4).

There have been concerns that volatility in the stock market could result in pension plan members making hasty decisions to withdraw assets, stop contributing, or change investment strategies within their scheme. Withdrawing or disinvesting retirement account at a time of deep market reductions could

result in an overall loss in the account value. Hence, the best solution for participants may be to remain invested until the market recovers in order to avoid losses arising from "selling low and buying high" (Pensions Policy Institute, 2020, 2). Young employees, aged under 25, are at greater risk of being negatively impacted, with the probability of working in sectors that have been blocked as a result of social distancing two and a half times greater than for the older population (Joyce&Hu, 2020, 2). By late March 2020, 69% of workers aged under 30 reported working fewer hours in the last week compared to usual and 58% reported earning less, compared to 49% and 36% of workers aged between 40 and 55 (Adams-Prassl et al., 2020, 2).
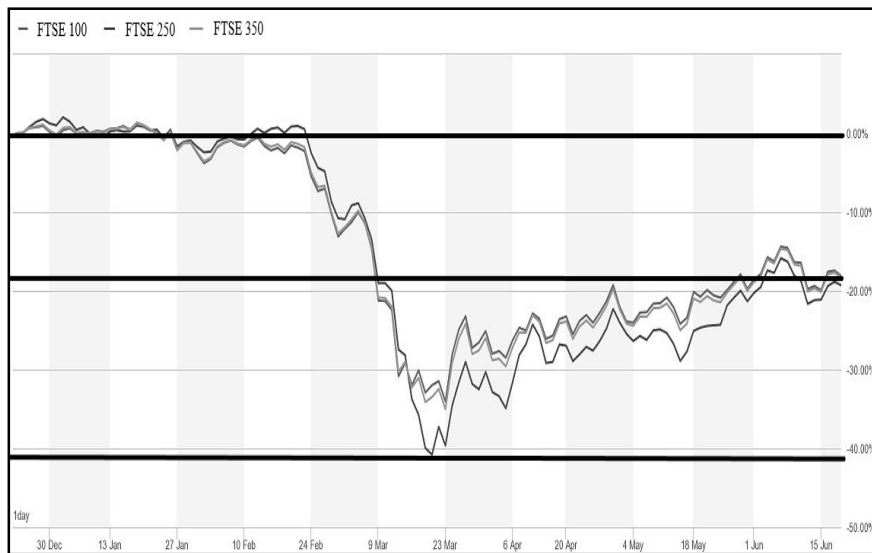
Graph 4 The percent change of FTSE 100, FTSE 250 and FTSE 350 compared to 2019 year-end

Source: https://www.londonstockexchange.com/indices/ftse-100
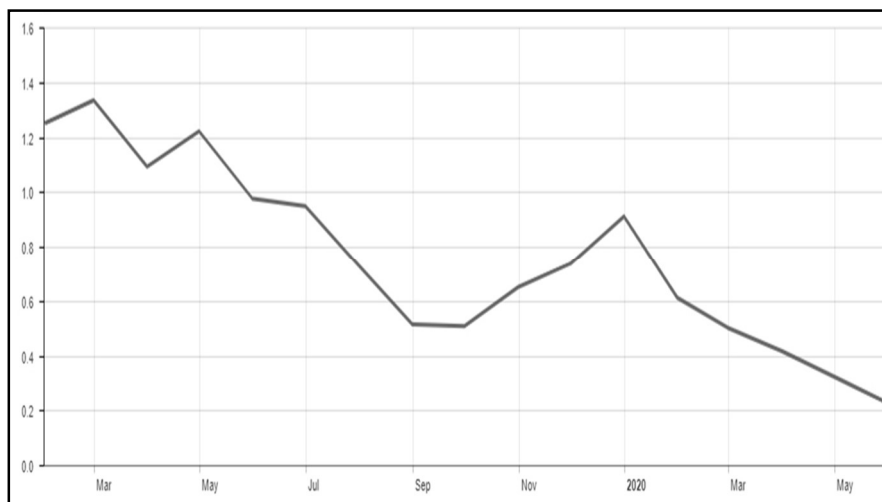
Graph 5 End month yield from British Government Stock, 10 year Nominal Par Yield (in 2019 and the first half of 2020)

Source: Bank of England, Retrieved June 18 2020, from https://www.bankofengland.co.uk/boeapps/database /FromShowColumns.asp?Travel=NIxAZxI1x&FromCategoryList=Yes&NewMeaningId=RNPY10&CategId=6& HighlightCatValueDisplay=Nominal%20par%20yield,%2010%20year

Although experiencing losses, UK pension plans have been more stable than the stock market in general because plans are diversified and hold more safe assets, such as government and corporate bonds. As of late March 2020, the value of NEST (National Employment Savings Trust) members' investments had

fallen by 17.6% since the start of the year, with members who are close to retirement losing only 0.6% as their investments have been largely shifted out of equities as they approach retirement.

While younger workers are at greater risk of experiencing immediate income reductions, the value of their retirement accounts has a longer period to recover before they become eligible to access them, through additional contributions and future investment returns.

The UK Government has confirmed that it will cover employer National Insurance and minimum automatic enrolment contributions of furloughed workers indicating that automatic enrolment requirements are unlikely to be lifted for employers, even in the short term. It can be expected that the opt-out rates increase as many people find their incomes increasingly challenged. The funding deficit of FTSE 350 pension schemes was up from £45 billion in January 2020 to £210 billion in May 2020. This comes as the market capitalisation of the same FTSE 350 companies with DB schemes fell by 21% from the beginning of the year to the end of May 2020. A combination of plummeting equities and the continued downward trend of government bond yields has pushed funding ratios further down (Graph 5). While The Pensions Regulator (TPR) is not forcing pension plans to reach target funding levels, the goal for pension plans to improve funding ratios will require a large part of the £210 billion deficit to be covered in the folllowing years (Professional Pensions, 2020). While liabilities had increased by £50 billion from January to May 2020 due to falling markets and low interest rates, the direct impact of coronavirus deaths was only 10% or the £5 billion. The global impact of Covid-19 is extensive but it appears that market fluctuations have had a far bigger impact on pension plans' funding than changes to longevity. The long-term impact depends on many factors, including the occurrence of the second and third pandemic waves, the introduction of vaccine, and the severity of a recession. These factors, particularly the impact of a severe recession, could have far bigger consequences than the immediate impact of Covid-19 in 2020.

As for Continental Europe, by the beginning of May 2020, more than 50 million workers had been put on government-supported job retention schemes across Europe. The number accounts for a quarter of the total EU workforce, an all-time high, surpassing the levels of furloughed workers after the Global financial crisis. In April 2020, the second month after COVID-19 containment measures were introduced in Member States, the Euro area seasonally-adjusted unemployment rate was 7.3%, up from 7.1% in March 2020. The EU unemployment rate was 6.6% in April 2020, up from 6.4% in March 2020 (Eurostat, 2020).

Due to plummeting equity markets and interest rates, Dutch pension schemes' funding levels had dropped by more than 8% in the period from the beginning of 2020 to the end of February. Pension funds' assets fell, by €111 billion, to €1,449 billion, while their liabilities went up €118 billion to € 1,618 billion. At the end of the first quarter of 2020, the average funding ratio of Dutch pensions funds stood at 89.6%, while their average policy funding ratio (the average of the funding ratios for the past twelve months) stood at 99.7%. This indicator also fell because the funding ratios in the first quarter of 2020 were lower than those in the first quarter of 2019 (De Nederlandsche Bank, 2020).

The fall in interest rates caused by the global coronavirus outbreak has pushed the Dutch pension fund system back into crisis, with the largest fund ABP (which holds €459 billion in assets for civil servants) warning it would have to reduce benefits in 2021. The ABP funding ratio fell to 88.7% in February from 94.1% in January 2020. Dutch pension funds invested a total €36 million in a new bond aimed at combating the coronavirus pandemic. The other two largest Dutch pension funds, APG and PGGM, have invested in the Nordic Investment Bank's €1 billion Response Bond, which matures in April 2023. Proceeds of the bond will finance projects that help to alleviate the social and economic effects of the

coronavirus pandemic in NIB's eight member countries: Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden (Pension Policy International, 2020).

Italy's pension regulator, Covip, reported a decline in contributions to occupational pension funds since March 2020 as economic activity in the country has fallen due to the government's response to the COVID-19 pandemic. The same body expects stronger fiscal incentives in order to encourage workers to restart contributing after the crisis, and greater investment of second pillar pension funds in the Italian economy. Italian pension funds recorded negative returns during the first quarter of 2020, but managed to contain the markets' volatility. Net of costs and taxes, industry-wide funds lost 5.2%, while open pension funds lost 7.5% and individual pension products lost 12.1%.

Germany's unemployment rate has risen far less rapidly than in countries such as the United States. In part, this is because of a government scheme to support the wages of struggling employers and employees called the Kurzarbeit, or short-time work programme. By late April, it was helping more than 10 million people. However, unemployment is still up, rising in April by 373,000, bringing the unemployment rate to 5.8%. The number of short-time workers could peak at a record 12 million and leave an average 2.7 million unemployed during 2020. Assuming that in the course of this economic downturn, the average monthly wage increases merely by 0.1% – what is still optimistic as it would copy the development of the financial crisis in 2009 – contribution income in 2020 could be around €8 billion lower than expected. This amount could be still balanced by means from the sustainability reserve, although it already declined to €38.3 billion in March 2020, due to decreases in contribution income and increases in pension expenditures. The Covid-19 crisis will deplete the sustainability reserve earlier than assumed, triggering the need for contribution rate increases, as pensions cannot be cut by law (Allianz Research, 2020, 2). The other option would be to increase state subsidies to postpone the urgency of higher contribution rates. But against the rising public debt, this might proof to be rather hard to carry out.

Romania's mandatory second pillar pension funds returned -4.5% over the first four months of 2020, according to the Romanian Pension Funds' Association (APAPR). The first quarter reported returns for the €13 billion worth second pillar pension system drop to -6.7%. According to APAPR (2020), 90% of the fall in the first quarter was caused by plunging equity markets, the Bucharest Stock Exchange falling by 24% over the period and the UK, German and French exchanges suffering similar falls (Moss, 2020). The remaining 10% of loss was caused by short-term volatility in bond prices. Bonds made a comeback in positive returns much sooner than the equity markets, which was beneficial for pension funds, since bonds account for the significant part of Pillar II pension funds' portfolios, with 65% of assets in government bonds and 10% in other bonds, as of March 31, 2020. Listed equities made up 18.5% and UCITS (Undertakings for the Collective Investment in the Transferable Securities) 2.5% of portfolios at the same date, with the rest in bank deposits. A significant recovery occured in April, and returns for the 12 months period prior to April 2020 were still positive, at 4%. Over the longer term, average annual returns for the three years before the end of March 2020 were 2.2%, and 3% over the five years to that date. It is expected that the recovery continues, as the lockdown on the economy started being eased on May 15. In this context, it should be noted that the investment performance of pension fund should be assessed in the relevant time horizon. According to APAPR (2020), the annual return rate (March 2019 - March 2020) is 1.3%, for the last 3 years the average annual rate remains 2.2%, for the last 5 years 3%, and for the last 10 years 5.6%.

CONCLUSION

In the previous decade, the challenges that pension plans faced in shaping their investment portfolios have become more pronounced. After the Global financial crisis, the debt crisis in the Eurozone and the long-term global trend of lowering interest rates, the Covid-19 pandemic ensued, which further limited the number of available investment alternatives. In the period from 2009 to 2017, developed stock markets were experiencing relatively continuous upward trend, and in 2018 the biggest drop in stock prices since 2008 occurred. During 2019, the stock markets recovered, and in the first quarter of 2020, dramatic drop of all stock exchange indices occured, with significant fluctuations later in the year. With significant fluctuations in the stock market, investors have diverted assets to safe investments, which have become unprofitable, given the growing number of countries that have issued bonds with negative interest rates. Unlike the Global financial crisis, when this "escape to safety" enabled the realization of moderate rates of return, in the midst of the Covid-19 pandemic, this maneuver is no longer profitable. The newly created circumstances will require pension fund investment managers to improve the reorientation towards alternative financial assets and different geographical areas in order to diversify their portfolios and limit growing market risks.

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INNOVATION, EXPORT, CO2 EMISSION AND ECONOMIC GROWTH: A PANEL ANALYSIS OF SELECTED CENTRAL AND EASTERN EUROPEAN COUNTRIES

Nevena Veselinović

University of Kragujevac, Institute of Information Technologies, nveselinovic@uni.kg.ac.rs

Filip Ž. Bugarčić

University of Kragujevac, Faculty of Economics, f.bugarcic@kg.ac.rs

Ljubivoje Radonjić[*]

University of Kragujevac, Faculty of Economics, ljubivojeradonjic@yahoo.com

Abstract: *The article presents an effort to examine the development patterns of the Central and Eastern European countries (CEEC), considering notable macroeconomic relations amongst export intensity, energy use, innovation capacity, and economic growth. From that perspective, the main objective of the article is to identify the significance and impact of prior mentioned macroeconomic features on economic growth, as well as the dynamics of CO2 emission in the CEEC. The Panel Auto Regressive Distributed Lag (ARDL) is utilized as the central model for examining the long-term and short-term relations among economic growth, technological innovations, export intensity, and CO2 emission. Based on the Pooled Mean Group (PMG) estimator, outcomes exhibit that the export intensity and the dynamics of CO2 emission have a notable impact on economic growth in the long term, while the impact of export intensity becomes irrelevant to explain the movement of economic growth in the short term. Innovation capacity has no significant impact on economic growth trends in the long or the short term. The different outcomes are obtained regarding the influence of the specified variables on the dynamics of CO2 emission. Trends in economic growth, in the long run, moderately determine the dynamics of CO2 emission. The innovation capacity and the export intensity have a significant negative impact on the movement of CO2 emission dynamics in the long run, although the dynamics of CO2 emissions remain determined only by innovation capacity in the short term.*

Keywords: *Innovation, Export, CO2 Emission, Economic Growth, Panel ARDL*

JEL classification: *C33, F10, O11*

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[*] Corresponding author

INTRODUCTION

In contemporary economic circumstances, it is important to comprehend the patterns of economic movement under the influence of various factors. Growing economies face the necessity to find out new technological and innovative solutions to foster a more efficient level and functioning of the economy. Active participation in international markets requires economic openness and their positioning in the world market by stimulating export, as a necessary determinant of economic growth. Economic activity is also strongly linked to energy use and CO2 emissions (Tang & Tan, 2013). In addition to contributing to economic growth, innovation and economic openness also affect energy consumption, so there is a strong relationship between innovation, exports, CO2 emissions, and economic growth (Fan & Hossain, 2018). The effects of these variables and their interaction with the degree of economic growth depend on a particular economy and its economic structures.

CEEC region has reached a certain level of development but still lag behind the most developed European Union (EU) countries. Reducing the backwardness, compared to the most developed EU countries, can largely depend on innovation and the intensification of export (Damijan, Kostevc, & Rojec, 2017). It is also important to establish the relationship between innovation, export, CO2 emission, and economic growth in the example of CEEC. This article tries to complement the literature gap in this respect and to indicate the interrelationship among variables. The main objective of the article is to identify the significance and impact of prior mentioned macroeconomic features on economic growth, as well as the dynamics of CO2 emission in the CEEC. The aim is to examine the development patterns of selected CEEC, considering notable macroeconomic relations amongst export intensity, energy use, innovation capacity, and economic growth.

The rest of the article is organized as follows: Section 2 presents the review of the past literature. Section 3 illustrates the used methodology and hypotheses. Section 4 provides results and discussion. At last, conclusions are summarized, and some basic policy recommendations are offered in section 5.

LITERATURE REVIEW

Numerous studies have analyzed the impact of innovation, economic openness, and CO2 emissions on economic growth. The main intention is to identify the pattern and intensity of influence of those variables on the economic growth in individual economies and to understand the economic growth and its determinants through different perspectives. On the opposite, some efforts were made to identify basic economic determinants of CO2 emission.

The development of new technologies and innovations can be considered as a key factor in the development of economic activities through the creation of knowledge and an innovation-based economy (Oulton, 2012). The contribution of innovation, as well as investment in research and development, provides a positive stimulus to the economy in the long run by creating the concept of "smart growth", which is based on knowledge and innovation (Rodriguez-Pose, & Bilbao-Osorio, 2004; Capello & Lenzi, 2013). Maradana, Pradhan, Dash, Gaurav, Jayakumar, and Chatterjee (2017) analyzed the long-term link between innovation and economic growth, based on the example of 19 European countries from 1989-2014. Using the cointegration technique and the Granger causality test, the study provides evidence of the long-term link between innovation and sustainable economic growth in most cases. Nazir and Tan (2018) have proven the positive attitude and importance that financial innovation has in the short and long term on economic growth. The authors also point out that the openness of the economy plays an important role in stimulating economic growth.

When it comes to the openness of the economy and its impact on economic growth, most studies have shown a positive impact. Using the ARDL model based on Toda and Yamamoto Granger causality approach, the significant impact of trade, energy, and financial development on economic growth was identified (Kumar R.R, Stauvermann, Loganathan, & Kumar R.D., 2015). Export can play a significant role in stimulating economic growth, especially in the case of developed and developing countries, while the effects of exports do not show a positive influence on economic growth in underdeveloped countries (Were, 2015). Analyzing the impact of exports and foreign direct investments, Sunde (2017) also confirmed the positive influence of economic openness on economic growth using the ARDL model approach.

The third variable, whose movement and impact on economic growth, can also be observed is air pollution followed through CO2 emissions. The demand for more intense economic growth can neglect the pollution effects that the development of industry causes. Consequently, it is essential to determine the effects of increased pollution in the short and long term. A review of the literature in this field shows that there are a positive cause and effect relationship between the two variables, but their intensity depends on the degree of development of the economy (Bengochea-Morancho, Higón-Tamarit, & Martínez-Zarzoso, 2001). Attiaoui, Toumi, Ammouri, and Gargouri (2017), using the panel ARDL-PMG approach, expose a positive impact between CO2 emissions and GDP, while a study conducted by Saidi and Hammami (2015) on the example of 58 countries also proves that economic growth and CO2 emissions are complementary. Al-Mulali and Ozturk (2016) find that economic growth leads to an increase in CO2 emissions only in the long run, while on the other hand, the openness of the economy leads to a decrease.

Fan and Hossain (2018) analyzed all four variables on the example of China and India, using the panel ARDL model. The findings show that innovation, trade openness, and CO2 emissions, have a significant positive impact on economic growth in China in the long run. In the case of India, trade openness and CO2 emission have also a significant positive impact in the long-run, but CO2 emission harms economic growth, in the short-run. Innovation does not have a significant impact on economic growth in the short term. Sohag, Begum, Abdullah, and Jaafar (2015) concluded that economic growth increases energy consumption, with the effect being more significant in the long run. Trade openness also increases energy consumption as measured by CO2 emissions in the long run, while innovation plays an important role in reducing energy consumption and contributing to long-term economic growth. Destek, Balli, and Manga (2016) proved the long-run cointegrated relationship between CO2 emission, energy consumption, urbanization, and trade openness. Research conclusion, on the example of 10 selected CEEC, indicates that an increase in energy consumption by 1 percent leads to an increase in CO2 by 1.0863 percent while, on the other hand, an increase in trade openness by 1 percent leads to a 0.0686 percent decrease in CO2 emissions.

Based on the above, the subsequent hypotheses are tested in the article:

- H_1: Increase in innovation capacity, export dynamics, and CO2 emission incites economic growth.
- H_2: Intense economic growth spurs the scope of CO2 emissions.
- H_3: Increased export activities and well-activated innovation capacity reduce the intensity of CO2 emission.

METHODOLOGY

To achieve the main objective, panel data series with an annual frequency range between 2002 - 2017 have been used in the article. The examination includes eight Central and Eastern European countries

(i.e., the Republic of Bulgaria, the Republic of Croatia, the Czech Republic, Hungary, the Republic of Poland, Romania, the Slovak Republic, and the Republic of Slovenia), and incorporates the following variables:

- Gross domestic product per capita (variable gdp_pc);
- Number of patents per million inhabitants (variable patent_inhab);
- Export as a percentage of gross domestic product (variable export_gdp_ratio);
- All sectors and indirect CO_2, excluding LULUCF and memo items (variable CO2_emission)

The statistical office of the European Union (Eurostat) served as the origin of data. Descriptive statistics of the variables and correlation matrix are exhibited in Table 1 and Table 2, respectively. The Jarque-Bera statistic shown in Table 1 reveal the absence of normal distribution for all series except the series of gdp_pc. The cause might be a cross-sectional and heterogeneous characteristics of the data, which are corrected through the examinations in panel data analysis.

Table 1 Descriptive statistics of the variables

	gdp_pc	patent_inhab	export_gdp_ratio	CO2_emission
Mean	10143.98	15.33633	57.17500	88840.76
Median	10135.00	8.395000	57.15000	50010.76
Maximum	20810.00	69.10000	95.10000	336556.8
Minimum	2220.000	0.520000	24.00000	13524.34
St. Dev.	4352.857	17.07405	19.75955	95078.62
Skewness	0.304273	1.728708	0.149425	1.785211
Kurtosis	2.432549	4.959268	1.855718	4.880611
Jarque-Bera	3.692420	84.22644	7.459686	86.85125
Probability	0.157834	0.000000	0.023997	0.000000
Obs.	128	128	128	128

Source: Author's calculations

Concerning the further aspects of the series, it is necessary to show the correlation between the selected variables. As pointed in Table 2, innovation capacity and the export intensity have a strong relation with economic growth, while the dynamics of CO_2 emissions have a weak and negative correlation. A moderate negative correlation is detected between innovation capacity and the dynamics of CO_2 emissions, also between the export intensity and CO_2 emissions.

Table 2 Correlation matrix of the variables

	gdp_pc	patent_inhab	export_gdp_ratio	CO2_emission
gdp_pc	1			
patent_inhab	0.79	1		
export_gdp_ratio	0.62	0.44	1	
CO2_emission	-0.18	-0.23	-0.34	1

Source: Author's calculations

All variables, besides export_gdp_ratio, are represented using logarithmic expressions and can be perceived as elasticities.

The initial step that has to be taken in panel data analysis is to test whether cross-section units are cross-sectionally dependent or cross-sectionally independent. Cross-sectional dependence is a significant matter, and overlooking it might lead to biased and inconsistent estimates (Dong, Sun, Li, & Liao, 2018). For that purpose, two tests are utilized in the article, Breusch–Pagan LM test and the Pesaran-scaled LM

test. Lagrange multiplier revealed by Breusch and Pagan (1980) is adequate for panel with N being comparatively small and T amply large (which is the case in the examination: N=8 T=16). The test is based on the following LM statistic:

$$LM = \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} T_{ij} \hat{p}_{ij}^2 \rightarrow x^2 \frac{N(N-1)}{2} \qquad (1)$$

Where $\hat{p}_{ij}$ is the correlation coefficient of residuals, as well as in Pesaran-scaled LM test, which can be estimated as:

$$LM_{pesaran} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} (T_{ij} \hat{p}_{ij}^2 - 1) \rightarrow N(0,1) \qquad (2)$$

Considering the high degree of interactivity in the functioning of economies of the examined countries, spatial spillover effects, which is one of the causes of cross-section dependence, become more apparent. Since it is profoundly presumable that the panel data in the examination will be identified by cross-sectional dependence, the following step determines the selection of the second generation unit root tests, which assumes that cross-section units are cross-sectionally dependent, to perceive the nature of the stationarity of the series. Pesaran (2007) introduced a unit root test marked as cross-sectionally augmented IPS test which can be expressed as:

$$CIPS(N,T) = N^{-1} \sum_{i=1}^{N} t_i (N,T) \qquad (3)$$

Furthermore, the panel ARDL formulated as an error correction model is used to examine the long and short term relations among economic growth, innovation capacity, export intensity, and dynamics of CO2 emission. The procedure is applicable because it can examine possible associations irrespective of the integration order of the selected variables. The model's imperative is that the series cannot be integrated of order two. Besides, this method proposes convenient and useful estimators because it reduces the obstacles appearing from endogeneity by including lag length for both endogenous and exogenous variables (Attiaoui et al. 2017).

Pesaran and Smith (1995) and Pesaran, Shin, and Smith (1999) proposed two different estimators as the solutions to heterogeneity bias produced by heterogeneous slopes in dynamic panels - Mean Group (MG) and Pooled Mean Group (PMG). The MG procedure permits the coefficients to be heterogeneous in the short run and long run, while the PMG procedure implies heterogeneity of the short-term coefficients, whereas the long-term coefficients are homogeneous (Sohag, Nabilah, & Begum, 2015). The decision between MG and PMG estimators is based on the Hausman test. If the Hausman test fails to reject the long-run homogeneity restriction, then the PMG estimator is more suitable, and vice versa.

RESULTS AND DISCUSSION

Observed from the perspective of strong intra-economic linkages of macroeconomic data, the premise of cross-sectional independence among different groups cannot be assumed, rather the premise necessitates to be questioned. The results of cross-sectional independence tests are presented in Table 3. The assumption of cross-sectional independence amongst groups is rejected according to to the Breusch–Pagan LM test and Pesaran-scaled LM test, considering that p-values are less than 0.05.

Table 3 Cross-sectional dependence tests results

Test	Statistic	P-value
Breusch–Pagan LM	144.6735	0.0000
Pesaran-scaled LM	15.59116	0.0000

Source: Author's calculations

Rejecting the assumption of cross-sectional independence requires utilizing the second generation unit root tests to examine the stationarity of the variables. As observed in Table 4, all variables are not stationary at level besides the innovation capacity (variable patent_inhab). Nevertheless, every of nonstationary variables (gdp_pc, export_gdp_ratio, CO2_emission) become stationary after the first difference, respects to CIPS test. The presence of a mixed order of integration supports to use panel ARDL model.

Since the Hausman test explicated that the PMG estimator is more suitable for producing further panel analysis, the following table exhibits the outcomes of the PMG estimator as well as the results of the Hausman test.

The Hausman test failed to reject the long-run homogeneity restriction, implying the appropriateness of the PMG estimator when economic growth is observed as a dependent variable. The same results of the Hausman test occur when the dynamics of CO2 emission are placed as a dependent variable.

The results from Table 5 manifest a positive influence of export dynamics and the boost of CO2 emission on economic growth (a 1 percent increase in export value and the CO2 emission enhances economic growth by 0.0325 percent and 3.7553 percent, respectively). From the short-term perspective, results reveal that a 1 percent rise in CO2 emission magnifies economic growth by 0.2944 percent while the impact of export intensity is irrelevant to explain the movement of economic growth in the short run. Nevertheless, the outcome of the same analysis indicates that innovative activities do not represent a significant pillar of economic growth in the long or the short term.

Table 4 Panel unit root test results

Variables	CIPS
gdp_pc	-2.384
patent_inhab	-2.819
export_gdp_ratio	-0.993
CO2_emission	-1.843
Δgdp_pc	-3.522
Δpatent_inhab	/
Δexport_gdp_ratio	-2.857
ΔCO2_emission	-3.387

Δ - is the first difference operator
*CVs are -2.21, -2.34, -2.60 at 10%, 5% and 1% levels of significance, respectively
*CVs for Δ are -2.22, -2.37, -2.66 at 10%, 5% and 1% levels of significance, respectively

Source: Author's calculations

Inevitably, economic development, to a greater or lesser extent, causes increased CO2 emissions. Within the analyzed group of countries, dynamizing economic growth encourages the use of CO2 (1 percent rise in economic growth fosters CO2 emission by 0.0635 percent over the long run, and 0.4543 percent over the short run). From a different perspective, one of the essential preconditions for establishing the so-called green economy is the emergence of new technological solutions. Fostering the innovation capacity represents a serious impetus to creating an economic structure based on sustainable development. This is in line with the hypothesis of Soete (2007), who outlined the necessity of simultaneous competitiveness development and quality of social and environmental conditions. The main findings administrate that innovations reduce CO2 emissions (a 1 percent increase in innovation capacity decreases CO2 emission by 0.1466 percent over the long run). Since the aggregate level of CO2 emissions is observed, evaluating the real impact of the progression of innovation on CO2 emission requires a lengthier period. Consequently, the outcomes obtained in the short term can be held as

irrelevant. Further conclusions of this part of the examination concern the impact of exports on CO2 emission. Specifically, the results show that the rise in export adversely affect CO2 emissions, which may be explained by the fact that open trade regimes are more capable to gain a lower level of pollution because they invest in industries that use modern technology and cause less polluting (Danchev, 1994). To some extent, a mentioned outcome can partly be justified by the relatively successful adoption and implementation of new technological solutions for those industries that are export-oriented. However, there is still not strictly determined regularity in defining the impact of trade openness on CO2 emissions. Market size, industrialization level, and various additional institutional characteristics should also be considered when evaluating the effects of trade liberalization on environmental outcomes (Zugravu-Soilita, 2018).

Table 5 Pooled Mean Group Regression results

Dependent variable	gdp_pc ARDL(1 0 0 0)	CO2_emission ARDL (1 1 1 0)
Long-run coefficient		
gdp_pc		0.0635*
patent_inhab	0.5225	-0.1466***
export_gdp_ratio	0.0325***	-0.0029***
CO2_emission	3.7553***	
Short-run coefficient		
ECT	-0.141048***	-0.3568538***
Δgdp_pc		0.4543***
Δpatent_inhab	-0.0163	0.0385**
Δexport_gdp_ratio	-0.0051	0.0020
ΔCO2_emission	0.2944***	
Hausman test value	2.36	1.49
P-value	0.5004	0.6847

Notes: * indicate significance (* at 10%, ** at 5% and *** at 1%)

The optimal lag length is determined by Schwarz Information Criterion

Source: Author's calculations

Within both instances, the ECT has a negative sign and is statistically notable at a 1 percent level of significance, implying a stable long-term association among the variables. As previously stated, the PMG procedure indicates the heterogeneity of the short-term coefficients as well as the heterogeneity of the dynamic adjustment process (Demetriades & Hook-Law, 2006). The subsequent table exhibits the error correction terms for each country. The outcomes indicate that error correction terms have a corresponding negative sign and are significant in most of the examined countries. The examples of countries where ECT has a corresponding negative sign, but statistically insignificant, are the Republic of Croatia (when the dynamics of CO2 emission is considered as a dependent variable), Hungary, and Romania (the case when the gdp_pc is the response variable), the Republic of Poland (when dynamics of CO2 emission is output variable) and Slovenia (in both instances). In these examples, the stable long-term relationship exists among the considered variables, but it is not significant to economic growth or CO2 emission, depending on what is estimated as the target variable.

A further consideration in the article is how long it will necessitate for the current imbalance to be reduced by 50 percent. The first observation covers an instance where gdp_pc is the response variable. In the Republic of Bulgaria and the Slovak Republic, a coefficient of -0,15 indicates that there was 15 percent of adjusting occurs in the previous period to the equilibrium, while 85 percent of disequilibrium remains. That means remain imbalance will be reduced by 50 percent in around four years. Slightly less time is needed to halve the imbalance in the Czech Republic (about three years). In the case of the

Republic of Croatia and Romania, a significantly longer time is required - about nine and eleven years to halve the imbalance, respectively. The shortest period of about one year is exposed in the instance of the Republic of Poland.

Table 6 The Error Correction Term

Dependent variable	gdp_pc ARDL(1 0 0 0)	CO2_emission ARDL (1 1 1 0)
	Error Correction Term	
The Republic of Bulgaria	-0.1517864 (0.000)	-0.6793443 (0.000)
The Republic of Croatia	-0.0688383 (0.002)	-0.0847174 (0.255)
The Czech Republic	-0.1955955 (0.001)	-0.4842131 (0.000)
Hungary	-0.0521207 (0.275)	-0.2140877 (0.030)
The Republic of Poland	-0.4058853 (0.002)	-0.0541444 (0.252)
Romania	-0.0649143 (0.078)	-0.6584657 (0.000)
The Slovak Republic	-0.1503593 (0.000)	-0.558725 (0.000)
The Republic of Slovenia	-0.03884 (0.335)	-0.1211329 (0.385)
	Figures in the parenthesis are p-values	

Source: Author's calculations

The following observation incorporates a case where the dynamics of CO_2 emission is the dependent variable. What can be noticed at first sight from Table 6 is that the longest time required to halve the imbalance is registered in Hungary (around three years), while in other countries that time is incomparably shorter (it is determined that is needed between a half year to one year for the imbalance to be halved).

CONCLUSIONS AND RECOMMENDATIONS

The article analyzed some of the most important patterns of economic development in the CEEC. Specific causalities among economic growth, export dynamics, innovation diffusion, and intensity of CO_2 emission have been tested. More precisely, it was an attempt to determine the extent to which the concept of sustainable development in the observed economies has been developed so far.

Apart from the efforts of establishing a new socio-economic framework during the transition period, all countries from our sample have faced the catching-up process for developing economies. With this in mind, it is obvious that the development of these countries in the previous decades predominantly relied on reformed industrial capacity, without fully utilizing the potential of new technological improvements.

In addition to examining significant relationships between these variables in the short term, the key analysis relies on their interdependence over the long term, with three hypotheses tested. The article has drawn several main insights. First, raised export scope and intensified CO_2 emissions have a positive impact on economic growth. Besides the slightly significant impact of export dynamics, increased gas emissions are more significantly associated with economic growth and development in the CEEC. Also, the evidence showed that innovation activity, measured by the number of patents per million population, did not significantly determine economic growth. This was explained by the fact that innovation diffusion requires a longer period for technological spillovers to become more visible factors of economic performance. Considering the positive impact of economic growth and export dynamics on CO_2 emission trends, but also an exclude of the significant role of the innovation activities, the first hypothesis with the assumption that innovation capacity, export intensity, and dynamics of CO_2 emission incite economic growth, can only be partially accepted.

Second, surveying the role of the underlying determinants of CO2 emissions has yielded divided conclusions. Following the theoretical arguments, a positive relationship between economic growth and CO2 emission was confirmed. The negative relationship between export and environmental pollution can be justified by the adoption of new production technology and the improvement of trade channel efficiency as mainly blueprinted solutions during the trade liberalization of the observed countries in previous years. Further, there is an identification of the negative impact of innovation activities on CO2 in the long-term. From the presented results, it is possible to evaluate the remaining two hypotheses. The second hypothesis, starting from the assumption that a positive trajectory of economic growth causes increased CO2 emission, has been proved. Similarly, recognizing the result that dynamized export activities and diffusion of innovation have a positive impact on the environmental economy, a third hypothesis can also be accepted.

Undoubtedly, an important contribution of this analysis is determined by the necessity of a better understanding of economic growth and its determinants through different perspectives. Also, discovering the role of economic trajectories on sustainable development is of particular relevance to contemporary socio-economic analysis. In this regard, exploring the dichotomy between the dynamics of economic growth and the main characteristics within which this growth is realized, this article represents a valuable essay for identifying economic weaknesses, as well as the potentials for further implementation of the sustainable development concept in the CEEC.

The paper has started with an effort to identify the development patterns in selected countries. In an aim to provide as much realistic comparative analysis, the absence of specific CEEC economies from testing is evident. The recommendation for future research could be oriented to cover the complete CEEC region. Additionally, an interesting approach can be the extent of the sample to the EU group to provide a wider perspective on this topic. Also, a variant combination of used variables can secure interesting perspectives for future surveys.

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DOES INSTITUTIONAL QUALITY MATTER FOR TRADE IN SOUTHEAST EUROPEAN COUNTRIES?

Marija Radulović[*]

University of Kragujevac, Faculty of Economics, marijaradulovicvb@gmail.com

Abstract: The quality of institutions is becoming more important in recent decades, especially in transition countries that have to reform their institutions to create a market economy. Without an efficient institutional framework, macroeconomic stability and trade reforms cannot be achieved. Therefore, the aim of the paper is to examine the effects of institutional quality on the trade of Southeast Europe. Worldwide Governance Indicators (WGI) are used to measure the quality of institutions in these countries between 1996 and 2017. Three models were estimated with total trade, exports, and imports as dependent variables. Panel autoregressive distributed lag (ARDL) approach was used to analyse the relationship between institutional quality and trade. The results show that there is the long-run relationship between institutional quality and total trade, while in the short-run only political stability and absence of violence and the rule of law were statistically significant. Furthermore, the results suggest that there is no long-run relationship between institutional quality and exports, while in the short-run regulatory quality, the rule of law, and political stability and absence of violence are statistically significant. The results confirm that there is the long-run relationship between institutional quality and imports, while in the short-run voice and accountability and political stability and absence of violence are significant.

Keywords: institutional quality, trade, export, import

JEL Classification: F 14, O 43

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[*] Corresponding author

INTRODUCTION

The quality of institutions is becoming more important in recent decades, especially in transition countries that have to reform their institutions to create a market economy. Unequal development in transition countries is a consequence of different institutional capacities, with more developed transition countries having better institutions, which enabled them to implement overall reforms faster and more efficiently, while less developed transition countries faced institutional reforms without the appropriate economic background, as a result of which their economic development was significantly slower (Tmušić, 2017). Without an efficient institutional framework, macroeconomic stability and trade reforms cannot be achieved. Institutions are a key factor in achieving long-term prosperity and productivity. Without well-functioning institutions, all policies and processes are less efficient, and markets cannot function well. Besides, infrastructure, macroeconomic stability and trade reforms cannot contribute to the competitiveness of the economy without an efficient institutional framework. North (1991) argues that institutions determine transaction costs, profitability and feasibility of economic activities; therefore, a macroeconomic impact of institutions, technology, and factor endowments determines actual magnitude and direction of trade. The conclusion of recent studies on the relationship between trade and institutional quality is that countries with better institutions are likely to trade more (Mashura & Makochekanwa 2017). Therefore, the aim of the paper is to examine the effects of institutional quality on the trade of Southeast Europe (SEE). The hypotheses of the research are as follows:

Hypothesis 1. There is a long-run and short-run relationship between trade and institutional quality in SEE countries.

Hypothesis 2. There is a long-run and short-run relationship between exports and institutional quality in SEE countries.

Hypothesis 3. There is a long-run and short-run relationship between imports and institutional quality in SEE countries.

Paper is structured as follows. After the introduction, section two provides a literature review of previous studies regarding the relationship between trade, exports, imports, and institutional quality. Section three presents the data and methodology. Section four presents results and discussion. Section five concludes.

LITERATURE REVIEW

A review of the literature found that numerous empirical and theoretical studies have confirmed the thesis on the impact of institutional quality on trade (Jama 2020; Gani & Prasad 2006; Ferto & Fogarasi 2011; Álvarez et al. 2018; Bojnec et al. 2014; Martinez-Zaros & Marquez -Ramos 2019; Levchenko 2007). However, there is still no consensus concerning dimensions of institutional quality which have a positive and which a negative impact on trade.

Jama (2020) examines the impact of institution quality measured through Worldwide Governance Indicators on exports of the Middle East and North Africa countries from 2010 to 2017. The author uses three dimensions of WGI (political stability and absence of violence, voice and accountability, and regulatory quality) as indicators of the quality of institutions. Using panel regression analysis, the author finds that only political stability and absence of violence has a statistically significant impact on exports of MENA countries, while voice and accountability and regulatory quality do not have a statistically significant effect. Political stability and absence of violence have a positive impact on the exports of MENA countries. Accordingly, Jama (2020) concludes that these countries need to implement reforms

to enable institutional development and improve exports, as well as to improve the competitive position of MENA countries and the region as a whole.

Gani & Prasad (2006) examine the effects of institutional quality on trade in Pacific Island Countries using a fixed effect model from 1996 to 2005. Regulatory quality, the rule of law, governance effectiveness, and control of corruption were used as indicators of the institutional quality. The authors first examine the impact of the institutional quality on exports and conclude that there is a statistically significant negative impact of the rule of law on exports, while the effects of control of corruption are statistically significant and positive. Government effectiveness and regulatory quality do not have a statistically significant impact on exports. Next, they examine the effects of institutional quality on imports and found that government effectiveness has no statistically significant impact on imports, while regulatory quality and the rule of law have a statistically significant and positive effect, and corruption control has a negative effect on imports. Finally, the authors examine the effects of the quality of institutions on total trade and conclude that there is a statistically significant positive impact of the regulatory quality and control of corruption on total trade, and government effectiveness and the rule of law do not have a statistically significant impact on institutional quality.

Ferto & Fogarasi (2011) examine the impact of institutional quality on the international trade flows of Central European transition countries using a gravity model for panel data on agricultural exports from 1999 to 2008. The results showed that there is a negative impact of government effectiveness and regulatory quality on trade.

Álvarez et al. (2018) examined the impact of institutional quality on bilateral sectoral trade flows of 186 countries from 1996 to 2012 using Poisson Pseudo Maximum Likelihood estimation methods. The results of the research showed that all six dimensions of the quality of institutions, i.e. voice and accountability, political stability and absence of violence, regulatory quality, the rule of law, government effectiveness, and control of corruption, are having a positive impact on trade.

The previous research results indicate that the effects of the quality of institutions on trade, exports and imports are not unique and depend on various factors: the research methodology, the research period, the research area, and many other factors. Accordingly, based on the presented research, a model will be formed to examine the impact of the quality of institutions on trade in the countries of Southeast Europe.

METHODOLOGY

To test hypotheses, a sample of seven SEE countries (Serbia, Bosnia and Herzegovina, Albania, North Macedonia, Croatia, Slovenia, and Bulgaria) was used. Worldwide Governance Indicators (WGI) were used to measure the quality of institutions, while trade of goods and services, exports, and imports were used to measure the trade in these countries from 1996 to 2017. Table 1 shows the variables and their sources. Kaufmann et al. (2008) introduced WGI as a composite indicator that ranges from −2.5 to 2.5.

The following equations are constituting the model:

$$Trade_{it} = f(VA_{it}, PS_{it}, GE_{it}, RQ_{it}, RL_{it}, CC_{it}) \tag{1}$$
$$Exports_{it} = f(VA_{it}, PS_{it}, GE_{it}, RQ_{it}, RL_{it}, CC_{it}) \tag{2}$$
$$Imports_{it} = f(VA_{it}, PS_{it}, GE_{it}, RQ_{it}, RL_{it}, CC_{it}) \tag{3}$$

Where *Trade_{it}* is the total trade of goods and services of country *i* in period *t,* where *Exports_{it}* is exports of goods and services of country *i* in period *t,* where *Imports_{it}* is the imports of goods and services of country *i* in period *t,* VA_{it} is voice and accountability of country *i* in period *t,* PS_{it} is political stability and

absence of violence/terrorism of country i in period t, GE_{it} is government effectiveness of country i in period t, RQ_{it} is the regulatory quality of country i in period t, RL_{it} is the rule of law of country i in period t, CC_{it} is control of corruption of country i in period t; $t = 1996, ..., 2017$.

Table 1 Sources of data

Variable	Measure	Source
Trade	Total trade of goods and services (%GDP)	World Bank
Exports	Total exports of goods and services (%GDP)	World Bank
Imports	Total imports of goods and services (%GDP)	World Bank
VA	Voice and accountability	World Bank
PS	Political stability and absence of violence	World Bank
GE	Government effectiveness	World Bank
RQ	Regulatory quality	World Bank
RL	Rule of law	World Bank
CC	Control of corruption	World Bank

Source: Author

Therefore, the following long-term equations are:

$$Trade_{it} = \alpha_1 + \sum_{l=1}^{p_{i-1}} \beta_{il}^* Trade_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il}^* VA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il}^* PS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il}^* GE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il}^* RQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il}^* RL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il}^* CC_{i,t-l} + e_{it}$$
(4)

$$Exports_{it} = \alpha_1 + \sum_{l=1}^{p_{i-1}} \beta_{il}^* Exports_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il}^* VA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il}^* PS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il}^* GE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il}^* RQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il}^* RL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il}^* CC_{i,t-l} + e_{it}$$
(5)

$$Imports_{it} = \alpha_1 + \sum_{l=1}^{p_{i-1}} \beta_{il}^* Imports_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il}^* VA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il}^* PS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il}^* GE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il}^* RQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il}^* RL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il}^* CC_{i,t-l} + e_{it}$$
(6)

and short equations are estimated:

$$DTrade_{it} = \varphi ECT_{i,t-l} + \sum_{l=1}^{p_{i-1}} \beta_{il} DTrade_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il} DVA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il} DPS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il} DGE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il} DRQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il} DRL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il} DCC_{i,t-l} + \alpha_2 + e_{it}$$
(7)

$$DExports_{it} = \varphi ECT_{i,t-l} + \sum_{l=1}^{p_{i-1}} \beta_{il} DExports_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il} DVA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il} DPS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il} DGE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il} DRQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il} DRL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il} DCC_{i,t-l} + \alpha_2 + e_{it}$$
(8)

$$DImports_{it} = \varphi ECT_{i,t-l} + \sum_{l=1}^{p_{i-1}} \beta_{il} DImports_{i,t-l} + \sum_{l=0}^{q_i} \delta_{il} DVA_{i,t-l} + \sum_{l=0}^{k_i} \theta_{il} DPS_{i,t-l} + \sum_{l=0}^{m_i} \gamma_{il} DGE_{i,t-l} + \sum_{l=0}^{n_i} \rho_{il} DRQ_{i,t-l} + \sum_{l=0}^{s_i} \vartheta_{il} DRL_{i,t-l} + \sum_{l=0}^{u_i} \tau_{il} DCC_{i,t-l} + \alpha_2 + e_{it}$$
(10)

where β_{il}^*, δ_{il}^*, θ_{il}^* γ_{il}^*, ρ_{il}^*, ϑ_{il}^*, τ_{il}^* are long-run coefficients and β_{il}, δ_{il}, θ_{il}, γ_{il}, ρ_{il}, ϑ_{il}, τ_{il} are short-run coefficients.

The models follow Gani & Prasad (2006) setting, but include two additional dimensions of quality of institutions: voice and accountability and political stability and absence of violence. The reason for that is research Jama (2020) and Alvarez et al. (2018), who found that these indicators have significant effects on trade. Since there was no multicollinearity between six dimensions of institutional quality, all dimensions could be included in the model.

To determine whether cross-section dependence exists between panel data cross-section dependence test is used, while Im, Pesaran and Shin unit root test was used to determine whether the data are

integrated of the same order. The Auto-Regressive Distributed Lag (ARDL) approach is applied to determine whether there are a short-run and long-run relationship between trade, exports, imports, and institutional quality.

RESULTS AND DISCUSSION

Table 2 shows descriptive statistics for institutional quality indicators: voice and accountability, political stability and absence of violence, regulatory quality, the rule of law, government effectiveness, and control of corruption for all SEE countries and separately for each country from 1996 to 2017.

Table 2 Descriptive statistics for institutional quality indicators

	VA	PS	GE	RQ	RL	CC
Serbia						
M	-0.02	-0.51	-0.26	-0.29	1.01	-0.49
SD	0.45	0.59	0.36	0.33	0.08	0.33
N	19	19	19	19	19	19
Bosnia and Herzegovina						
M	-0.02	-0.46	-0.69	-0.31	-0.39	-0.36
SD	0.13	0.22	0.22	0.27	0.17	0.08
N	19	19	19	19	19	19
Albania						
M	0.01	-0.14	-0.36	-0.01	-0.59	-0.69
SD	0.22	0.33	0.25	0.26	0.17	0.17
N	19	19	19	19	19	19
North Macedonia						
M	-0.07	-0.54	-0.19	0.12	-0.32	-0.33
SD	0.18	0.33	0.27	0.28	0.14	0.23
N	19	19	19	19	19	19
Croatia						
M	0.44	0.53	0.48	0.38	0.09	0.05
SD	0.24	0.21	0.18	0.22	0.25	0.24
N	19	19	19	19	19	19
Slovenia						
M	1.07	1.04	0.99	0.79	1.01	0.92
SD	0.08	0.14	0.12	0.15	0.08	0.13
N	19	19	19	19	19	19
Bulgaria						
M	0.49	0.28	0.09	0.52	-0.10	-0.17
SD	0.09	0.18	0.13	0.24	0.07	0.11
N	19	19	19	19	19	19
Total						
M	0.27	0.03	0.01	0.17	0.10	-0.15
SD	0.45	0.64	0.58	0.46	0.63	0.53
N	133	133	133	133	133	133

Source: Author's calculations in Eviews 10. VA – voice and accountability, PS – political stability and absence of violence, GE – government effectiveness, RQ – regulatory quality, RL – the rule of law, CC – control of corruption.

The lowest average value of voice and accountability is in North Macedonia (-0.07), followed by Bosnia and Herzegovina (-0.02) and Serbia (-0.02). Voice and accountability as indicators of the quality of institutions include perceptions of the extent to which citizens of a particular country can participate in government elections, perceptions of freedom of expression, freedom of association, and freedom of the media (Kaufmann et al. 2008). Consequently, low values of this indicator are expected in these countries, primarily due to war conflicts, unstable political situation and international sanctions in the observed period in Serbia and Bosnia and Herzegovina, as well as because these countries are not yet members of the EU. The lowest value of political stability and absence of violence was in North Macedonia (-0.54). It indicates the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism (Radulović, 2020). The low value of this indicator in North Macedonia is a consequence of political instability in the country as well as disagreements with Greece over the name of the country. The lowest average value of government effectiveness and regulatory quality is in Bosnia and Herzegovina (-0.69 and -0.31, respectively). Government effectiveness includes the perception of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (Kaufmann et al. 2008).

Table 3 Panel ARDL Long-Run Results

Variable	Coefficient	Std. Error	t	p
Dependent variable: Trade				
VA	-7.44	0.21	-35.89	< 0.001
PS	-14.67	0.03	-530.48	< 0.001
GE	-42.61	0.09	-466.39	< 0.001
RQ	22.06	0.04	532.98	< 0.001
RL	27.70	0.09	319.66	< 0.001
CC	44.56	0.15	295.29	< 0.001
Dependent variable: Exports				
VA	8.64	1.78	4.85	0.562
PS	-127.21	17.25	-7.38	0.175
GE	146.92	17.34	8.47	0.463
RQ	23.31	7.47	3.12	0.320
RL	29.88	2.07	14.44	0.546
CC	74.61	8.96	8.32	0.871
Dependent variable: Imports				
VA	15.24	0.03	492.13	< 0.001
PS	2.75	0.03	92.58	< 0.001
GE	50.95	0.04	1180.45	< 0.001
RQ	-19.06	0.07	-275.94	< 0.001
RL	-82.57	0.16	-521.09	< 0.001
CC	-61.89	0.13	-459.11	< 0.001

Source: Author's calculations in Eviews 10; VA – voice and accountability, PS – political stability and absence of violence, GE – government effectiveness, RQ – regulatory quality, RL – the rule of law, CC – control of corruption.

The efficiency of institutions in Bosnia and Herzegovina is below the average of countries in transition, especially below the average of EU candidate countries (Efendić, 2010). The lowest average values of the rule of law and control of corruption are in Albania from 1996 to 2017 (-0.59 and -0.69, respectively).

The rule of law includes the perception of the extent to which institutions trust and respect the rules of society, especially the quality of contract execution, property rights, the work of the police and courts, the likelihood of crime and violence (Kaufmann et al. 2008). Therefore, this value of the rule of law should be a signal to society that the quality of institutions in this segment should be improved. The highest average value of all indicators from 1996 to 2017 are in Slovenia.

To test whether there is cross-section dependency (correlation) in the time series, the Pesaran CD test was applied (Pesaran, 2004) that test the null hypothesis that there is no cross-section dependence. If there is a cross-section dependency, it can lead to substantial bias in estimations. The results of Pesaran CD test showed that null hypothesis could not be rejected for variables political stability and absence of violence and control of corruption, while it should be rejected for variable trade, exports, imports, voice and accountability, government effectiveness, regulatory quality, and the rule of law. Based on the results of Pesaran CD test, unit root tests were applied; the unit root tests of the first generation for variables without cross-section dependence and the unit root tests of the second generation for variables with cross-section dependence. Im, Pesaran, & Shin (1997) unit root tests results showed that variables political stability and absence of violence and the rule of law are I(0), while variables trade, exports, imports, voice and accountability, government effectiveness, regulatory quality, and control of corruption are I(1). Since variables are not integrated of the same order and are I(0) and I(1), the panel ARDL approach is used to estimate the long-run and short-run relationship between trade, imports, exports and institutional quality indicators.

The optimal lag length is determined using Akaike Information Criterion (AIC) and is found to be ARDL (1, 1, 1, 1, 1, 1, 1) for all three estimated models. Table 3 shows the long-run results of panel ARDL approach for equations (4), (5), and (6). The results indicate that there is a statistically significant long-run relationship between voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and control of corruption. Furthermore, there is a statistically significant negative long-run relationship between trade and voice and accountability, political stability and absence of violence, government effectiveness, while there is a statistically significant and positive long-run relationship between trade and regulatory quality, the rule of law, and control of corruption.

The results also reveal that there is a non-significant long-run relationship between exports and quality of institutions. The ARDL approach results indicate a statistically significant long-run relationship between imports and quality of institutions. The results show a positive long-run relationship between voice and accountability, political stability and absence of violence, government effectiveness, while there is a negative long-run relationship between regulatory quality, the rule of law, and control of corruption (Table 3).

The error-correction term (ECT) shows how much of the disequilibrium caused by a shock in the short run will be corrected in the long run. The ECT for equation (7) with trade as the dependent variable was statistically significant and negative and shows that in response to a shock, the speed of adjustment towards equilibrium is 58% annually. The ECT for equation (8) with exports as the dependent variable is not statistically significant. The ECT for equation (9) with imports as the dependent variable was statistically significant and negative and shows that in response to a shock the speed of adjustment towards equilibrium is 39% annually (Table 4). The results show a statistically significant short-run relationship between trade and political stability and absence of violence and the rule of law, but the relationship between trade and political stability and absence of violence is positive and between trade and the rule of law is negative. The results indicate a statistically significant short-run relationship between exports and political stability and absence of violence, regulatory quality, and the rule of law. The

relationship between exports and political stability and absence of violence is positive, while the relationship between exports and the rule of law and regulatory quality is negative. The results confirm the short-run between imports and voice and accountability and political stability and absence of violence. Still, the relationship between imports and voice and accountability is negative and between imports and political stability and absence of violence is positive (Table 4). The results obtained for the relationship between trade and the rule of law are opposed to Gani & Prasad (2006), who found a non-significant relationship between these variables. The results for the relationship between exports and the rule of law are in line with Gani & Prasad (2006). The results for the relationship between regulatory quality and trade are in line with Ferto & Fogarasa (2011).

Table 4 Panel ARDL Short-Run Results

Variable	Coefficient	Std. Error	t	p
Dependent variable: Trade				
ECT	-0.35	0.17	-2.03	0.046
D(VA)	11.85	8.43	1.40	0.164
D(PS)	18.63	8.78	2.12	0.037
D(GE)	10.65	11.91	0.89	0.374
D(RQ)	-18.92	11.87	-1.59	0.115
D(RL)	-56.32	15.64	-3.60	0.001
D(CC)	3.51	12.42	0.28	0.778
C	38.20	17.21	2.22	0.029
Dependent variable: Exports				
ECT	0.03	0.06	0.46	0.646
D(VA)	1.46	2.51	0.58	0.563
D(PS)	1.99	6.11	0.33	0.045
D(GE)	0.39	5.46	0.07	0.942
D(RQ)	-19.39	9.84	-1.97	0.043
D(RL)	-13.43	6.32	-2.12	0.037
D(CC)	10.42	11.58	0.90	0.371
C	3.05	0.82	3.72	< 0.001
Dependent variable: Imports				
ECT	-0.39	0.19	-2.08	0.041
D(VA)	-6.86	8.95	-0.77	0.046
D(PS)	12.74	6.78	1.88	0.044
D(GE)	-10.53	6.55	-1.61	0.113
D(RQ)	-5.94	9.79	-0.61	0.546
D(RL)	3.80	18.28	0.21	0.836
D(CC)	2.94	15.01	0.19	0.845
C	33.37	20.77	1.61	0.113

Source: Author's calculations in Eviews 10; VA – voice and accountability, PS – political stability and absence of violence, GE – government effectiveness, RQ – regulatory quality, RL – rule of law, CC – control of corruption.

The results show that political stability and absence of violence is a significant and positive predictor of trade, exports, and imports in the short-run. The results are in line with Jama (2020) and Alvarez et al. (2018). The results for imports and political stability and absence of violence in the short run are in line

with the results in the long-run. In contrast, the results for trade and political stability and absence of violence in the short run are opposed to the results in the long-run. The results for trade and the rule of law in the short run are in line with the results in the long run (negative relationship).

CONCLUSIONS AND RECOMMENDATIONS

The study examines the long-run and the short-run relationship between total trade, exports, and imports and quality of institutions (voice and accountability, political stability and absence of violence, regulatory quality, the rule of law, government effectiveness, and control of corruption) for SEE countries from 1996 to 2017. The panel ARDL approach results show that there is the long-run relationship between all six dimensions of institutional quality and total trade, while in the short-run political stability and absence of violence and the rule of law were statistically significant. Therefore, hypothesis 1 that there is a long-run and short-run relationship between trade and institutional quality in SEE countries is partially proven. Furthermore, the results suggest that there is no long-run relationship between exports and institutional quality, while in the short-run regulatory quality, the rule of law, and political stability and absence of violence are statistically significant. Hypothesis 2 that there is a long-run and short-run relationship between trade and institutional quality in SEE countries is partially proven. The results confirm that there is the long-run relationship between six dimensions of institutional quality and imports, while in the short-run voice and accountability and political stability and absence of violence are significant. Therefore, hypothesis 3 that is a long-run and short-run relationship between imports and institutional quality in SEE countries is also partially proven. The results suggest that the SEE countries should improve their institutional quality, especially control of corruption, regulatory quality and the rule of law to enhance exports, imports and total trade.

According to the author's knowledge, based on the reviewed literature dealing with the impact of institutional quality on trade, there is no research examining this relationship in SEE countries, so the paper will contribute to the existing literature by providing insights about possible effects of institutional quality dimensions on trade. Future research may be extended to the level of individual countries depending on the availability of data, as well as to the inclusion of more explanatory variables, to perform a better analysis over longer period and draw adequate conclusions to help economic policymakers create and apply a proper institutional framework that would increase trade in SEE countries.

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THE IMPACT OF FOREIGN DIRECT INVESTMENT ON THE COMPETITIVENESS AND ECONOMIC DEVELOPMENT OF THE REPUBLIC OF SERBIA

Jelena Peković

University of Kragujevac, Faculty of Economics, jelenapekipekovic@gmail.com

Abstract: *The paper examines the impact of foreign direct investments on the competitiveness and economic development of the Republic of Serbia in the period from 2015 to 2019. The Serbian public attributed almost fantastic properties to foreign direct investments, and their exceptionall effect on economic development was accepted as an axiom. However, numerous studies have proven that the growth of foreign direct investment in the host country does not automatically and positively affect the economic growth and competitiveness of the country, but is conditioned by numerous factors such as macroeconomic stability, financial structure, intellectual capital, etc. During the last decade, the Republic of Serbia has introduced numerous measures that have facilitated the inflow of foreign investments, liberalized investment and capital transfer where privatization has been used as the main means of investing in the Serbian economy. The main goal of this research was to show the positive impact of foreign direct investments and their causality on competitiveness and economic development in the observed five - year period. The results of the research confirmed the positive impact of foreign direct investment on the competitiveness and economic development of the Serbian economy.*

Keywords: *Foreign direct investment, Global competitiveness index, GDP, Economic growth*

JEL classification: *F21, F43, F62, O12*

INTRODUCTION

Previous research in the field of mutual influence of foreign direct investments (FDI) on the competitiveness and economic development of the host country has contradictory results. The conclusion of the conducted research ranges from the neoliberal concept and the positive effect of investing, to the negative conclusions.

The neoliberal concept advocated by the representatives of the "Washington Consensus" implies that all foreign direct investments stimulate the country's economic development and encourage its competitiveness in the world, while the proponents of "academic skepticism" point out that there is no dialectical link between foreign direct investment and economic development. The advantages of foreign direct investments, in relation to other types of international capital movements, are that they provide a foreign investor with a number of benefits in the form of technology exports, expansion in the host country market, product placement, use of raw materials, labor and energy, and savings on production and transport costs. They are mainly focused on countries in transition with market-oriented economies, such as Serbia.

The subject of this paper is to identify the cause-and-effect relationship of the pillars of competitiveness on foreign direct investment and their impact on the economic development of the Republic of Serbia. Supporting the opinion of Porter (2005), who states that the competitiveness of a country is not only about macroeconomic stability and public policies, World Economic Forum (WEF) was applied the concept of national competitivenes. The aim of the research is to prove that the pillars of competitiveness are determinants of foreign direct investments (FDI) in the Republic of Serbia, as well as that FDI has a positive impact on the economic development of the Serbian economy. The research was conducted on the basis of available secondary data for the Republic of Serbia, which covered a five-year period from 2015 to 2019.

LITERATURE REVIEW

The main goal that countries in transition want to accomplish is to achieve stable, long-term economic growth that will be based on increasing investment, improving a technological base and increasing the competitiveness of their products on the international market. Lee & Tcha (2004) state that the FDI is the most efficient way to achieve economic growth in the host country. Organization for Economic Cooperation and Development (OECD) reported on the fact that FDI is considered as the only source of economic growth and modernization in countries with weak economy. Carkovic & Levine (2002) state that governments attach much importance to FDI, especially the governments of developing countries. Namely, developing countries do not have enough accumulated financial resources so they usually rely on FDI inflows for capital.

Although foreign direct investment is considered a good way to increase host country economic growth, some investment benefits may be ineffective if the host economy is unable to take advantage of new technologies or know-how techniques taken from foreign investment. Durham (2004) examined the effects of foreign direct investment on economic growth using data from 80 countries. He concludes that sometimes FDI has insignificant and negative effects on the economic growth of developing countries.

He also believes that the impact of FDI depends on the absorption capacity of the host country. Zilinske (2010) states that the effects of foreign direct investment can be both positive and negative. For example, greenfield FDI has more positive effects than mergers and acquisitions (brownfield investments).

Foreign direct investments from the perspective of the economy of the Republic of Serbia

Foreign investors often call Serbia the gateway to the Balkans and a bridge to other markets. It must be emphasized that Corridor X, ie the Salzburg-Thessaloniki highway passes through Serbia, as well as Corridor VII, ie the Rhine-Main-Danube canal, which connects the North and Black Seas and is an extremely important element of the international road network (Stankov, 2017).

In Serbia, there are a total of eight ports on the Danube and one each on the Sava and Tisza, which enable safe and accessible river transport of goods, raw materials and equipment. Numerous advantages for investing in Serbia, in addition to a good geographical position, include qualified and cheap labor, duty-free treatment based on signed trade agreements, competitive operating costs, financial incentives and facilities and support from the Government. Investors are also encouraged by the fact that Serbia received the status of a candidate for membership in the European Union in 2012 and that it has been developing economic cooperation with it for a long time.

Nestorovic (2015) investigated whether foreign direct investment affects the development of countries in transition. She analyzed a total of sixteen countries in transition, including Serbia, over a ten-year period. The results of the research obtained on the basis of regression analysis showed a positive, but not statistically significant correlation between foreign direct investments and economic growth of countries in transition. Also, research has shown that a higher share of foreign direct investment in the secondary sector increases their impact on economic growth, and that it is possible to monitor their impact on productivity at the enterprise level. In his study, Kastratović (2016) analyzed the impact of FDI on the economic and social development of Serbia, as well as on the degree of its international integration in the period from 1997 to 2014. The results of applying simple linear regression have shown that FDI has the effect of accelerating economic growth, reducing unemployment, inequality and poverty, and increasing exports.

Stojanovic (2018) researched the connection between foreign direct investments, exports and economic growth measured by the gross domestic product of Serbia in the period from 1998 to 2016. The results of the use of statistical-quantitative analysis indicated that foreign direct investments and exports have a positive effect on the economic growth of Serbia. Stankov (2017) empirically investigated the existence of a link between FDI and the 12 pillars of competitiveness in emerging European countries and its effect on development in the period from 2007 to 2015, among which was the Republic of Serbia. The research showed that macroeconomic competitiveness factors have a positive effect on the inflow of foreign direct investment.

National competitiveness

OECD defines competitiveness as a measure of a country's advantage or disadvantage in selling its products in international markets. Relying on four decades of experience in evaluating competitiveness, the Global Competitiveness Index (GIC) represents the competitiveness of 141 world economies measured through 103 indicators, which are organized in 12 topics. Each indicator, using a scale from 0 to 100, shows how close the economy is to an ideal country or the "limit" of competitiveness. According to the WEF report for 2019, Serbia was ranked 72nd on the list of global competitiveness, which is a decrease of seven places compared to 2018. Table 1 shows the global competitiveness index of the Republic of Serbia for the period from 2015 to 2019.

By applying panel series analysis and the OLS regression model, Popovici & Calin (2012) sought to discover a link between competitiveness and FDI in order to confirm a research hypothesis that national competitiveness is one of the determinants of FDI inflows in host countries. The sample included seven

countries of the CEE (Central and Eastern Europe) region and EU member states, and the survey covered the period from 1996 to 2010.

Table 1 Global Competitiveness Index of the Republic of Serbia (2015 - 2019)

Year	2015.	2016.	2017.	2018.	2019.
Number of points	60,0	62,1	59,2	60,9	60,9

Source: WEF: https://www.weforum.org

The authors came to the conclusion that there is an extremely strong connection between competitiveness and FDI inflows. They research also showed that labor costs, size and market openness are the most important determinants of FDI inflows. A sufficiently large and open national market and low labor costs are very strong drivers of FDI inflows in the analyzed countries. In the following empirical study, Popovici & Calin (2015) were researching individual pillars of competitiveness. Values of the pillars they took from the Global Competitiveness Report (GCR). Using panel series analysis, the authors examined the existence of the impact of competitiveness pillars on FDI inflows in ten countries of the CEE region and EU member states during 2013. The results of the study showed that the pillars of competitiveness such as institutions, infrastructure, commodity market efficiency, labor market efficiency, technological maturity, business culture and innovation have a positive and statistically significant impact on FDI inflows. Based on the above, the first hypothesis in this research was formed:

H1: Macroeconomic competitiveness factors have a positive statistically significant impact on the inflow of foreign direct investment in the Republic of Serbia.

Gross Domestic Produce

The most common indicator of a country's growth and development is Gross domestic product growth (GDP growth). The gross domestic product of the Republic of Serbia, in the period from 2015 to 2019, has increased at a rate of 3.04% on average per year. Table 2 shows the GDP growth in the Republic of Serbia in the period from 2015 to 2019 and the forecasts for 2020. Given the situation with the COVID-19 virus, it is expected that the results at the end of 2020 will deviate from the projected + 3.9% to -1.4%.

Table 2 GDP growth in the Republic of Serbia (2015 – 2019, with forecast for 2020).

Year	2015.	2016.	2017.	2018.	2019.	2020.
GDP growth	+3,5	+2,8	+1,9	+3,5	+3,5	+3,9/ -1,4

Source: World Bank Group: https://www.worldbank.org

Lovrinčević, Mikulić and Marić (2004) investigated the relationship between investment efficiency and foreign direct investment in eleven countries in transition in the period from 1994 to 2002. The results of the research showed that the high rates of economic growth in the observed countries in the given period were the result of more efficient investments, and not a larger volume of investments in GDP. They also found that the efficiency of investments is not in direct correlation with the share of foreign direct investment inflows in GDP. Nestorović (2014) in her research of the impact of foreign direct investment in transition countries found that foreign direct investment does not significantly affect GDP growth, but that it is positively correlated with the growth of gross domestic product. Its regression model showed that FDI has a positive effect on GDP growth and that countries should encourage the inflow of foreign direct investment in order to accelerate the dynamics of economic growth. Based on the review of the relevant literature the following hypothes was formed:

H2: Foreign direct investments have a positive statistically significant impact on the economic development of the Republic of Serbia.

METHODOLOGY

The empirical model that will be presented in this paper will analyze the impact of macroeconomic competitiveness factors on foreign direct investment and the impact of FDI on the economic development of the Republic of Serbia in the period from 2015 to 2019. The impact of FDI on economic development will be observed through the dependent variable GDP growth, which is defined as the difference between the logarithms of the value of GDP from period t and period t-1, which are taken from the World Development Indicators (WDI, 2015 - 2019).

This paper belongs to the group of quantitative research, because the process and design of the research are predetermined, and the phase of data analysis was preceded by the phase of data collection. In the process of data collection it was used the desk method where two secondary data sources are singled out: the Global Competitiveness Report (GCR) published by the World Economic Forum (WEF) and the World Investment Report (WIR) published by The United Nations Conference on Trade and Development - UNCTAD.

Data analysis will be performed through The Statistical Package for the Social Sciences (SPSS). A simple regression analysis will be applied to determine whether macroeconomic competitiveness factors have a positive impact on FDI, as well as whether FDI has a positive impact on the competitiveness and economic development of the Republic of Serbia. Based on the results of the regression analysis, a decision will be made to confirm or reject the research hypotheses.

RESULTS AND DISCUSSION

In order to test hypotheses, it was applied a simple regression analysis. Table 3 shows the results of a simple regression analysis examining the impact of the global competitiveness index on foreign direct investment.

Table 3 Results of simple regression analysis (Dependent variable: FDI)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-0,34	.206		-.165	.870
GCI	.124	.057	.352	2.158	.038

Source: the author

The coefficient of determination R^2 is 0.124 which means that 12.4% of the FDI variability is explained by this regression model. The coefficient β shows the strength of the influence of the independent variable (global competitiveness index - GCI) on the dependent variable FDI and its value is 0.352. The value of the Sig coefficient is 0.038, which is less than 0.05, so the values are statistically significant at the level of 0.05 (95% probability). Based on the above, we can conclude that H1 was confirmed.

Table 4 shows the results of a simple regression analysis examining the impact of foreign direct investment on gross domestic product growth.

Table 4. Results of simple regression analysis (Dependent variable: GDP growth)

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
2 (Constant)	0,84	.018		4.667	.000
FDI	.838	.023	.988	36.111	.001

Source: the author

The coefficient of determination R^2 is 0.838 which means that 83.8% of GDP growth variability is explained by this regression model. The coefficient β shows the strength of the influence of the independent variable FDI on the dependent variable GDP growth and its value is 0.988. The value of the Sig coefficient is 0.001 (99% probability). Based on the above, we can conclude that H2 was confirmed.

CONCLUSIONS AND RECOMMENDATIONS

This research sought to examine the existence of a link between the pillars of competitiveness and their impact on FDI inflows in the Republic of Serbia. The results of the research confirmed hypothese 1 of this study that macroeconomic competitiveness factors have a positive statistically significant impact on the inflow of foreign direct investment. This confirmed previous research (Popovici & Calin 2012, 2015; Stankov 2017).

Hypothesis 2 of this research was formed in order to examine whether foreign direct investments have a statistically significant impact on economic development. Direct investments are considered a good way to increase economic growth, despite the fact that some of the investment benefits may be ineffective if the host country because she isn't able to use new technologies. The results of the research showed a positive correlation between foreign direct investment and GDP growth. This results confirmed previous researchs (Lovrincevic et al., 2004; Durham, 2004; Nestorovic, 2014; Kastratovic, 2016; Stojanovic, 2018).

The scientific contribution of the research is reflected in the expansion of existing knowledge of the impact of the pillars of competitiveness on FDI inflows in the Republic of Serbia, with the simultaneous impact of FDI on the growth of gross domestic product. In this way, a starting point was provided for conducting future research, which would further examine the impact of competitiveness on FDI inflows, since most of the existing research dealt with the impact of competitiveness on countries in transition, but there are not enough researchs that investigated that impact in Republic of Serbia, as a separate unit. The practical implications of this paper can be important for policy makers and public agencies involved in the promotion of foreign investments.

There are several limitations in the research. First of all, the research covered a five-year period. Subsequent research should cover a longer period of time, applying the same methodology. Also, the research could be conducted using some other econometric methods. In addition to the variable impact of the pillars of competitiveness on FDI inflows, there could be included the impacts of other variables as well - such as privatization, country investment risk and market growth.

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ACCOUNTING AND BUSINESS FINANCE

ABC IN THE SERVICE OF QUALITY INCREASE IN THE IT COMPANIES

Ljilja Antić[*]

University of Niš, Faculty of Economics, ljilja.antic@eknfak.ni.ac.rs

Bojana Novićević Čečević

University of Niš, Faculty of Economics, bojana.novicevic@eknfak.ni.ac.rs

Jovana Milenović

University of Niš, PhD student at Faculty of Economics, milenovicjovana@gmail.com

Abstract: Globalization of business, shortened product life cycle, continuous increase of competition, pervasive and ubiquitous development of information and communication technologies has led to the need of analyzing business costs and the quality of performed tasks, as well as their relations, especially in the service sector, which has, in recent years, represented the strategic sector of an economy, and has had a dominant role in GDP. Information technology has a special significance within the service sector, and, despite the recession which is present, records an increase in employment. In order for IT managers to perform their activities successfully, track their expenses and manage them, they need an adequate information support, which is composed of new concepts and business and cost management philosophy, such as, among others, activity-based costing and total quality management. Due to its information suitability, the ability of improvement throughout time and adaptability to specific business conditions, activity-based costing offers an adequate information support to the managers of IT companies. Activity-based costing information is used for expense identification and calculation with the purpose of increasing the quality of offered services and achieving targeted profitability. IT company's expenses, especially salary expense, increase due to knowledge and sophisticated technology implementation. This implies the need for suitable calculating concept and cost and company management choice. The purpose of this paper is to point at the specific activity of the IT sector, as well as the implementation of the activity-based costing and quality management, which are in the function of achieving high performance of the IT sector companies.

Keywords: activity-based costing, quality management, IT sector companies

Jel Classification: M40, M41

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[*] Corresponding author

INTRODUCTION

Intensive development of technology, strengthening of competition, development of science and digital economics, had an impact on changes in the service sector. A service, as an economics category, is a transaction in which no physical goods are transferred from the seller to the buyer. The service sector has a strong impact on the economy of a country, and it contributes greatly to the growth of employment and the gross domestic product. The quality of services represents an important weapon in the battle against the competitors. The quality of services can be defined as the absence of errors in the company's activities. According to the standard ISO 8402, quality is the totality of characteristics of an entity that bear upon its ability to satisfy stated and implied needs. From the customer point of view, quality represents the level of need and expectation satisfaction, that is to say, compliance with customers' increasing demands and expectations.

On a worldwide scale, information technology is of particular significance in the service sector. Companies engaged in information technology operate globally and they have wider range of opportunities for outsourcing. The product/service placement is unlimited.

In recent years, the IT sector has achieved the dominant position in the Republic of Serbia. This has happened due to the orientation towards foreign markets; therefore, it cannot be disturbed by the outstanding weakness of the domestic business environment. Frequently, these weaknesses of the domestic business environment lead to the situation that the IT companies with domestic founders have foreign partners or move their activities abroad. Likewise, foreign IT companies seek domestic partners. It has led to the fact that eight out of ten leading software development companies in our market are foreign-owned. These companies attract and employ highly skilled professionals.

According to the available data, in 2018 approximately 2500 IT companies whose annual income totaled over one million RSD operated in Serbia. Most of them were software development companies, up to 63% of the total number. According to the number of employees in the IT companies, 78% are micro enterprises (10 employees or fewer).

In order to enter the foreign market, IT companies have to put effort into offering high quality services at prices that are lower than those of the competitors. To achieve that, it is necessary for them to adopt and apply new concepts of cost and management philosophies, like activity-based costing and total quality management and others.

In this sense, this paper is divided into three parts. In the first part of the paper, it is pointed at the specifics of business operations of companies in the IT sector. In the second part of the paper, the possibility of ABC implementation in the IT companies is discussed. In the third part of the paper, the information produced by the activity-based costing is put in the function of the TQM implementation in the IT companies.

THE SPECIFICS OF BUSSINES OPERATIONS OF THE IT SECTOR COMPANIES

Due to the great importance for the economy of a country, high earnings and other costs of business, attractiveness in the modern business conditions, IT companies' managers were encouraged to find a way in which they will become dominant and suitable for cooperation. This implied the implementation of new management philosophies, cost management concepts with the aim of the acquisition of the information necessary for performing the management activities. Namely, the IT sector partners seek cooperation with the companies which can offer high quality with the lowest possible cost, and to achieve that, it is necessary to obtain adequate information, produced by the above mentioned concepts (Antić &Novićević, 1999).

The IT sector market is of a global character, the physical distance of a partner is not taken into consideration, as the focus is on costs, time and quality. In this sense, the managers of the IT companies had to find a method of allocating their costs more precisely to the projects in order to make their company's performance outstanding. Namely, a lot of managers were not able to answer the questions like: How much does the Web connection precisely cost? What are the overall costs, including support and maintenance costs? How can the costs be reduced? What exactly is the cause of resource spending? (Neuman et al., 2004).

In the search for the answers to these questions, the IT companies' managers faced the lack of relevant information for the answers to the asked questions. Namely, IT companies mostly deal with intangible assets, which are difficult to measure value and costs. IT companies are labor-intensive and there is the need to identify many activities which are cost drivers in the process of service performance. Another question is raised – are all the IT sector companies typically service businesses? This is a logical question, since, by operating, these companies create a product (software) which is intangible and does not have any physical substance. Also, the time of service performance and of usage offered by an IT company does not match. In other words, a product/service can be used not before the delivery throughout a longer period of time, during which additional upgrades are plausible.

IT companies have a product/service as the result of their business operations, which is most often distributed in a digital format. In that sense, some prior investments in the software programming development and digital exchange channels are required. These costs are initially treated as the overheads. Lowering the overhead cost per unit can be achieved if the product/service customer base is widened. Along with the above mentioned costs, IT companies have the direct labor costs with a dominant share. The direct labor costs should be in direct relation with the employees who offer a particular service.

IT companies have a rather inconsistent money and business flow. Namely, significant initial financial investments in software programs and distribution channels most often are not directly in balance with the volume of sales and income, which is line with a considerable risk of starting a business. However, with the business development, initial investments are covered with the increase of sales and income. Negative or low initial margin soon starts to increase, because the sales growth is followed by low additional costs (Carter et al., 2015).

In IT companies, a particular attention should be paid to the process of providing services can be divided into two parts: invisible and visible part (Chea, 2011). The invisible part consists of the system, management and physical support. The elements which were not particularly significant in other sectors should be included here, and these are the business operation terms, and they are considered a visible part. Due to the activities of this sector, workforce offer is big, so one of the factors while choosing a job are the business conditions that could be offered to an employee. The conditions which could be offered to the employee depend on their communication abilities, their presentation and the negotiation skills. The future cooperation with the customers depend on it, because it continues even after the delivery of the product/service, and lasts the whole period while the product is being used, and could imply a regular service as well.

The above mentioned characteristics of the IT sector highlight the need to implement the concepts which incorporate tools and techniques for linking the strategic and marketing decisions on one hand, and the operational decisions on the other hand, and in that manner, create a multidimensional approach. This approach is of a strategic importance for each company and has the following goals: conflict avoidance and control orientation; strategy and resource allocation linking, and focusing on coordination of all departments of a company (Neuman et al., 2004). These goals could be achieved,

along with other methods, by implementation of activity-based costing and management, and using it for the benefit of service quality increase and the profitability of the IT companies.

THE POSSIBILITY OF ABC IMPLEMENTATION IN THE IT COMPANIES

The ABC, developed in the 1980s, had its first use in the production companies. Its use later spread to the non-profit and service organizations (Antić & Sekulić, 2016). The implementation of this concept in the IT companies provides the information for identification, costing and cost management, as well as making business decisions. The main challenge in the ABC implementation in the IT companies is the business process definition and the activities which cause the resource spending in real time, as the processes and activities in the IT sector change rapidly, and the service diversity is in constant increase. Activity-based costing was initially designed as a solution for the problem of inadequate overhead cost allocation in the production process. The functioning of this costing concept implies the identification and selection of activities performed within a company, as parts of the processes or tasks that need to be completed in order to produce a product or provide a service, as well as the identification and selection of resource cost drivers that are needed for the allocation of costs to the activities and activity cost drivers for the allocation of activity cost to the cost objects.

Over time, activity-based costing has become the background for the new concept of cost and enterprise management based on activities and has started producing the information for performance measurement of the activities, resources and cost objects. Although there has been much criticizing of ABC, such as that it has not a lacks of customer focus, that it does not appreciate the process flow and does not encourage organizational learning and continuous improvement, in the end it showed to be nothing else but the resistance to change and beginner's lack of understanding of the basics of this concept (Chea, 2011). Namely, in time it showed that activity-based costing offers a good information base to other modern management concepts and philosophies.

An adequate activity-based costing implementation implies that (Wegmann, 2013):

- the manager is familiar with this concept and its advantages,
- all the cost object, meaning the ongoing projects, are identified instantly,
- all the necessary work and tasks are identified, and based on that, time consuming activities and activities that consume resources should be determined, as well as to which activities the resource cost should be allocated,
- it should be determined which resources are needed for job completion and brought into connection with suitable activities, and to identify the cause of resource spending,
- identify the cause of activities which will be used for allocation of cost object, meaning, the ongoing projects,
- the employees are familiar with the benefits they will have from activity-based costing implementation.

The IT managers should be introduced with the ABC concept, highlighting the advantages they will have from the information produced by the concept – the information about various aspects of business, and specific services for particular customers. In this way, a connection is made between the product/service which needs to be produced/provided, and the customer whose requests need to be fulfilled, with particular activities which need to be done and resources that need to be used.

The identified activities which are performed in a company can be divided into those for which the organizational resources are being used with the purpose of completing the main and auxiliary processes, in order to estimate all the resources necessary for the process completion. The above

mentioned procedures make it easier for the managers to understand the functioning of the processes, as well as to undertake the adequate corrective actions if necessary. Practice has shown that six to nine months (Ooi & Soh, 2003) are required for the introduction of the activity-based costing concept in the IT companies. This approach to new concept introduction motivates the managers and employees to identify the excess of resources, activities and costs, to have better understanding of cost drivers, and make better assumptions for budgeting and control.

The identification of all ongoing projects is necessary for the analysis of the actual state, necessary resources, time, and such. Properly identified projects will ensure proper identification of cost object. The cost object, meaning the final product/service which the consumer can recognize and describe in the IT companies are quite particular, as compared to other companies. They do not refer to the technical components or the software, but are rather intangible and abstract. Possible cost objects in the IT companies are: the Internet, the intranet, messaging AT and Managed labs, server platforms, training, PC services, LAN/WAN services, phone, and marketing support (Chea, 2011).

The implementation of the ABC model in the IT companies demands sorting the cost objects into several main categories, like workforce, the Internet, the equipment, the software, and such. Most frequently, the cost of labor and the equipment are the main cost objects in the IT companies.

Table 1 Potential Cost Drivers to Be Used in an IT Environment

SERVICE COST OBJECTS	COST DRIVERS		
Internet	Amount of network traffic	Number of employees	Size of message
Intranet	Number of message	Number of employees	Size of message
Messaging	Number of message		Size of malibox
Server Platforms	Number of log ins to server	Number of PCs	
Training	Number of classes	Number of employees	Number of students
PC Services	Number of PCs	Number of licenses	Type of hardware/software
LAN/WAN Services		Number of employees	
Phone	Number of telephone ports		

Source: Neuman et al. (2004). Cost Management Using ABC for IT Activities and Services. *Management Accounting*

An important step in the ABC implementation is the identification of the cost drivers which are used for cost allocation to the product/service offered by an IT company. The cost drivers are most frequently expressed in hours, but could be seen in other units, like engagement, number and price of products, number of calls in each business unit, and such. The main challenge in the IT companies is to determine causality rate as, along with the number of personal computers in a company, there are other cost components that need to be included: software licence, internet access, electonic boxes and such.

Potential cost drivers that could be used in tne IT companies are: bandwith, the number of messages, the number of server log-ins, the number of trainings, the number of computers, the number of phone calls. It is important that the choice of cost drivers does not act as a deterrent in the implementation of new techologies which could increase producitivity. Possible causes of certain cost object in the IT companies are presented in the table 1.

The infomation about the activities produced by the ABC can be used for benchmarking activities, not only within an IT company, but also with the same activities performed in other companies. Based on that, activity analysis and the analysis of the level of provided service can be carried out, in order to learn what the consumer is ready to pay for.

The success of the ABC implementation in the IT companies will depend on the readiness of the employees for the concept implementation. Therefore, it is necessary to introduce the employees with the benefits of the concept implementation. The ABC concept offers information about the method od activity performance and benefits and the role of each individual in the process od production and service providing.

The information produced by the ABC is used by the IT companies' managers, while making strategic decisions and decisions about transfer prices for internal performance measurement, as well as for planning and motivating rhe employees. The accurate infomation about costs and activities carried out within a company make profitability analysis, determining cost drivers and the certain irregularities easier and make a reliable foundation for creating a cost reduction plan (Antisal & Anitsal, 2014).

By applying the EVA concept together with the ABC, the cost of capital is included in the analysis, so by discussing and analyzing the financial structure - the capital structure, a contribution is made to the more efficient overall company management. Inclusion of both financial and business sphere of the company in the management, so called integrated approach to management, has the following advantages (Chea, 2011):

- by including the EVA concept into the integrated management system, the allocation of capital costs to various activities is enabled, so the production costs reflect the total costs, and
- the information about the costs is complete, as it includes the capital costs, not only business operation costs, by which the managers are made clear that the capital is a valuable and limited resource.

If EVA is a positive, that indicates that the company is generating wealth, but if it is negative, the wealth is diminishing. The EVA concept based on the ABC will help the managers to manage costs and capital simultaneously.

The implementation of the ABC diminishes the shortcomings of the traditional methods while allocating the costs, produces reliable information about activity costs and the cost object and considerably improves the business performances. Up to 75% of the respondents in a research agreed that the ABC implementation brought about financial performance increase, and that it also contributed to considerable cost reductions, quality and profitability increase (Nuaimi, 2017).

THE ABC AS THE INFORMATION BASE OF TQM

In the IT companies a special attention is paid to the quality performance measurement and management, which are the main drivers of the competitiveness improvement. The high quality of provided services in the IT companies enables easier reach, strengthening and maintaining the

competitive advantage. The quality is an extremely important factor of value adding, which is incorporated in the production or delivery of products along the chain of supplies (Singh, 2010).

A well implemented ABC concept is an adequate information base for measuring the key performance indicators of the quality of provided services. The quality of the provided services can be measured on various levels within an IT company. The following performances can be measured: Quality performance, Financial performance, Product quality performance, Reduction in costs, Innovation performance, Employee satisfaction, Employee quality awareness, Customer satisfaction, Company's image, Rework rate, Delay rate of delivery, and such (Talib & Rahman, 2010.).

The IT companies struggle to preserve and improve their competitiveness in the global market, with the wide offer of workforce, therefore, the focus is on the quality performance measuring, and it is extremely important for the management. In that sense, the TQM concept is of utmost importance, and it has the information support from the ABC concept. TQM is an integrated management philosophy, which is based on the satisfaction of the customers' demands, reduction of processing time, employee involvement, team work, benchmarking and closer relations with suppliers.

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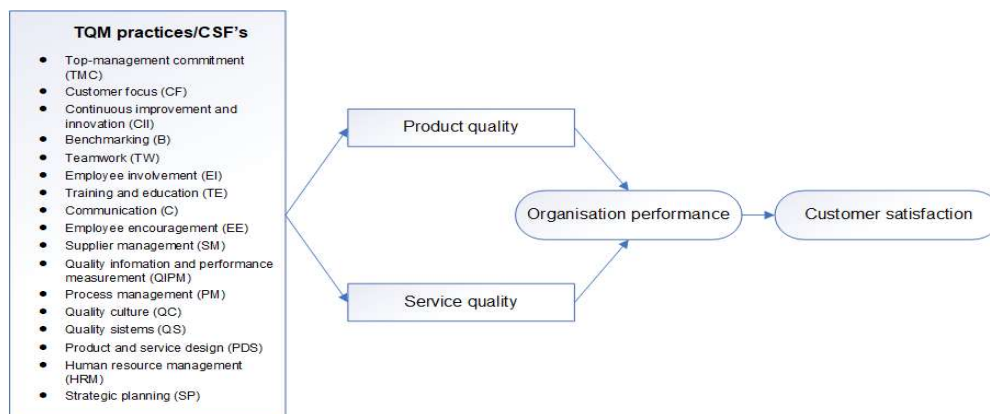
Figure 1 – Practice TQM

Source: Talib, F., Rahman, Z. (2010). Studying the impact of total quality management inservice industries. Int. J. Productivity and Quality Management, Vol. 6, No.2.

In the definitions of TQM, its 'hard' and 'soft' sides are pointed out (Vouzas & Psyhogios, 2007). The 'soft' side is characterized by the management principles such as strategic quality planning, business culture of the employees, development of close relations with the suppliers, customer in focus, process management, and continuous improvements. The 'hard' side contains the instruments, techniques and methods for quality improvements, with the purpose of fulfilling the 'soft' side of TQM. Successful implementation of the total quality management in the IT companies that use ABC is plausible, as this concept supports the practice of cost reduction, productivity increase and the improvements in the quality of products/services. If the TQM as the management philosophy has the information support from the ABC concept, the following TQM practices can be applied in the IT companies: Top-management commitment, (TMC), customer focus (CF), training and education (TE), continuous improvement and innovation (CII), supplier management (SM), employee involvement (EI), information and analysis (IA), process management (PM), quality systems (QS), benchmarking (BM), quality culture (QC), human resource management (HRM), strategic planning (SP), employee encouragement (EE), teamwork (TW), communication (COM), and product and service design (PSD) (Talib & Rahman, 2010.) The implementation of these practices adds to the improvement of the service

quality, organizational performances and customer satisfaction, as shown in the picture 1The management of an IT company is responsible for strategy defining and mission and vision development, as well as for their implementation within a company. Their duty is to incorporate continuous improvement culture in the company, meaning that the employees are focused on the most efficient way to perform an activity within the defined time frames. ABC classifies the activities into the value added and non-value added. By identifying the activities which are non-value added, in other words, the ones which increase the costs and time and do not add value for the customers, it is possible to eliminate the above mentioned or bring them to an acceptable extent. (Antić et al., 2019). The identified value added activities should be accessed further and it should be determined whether they are performed efficiently or there are possibilities for them to be improved, which will contribute to the increase in quality.

ABC offers important information about customers, based on which the IT companies' managers will be able to comprehend and understand the needs of the customers, the quality they require, as well as the time and the preferred delivery method. Therefore, a continuous quality analysis is necessary, in order to get an insight whether the organization is ready for the continuous change and adaptation to the market demands (Singh, 2010).

The continuous improvement is the key factor of the quality of the provided services, and it is especially significant to the IT companies because of quick and frequent changes and constant search for new hardware and software solutions. The implementation of the continuous improvement philosophy transforms an IT company into a learning organization. The definition of the corresponding aims for performance improvement in the sense of discovering and applying the best practices in an IT company facilitates reaching the superior market position.

Employee involvement is only one of the demands of the strategic orientation of the IT companies. In that sense, the ABC enables the employees of all levels and from all departments to analyze their own business operations and suggest the corrective actions. In addition, employees' points of view and opinions represent the foundation for the ABC improvement. Bringing the employees into close connection with the aims and tasks of the IT companies, what determines their behavior, is made much easier with the information produced by the ABC. Employee involvement implies their additional training, offering relevant information and rewarding them for the accomplished quality performance (Sahin & Topal, 2016).

The purpose of team work is to involve the employees in a process which refers to accomplishing not only quality performance, but other business performances as well (izvor). Team work is crucial for change management and plan implementations, problem solving and creating the feeling of belonging and importance. It is the foundation of the mutual trust building among the employees and communication improvements.

The researches have shown that there is a connection between the training of the employees and quality performance (Bon & Mustafa, 2013). This is not only about the additional trainings for the tasks the employees perform, but rather about the trainings for use of concepts and tools which refer to quality establishment and measurement. There are various concepts of strategic orientation and appreciation of quality concepts which can to be implemented in the IT companies. Apart from the total quality management, the ABC information can serve in the time-based management. The time-based management takes into account the process duration, as a factor of quality performance improvement. However, longer processes mean higher costs and more activities, which do not always signify quality improvement. The time-based management can be regarded as a marketing tool and a cost reduction tool, especially when the target performance scope is defined by using the ABC.

Timely information which is exchanged within the IT companies is an important aspect for ensuring the quality of the provided service. A well-formed communication system within a company will ensure misunderstandings to be avoided and external failure costs to be reduced. Also, everybody within a company must recognize the value and effect of good communication, as one of the most significant factors in achieving the demanded quality.

During the quality performance measuring, financial and non-financial performances must be taken into consideration. Namely, non-financial performances, such as quality improvement, inventiveness and market share increase, can result in actual cost reduction and have a positive effect on financial performances. Quality improvement will provide customer retention and will ensure their loyalty, which further implies the possibility of financial and market share growth.

CONCLUSION

As the result of their business operations, the IT companies have intangible products/services. Their activities are work-intensive, and they have income and cost relation, receiving and issuing money. The necessity for efficient management of the IT companies demands the knowledge of total costs, as well as the answers to the question what the price of something is. Satisfying such requests is achieved by the incorporation of the tools and techniques used to make a more direct link between strategic and operational dimension of business and management. Creating such links enables activity-based costing integrated in the total quality management.

The activity-based costing and the total quality management practices in the IT companies enable:

- managers to comprehend the activities performed in the company, to establish a hierarchy and to find the adequate resource cost drivers, in order to provide a good foundation for the search of business operation constraints and potential opportunities for business improvements;
- managers to offer their customers higher value than their competition, through understanding and communication between the consumers and the employees;
- managers to reduce the business costs without putting the quality of the provided services in danger;
- facing the managers with the method of using the available resources and capacities, in order to achieve increase in productivity;
- highlighting the importance of accomplishing the quality performance through employees' training and providing the relevant information and
- bringing together the employees with the company's aims, in order for them to perform their tasks in accordance with them and to be motivated for high performance achievement through incentives.

The ABC offers the information support to the TQM, for measuring the activity performances, processes, resources and cost object. Simplicity, small resource consumption and the wide variety of the offered information create the environment for more and more intensive the ABC implementation in the IT companies.

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CONTROLLER RESPONSIBILITIES AND PARTNERSHIP WITH MANAGEMENT

Mirjana Todorović[*]

University of Kragujevac, Faculty of Economics, mtodorovic@kg.ac.rs

Dejan Jovanović

University of Kragujevac, Faculty of Economics, djovanovic@kg.ac.rs

Abstract: Controlling and controllers are constantly gaining importance and a large number of researchers are focused on these. This is understandable given that controlling should contribute to efficiency and effectiveness of management's work. Controlling and management processes are tightly linked so controllers today are referred to as business partners of management. The controller represents the "right hand" of management and controller should support, advice and provide information support to management at all hierarchical levels. The concept of controlling is based on the partnership between the controller responsible for transparency of the information necessary for decision-making process and the management responsible for decision-making process. The preconditions for the success of controlling and controllers are a quality information system of the company, highly developed accounting information system and accounting function, expertise and competence of the controller, especially in the area of finance and accounting, as well as interested, dedicated and educated management. The role of the controller has changed over time and the relationship between controller and management is still a source of controversies. It is often not quite clear what is meant by controlling and by controllers' jobs. Therefore, the aims of the paper are to identify the evolution of controller roles, to analyze its role today and to describe the controller-management relationship. The paper should answer the question: Who the controller actually is?

Keywords: controlling, management accounting, controller, management, business partnership

JEL Classification: M10, M21, M40, M51

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[*] Corresponding author

INTRODUCTION

Although it has a significant place in literature and practice, it is not quite obvious and it is not easy to explain what controlling is. Problems related to the understanding of controlling are conditioned primarily by terminological specifics (controlling is associated with control), as well as the existence of different definitions of controlling. Over time, different concepts of controlling have been developed with completely different understandings of controlling. Systematization, which should facilitate understanding of the essence of controlling, is quite complex. The controlling tasks are numerous and varied. They differ from company to company and are conditioned by specific circumstances. These tasks, as well as the role of the controller, have changed over time as controlling has evolved. The complexity of the relationship and the specific roles of controller and manager are still a source of ambiguity and cause dilemmas. Altogether, this leads to the confusion regarding the understanding of controlling and makes it more difficult to have a clearer view of the position of controlling and the controller.

When describing the jobs and tasks of the controller, literature often says that the controller is a navigator, advisor, co-driver, moderator, information analyst/expert, information provider, change agent, innovator, business partner, sparring partner, economy's common sense, that they act as a doctor, represent the company's economic conscience, are the management's right hand, etc. It is obvious that these are numerous, diverse and quite wide-ranging jobs. However, just listing and trying to describe the tasks of the controller in a descriptive and broader way does not contribute to explaining who the controller is and what the controller actually does. Hence, the goal set by this paper is to see how the role of the controller has evolved, what its role is today, what the controller deals with, as well as what the relationship between the controller and the manager is. The research should provide an answer to the question of who the controller really is.

Research will be conducted using a descriptive analysis of the defined subject of the research with an empirical analysis of tasks and responsibilities for the position of controller in the Republic of Serbia. Theoretical analysis, empirical research and examples from international practice should provide basis for the conclusions.

The structure of the paper, in addition to the introduction and conclusion, consists of four parts. First, the evolution of controller tasks is analyzed, ie we talk about three generations of controllers. The second part of the paper deals with the identification of controller tasks. The third part of the paper discusses the profile of the controller, ie the necessary professional and personal qualifications that a person should possess in order to be a successful controller. The fourth part of the paper analyzes the relationship between controller and management.

GENERATIONS OF CONTROLLERS

Following the changes in the environment and looking for ways to respond to them, controlling has continuously grown and developed. It included new perspectives, content and tools depending on the circumstances and problems that prevailed at the time*. The results of this process are four different concepts of controlling, namely: accounting-oriented concept, information-oriented concept and management-oriented concept of controlling. On their basis, the practical controlling concept has evolved. The mentioned controlling concepts reflect different approaches to observing controlling and

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* The basis of the analysis is a situational approach, according to which there are no generally valid optimal alternatives to action, but alternative possibilities, appropriate and adapted to the specific situation.

indicate the focus of controlling in certain development stages. However, the development of controlling can also be observed from the controller's standpoint. Their tasks have also changed, and if we follow this change over time, then we are talking about three generations of controllers, namely: the controller as a registrar, as a navigator and as an innovator. Controlling began to develop within accounting, so it is logical that in the initial stages of development, controlling was viewed as an accounting-oriented concept, and the controller as a registrar. The controller as a registrar operated in stable conditions of a relatively static environment (1950s and 1960s), with rare changes, when the demand was higher than the supply and almost everything could be sold. In such conditions, with relatively stable and reliable information, it was possible to predict and plan quite precisely. Companies were passively adapting to the environment and were not under pressure to do so quickly. Management was characterized by an internal focus, and improvements included cost rationalization activities. The controller as a registrar was an accountant (head of accounting). Their basic tools were bookkeeping, balance sheets and calculations. They applied traditional approaches to calculating costs and effects. The controller primarily dealt with internal accounting issues. Controlling had the function of documenting and controlling, it was oriented towards the past and data accuracy, and it served to rationalize business (Osmanagić Bedenik, 2007, 13; Perović, 2007, 32).

The acceleration of market changes in the early 1970s and the growing size of companies complicated adjustment problems. Companies were forced to turn to the environment, competitors, industry and market. The competition was intensifying. The information was no longer so secure, and had to be accepted with caution (taking into account the potential risk). In such a dynamic (but still limited dynamic) environment, forecasting became more difficult and uncertain, and planning was expected to be more flexible (Osmanagić Bedenik, 2007, 14). Companies were forced to leave their passive position; it was necessary to actively adapt and strive to influence changes in the environment. During this period, the controller had the role of a navigator. The controller was supposed to support management as an economic navigator to ensure that the ship (company) arrives at the profit port (Blažek et al. 2014, 215). The tools that the controller used as a navigator were the budget, control of budget execution and reporting on execution, analysis of deviations, short-term calculation of costs and results, contribution calculation, turning point, etc. At this stage, the controller was supposed to facilitate the direction and management of the company, and was usually in the position of director of the financial and accounting sector.

In modern, extremely dynamic conditions, companies are exposed to constant and radical changes. Their success depends on a large number of external and internal factors. They must actively deal with competition issues, customers, suppliers, products, etc. Quick adaptation and active and strong focus on the environment become imperative. The size and complexity of companies continue to grow, so problems of integration and coordination are more and more pronounced. The controller becomes an innovator who should enable problem solving, introduce, develop and apply new tools that will help the ship's captain in fog and storm (Osmanagić Bedenik, 2007, 16). The controller should create tools (tool box) and show how those tools should be used (Blažek et al. 2014). The most important tools of the controller as an innovator are target costs, lean production, strategic control, development of early warning systems, CSR (Corporate Social Responsibility) tools and the like. The controller becomes strategically oriented towards the future. At this development stage, the dominance of the management concept of controlling begins. Controlling is seen as a management subsystem whose main task is the coordination and integration of management activities.

It should be noted that, regardless of the concept of controlling, i.e. regardless of the type of controller, what they have in common is the focus on creating the highest-quality management-oriented information that should support the management system in achieving the goals set. The characteristics

of the environment, business conditions and the requirements set before them only determine the application of various tools, i.e. the specific tasks of the controller.

CONTROLLER'S TASKS

Answering the question of what exactly the tasks of a controller are is not easy. A previous analysis indicated that the tasks of the controller changed over time. Also, tasks vary from company to company. The tasks of the controller are also influenced by the chosen concept of controlling and numerous organizational factors. There is no universal concept for building controlling that can be applied in every company.

The situation is similar with the tasks of the controller. Also, there is no formal education for controllers, so that is one of the reasons for the different understanding of the tasks of controllers in practice. With all of the above in mind, it may seem that the attempt to create a holistic and final overview of the controller's tasks is probably predestined to failure. However, in accordance with the objectives of the paper, in order to answer the question of what the controller does, reviews of the most common tasks of the controller in practice, but also in the professional literature, will be given.

In order to identify the practical attitudes in relation to the tasks of the controller, an analysis of job advertisements for the position of controller in the Republic of Serbia was conducted during the month of October 2020. It was determined that in that period there were 10 active advertisements for the position of a controller, of which 7 referred to the position of financial controller, 2 to the position of controller in production, and 1 position to controller in logistics (https://poslovi.infostud.com//). Bearing in mind that this is a period of only a month, it can be concluded that this is a significant number of ads, and that there is obviously a strong demand for this job. Because some ads were quite large, it is not possible to upload them in their original form. However, the most important responsibilities expected of the controller will be listed.

- The financial controller should perform the following tasks: preparation of financial statements quarterly and annually in accordance with IFRS and local regulations, preparation and harmonization of reporting systems at the company level, closing activities on a weekly, monthly and annual level, data processing and preparation of reports for various purposes, contact person for external audit, ensuring the effectiveness of internal controls, budgeting, interpretation of deviations, proposing and monitoring the implementation of corrective measures to achieve planned results, forecasting, continuous improvement, calculation of planned cost price, organizing the process of allocating costs and revenues within the company, auditing and control of keys for allocation, price formation, sales price management, advising the management on the financial aspects of business activities, giving recommendations for improving financial performance, analysis of creditworthiness of customers, monitoring and reporting on the collection of receivables, etc.
- The logistics controller is expected to do the following: cooperate with the EDI provider, prepare and issue invoicing orders, revoke invoices and credit notes, contact invoicing persons and resolve supplier complaints, extract data from systems used for revenue calculation, cost control, etc.
- The production controller is expected to perform the following: seek ways to reduce costs, reduce costs, implement improvements, monitor savings, coordinate reporting of actual and projected values, financial analysis in accordance with strategic decisions to ensure transparency of costs and non-financial performance, contact person for internal and external audit, support

to the budgeting and business planning process, preparation of information for various levels and functions, monitoring of KPIs, ad hoc analysis, etc.

The conducted analysis speaks in favor of the previously stated views. The jobs of controllers are really very differently understood. However, it is obvious that the required profile of the controller represents a person with financial and accounting knowledge. Also, the description of these jobs clearly indicates that these are the tasks of an accountant (especially a management accountant). This also points to the conclusion that the accounting concept of controlling is dominant in companies looking for persons for the position of a controller. It may be too narrow an understanding of the tasks of controllers compared to developed Western European countries, but the analysis clearly indicates the current situation in our country. Future empirical research in this field, using more advanced analysis techniques, should provide a more detailed answer to this question.

Contrary to practice, it is necessary to consider the perspective of the controller's work in professional literature. In order to describe the work of the controller in literature, one can find views that the controller is a doctor (Blažek et al. 2014, 151, Management Center Belgrade). Doing the job as a doctor means that the controller must take a medical history, make a diagnosis, determine therapy and monitor recovery. Anamnesis means determining the actual condition: whether there is a problem (e.g. fever or nausea) or whether there is a deviation. At the stage of determining the diagnosis, the question must be asked why something happened. Asking this question is never popular, but it is necessary. The diagnosis is determined by analysis: whether something hurts you, where it hurts you and why it hurts you. The goal is to identify the deviation and its causes. This should be followed by action. It is not always easy to carry out an action. There may be resistance from the management and employees with the search for justifications, such as force majeure, time (mis)match, evasion, raising doubts about the accuracy of numbers, bad budgets, etc. This is a key step in the controller operation process. That is why the controller should be a psychologist. When information is needed, controllers manufacture it. When further action is needed on the basis of this information, controllers must become vendors. In the end, therapy cannot be good if you do not have an accurate diagnosis. Therapy involves corrective measures, e.g. take the medicine three times a day. The recovery phase is the phase of projecting new results.

Also, from a somewhat broader perspective, the following could be identified as the basic tasks of the controller (Očko, Švigir, 2009, 35):

- Preparation of information for decision making,
- Monitoring and control of decision implementation,
- Enabling real-time management,
- Counseling and encouragement,
- Counseling and motivation,
- Coordination of management activities,

Creating information in accordance with the needs and changes in needs, etc.

It is obvious that the jobs of controllers are considered much more broadly in literature, and that their description and list could make us conclude that they reflect the dominance of the management concept of controlling. In order to at least partially overcome this gap, and to solve the problem of not understanding controlling and to contribute to a unified understanding of controlling, the International Group of Controlling (IGC) created a model of the controlling process. Similarly, the IGC provided an overview of the responsibilities of the controller, in order to further define the tasks of the controller. According to the IGC, the responsibilities of the controller include:

- Ensuring transparency of business results, finance, processes and strategies, in a way that contributes to economic efficiency;
- Coordination of sub-goals and plans in a holistic way and creation of a reporting system that is future-oriented and refers to the company as a whole;
- Shaping the controlling process, i.e. defining goals, planning and monitoring, so that decision makers can act in accordance with the goals;
- Management reporting;
- Developing and maintaining a controlling system.

A review of the responsibilities of controllers under the IGC indicates that controllers generally have two roles in the company. On the one hand, they are internal consultants and management partners, and are jointly responsible for achieving goals. On the other hand, they are information service providers, as they are responsible for providing relevant management information. Based on this, a clearer line can be drawn between the controller and the controlling. Controllers provide services, advise and support various departments (services). Controlling involves the process of defining goals, planning and managing business results and is the task of management. The controller contributes to this process and shares the responsibility with the management as a sparring partner (Management Center Belgrade, 2012, *IGC model of the controlling process,* 13-14).

It is clear that the expectations from the controller are very high, so the issue of knowledge, skills and competencies of the controller becomes crucial. What should a controller know and what kind of person should they be in order to successfully complete all tasks?

CONTROLLER'S PROFILE

The controller profile is very important for the success of the controller. When analyzing the profile, it is most often pointed out that the controller should possess professional competencies (hard skills – technical know-how) and appropriate personal characteristics (behavioral skills or soft skills – know who). Table 1 shows the required professional knowledge and desirable personal characteristics of the controller.

Table 1 Profile of the controller

PROFESSIONAL KNOWLEDGE		PERSONAL ATTRIBUTES
Type of knowledge	**Content of knowledge**	
Economic theory of relations in management and execution systems	*Information system:* cost calculation, capital budget preparation, success analysis, performance, reporting, etc.	*Intelligence*: flexibility, initiative, thinking in the context of networking.
Coordination instruments		*Social behavior*: communication, negotiation, leadership.
Methods of planning and control success	*Planning and control:* budgeting, planning prices, controls, etc.	
Behavioral theory	*Goals:* defining goals, resolving conflicts of goals, etc.	*Reliability*: trust, willingness to work and achieving results.
Motivation tools	*Human resource management:* leadership style, motivation, etc.	
Creativity development techniques	*Organization:* processes, instruments.	

Source: Osmanagić Bedenik, 2007, 285.

Professional competencies imply appropriate knowledge and experience. The controller must have multidisciplinary knowledge in the field of: accounting and finance, accounting system, cost accounting, internal reporting, business analysis, information technology, statistics, company organization, strategic

and operational management, etc. (Blažek et al. 2014, 217; Meter, M., Pureta, T. 2013). The controller must love numbers, must understand the language of numbers, think in numbers, must measure, compare and analyze. It is necessary to transform the subjective (qualitative) into the objective (quantitative), the framework into the exact, the doubtful into the transparent, the partial into the complete (Očko, Švigir, 2009, 36).

Basic knowledge is acquired through studies of economics with a focus on accounting and finance, but with the development of skills in the field of information technology (IT), monitoring of management subjects, such as planning, project management, company organization and the like. When it comes to practical experience, the most important experience is gained through working in accounting functions or internal audit, which encourage thinking and acting in the context of numbers (Ziegenbein, 2008, 197).

As educated accountants, controllers have learned to be analytical. It is a type of people who think logically and go into the essence of things. Their key questions are why something happened, which puts people in a defensive position, but also what to do next. The controller is the creator of information but also its seller. Therefore, attention should be paid to the psychological profile of the controller. When it comes to the psychological profile of the controller, one should keep in mind their personal characteristics, communication skills, social competence and conceptual-cognitive competence (Meter, Pureta, 2013; Ziegenbein, 2008, 199; Blažek et al. 2014, 217). The most important personal qualities are self-awareness, self-confidence, self-motivation, self-discipline, proactivity, quick thinking (clarity, sharpness of mind), etc. The most important communication skills are: they know how to listen, they are patient, they can and want to explain, they are firm but kind, they know how to deal with problems, they are a partner and at the same time distanced, etc. In the domain of social competencies, empathy, assertiveness, cooperation, constructiveness, understanding of social connections (work in networks), social intelligence (competent in interpersonal relations), ability to implement will and persuasion, communicativeness, etc. should be emphasized. The coordinating and integrative role of the controller requires from them a special way of cooperation. This means that the controller builds their position and role on their knowledge and experience, not on a formal position. They must be able to follow completely different ways of thinking of functional managers, and must be able to mediate between them. The controller should moderate the communication of different profiles of experts to jointly solve problems, i.e. achieve goals. It is necessary to know the theory and instruments of motivation, in order to contribute to the orientation towards the set goals (Osmanagić Bedenik, 2007, 285). Conceptual-cognitive competencies include the ability to plan tasks, set priorities, see the bigger picture, creativity, focus, understanding the problem, risk awareness, analytical thinking and the like.

In order to indicate the desired profile of the controller as clearly and vividly as possible, a comparison can be made between a strong and a good controller. For some managers, a strong controller is one who openly points out mistakes and bring truth to the fore. Practically, they force management to justify themselves. This kind of controller gives the impression that they are strong. Still, does that mean that a strong controller did a great job? Is it more likely that the controller that gives the impression that they are strong are in fact weak and powerless? Very often such controllers are said to lose control and may win the battle, but lose the war. On the other hand, there are excellent controllers that act as moderators of profitability. They are quieter and don't say much. They are able to direct, so that their presence is not even felt. They ask questions facing the future: what to do now, how to repair the damage, how much money is needed to achieve the goal, how to achieve the goal by the end of the year, how to hide the positive deviation, etc. Questions like this are much harder to answer. These questions do not mean criticizing and looking only for the cause of the problem, these

questions mean looking for a solution. Such issues create a positive climate and conditions for teamwork. Such controllers are, in fact, good controllers (Blažek et al. 2014, 209).

RELATIONSHIP BETWEEN MANAGERS AND CONTROLLERS

The processes of controlling and management are inextricably linked. Controlling complements and integrates management activities in a conceptual, functional and institutional sense. By providing professional and comprehensive support to management activities, controlling contributes to increasing the efficiency and effectiveness of management. Therefore, controlling is seen as a dispositive instrument of management (Figure 1).

The controller, in fact, represents the "right hand" of management, and is necessary to support, advise and provide information support to management at all hierarchical levels in the implementation of management activities. They need to help define the mission, vision, goals, strategies and plans. They also monitor and report on the causes and consequences of deviations from the plans, as well as propose measures to overcome gaps.
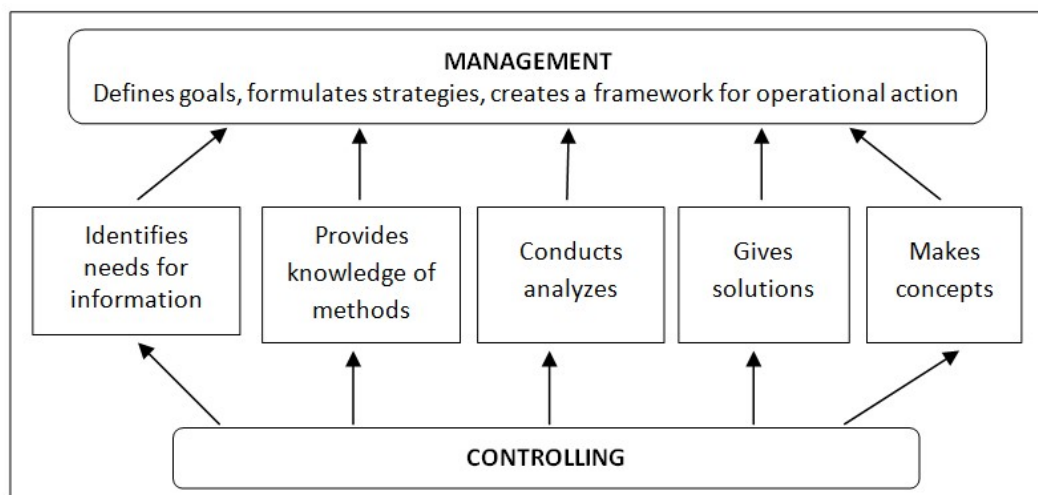
Figure 1 Controlling - a dispositive instrument of management
Source: Luković, 2009, 35.

Good controlling helps and contributes to the success of management. However, the success of controlling largely depends on the management. Therefore, ensuring good controlling is not the sole responsibility of the controller. A prerequisite for good controlling is the partnership between the controller and the management. The relationship between controller and management can be described as a relationship of cooperation and complementarity. The basis of their cooperation is teamwork, where each team member has their place and role, i.e. respects the contribution of another team member. Thanks to teamwork, personal characteristics and creativity of individuals are encouraged and developed, innovative and creative solutions are created, development bottlenecks are eliminated more efficiently, a holistic approach to observing the company is encouraged, and the like (Osmanagić Bedenik, 2007, 248).

Controllers and managers have almost identical goals. What they have in common is that they care about the future, survival and success of the company. It is for these reasons that it is not easy to pinpoint where the responsibilities of managers and controllers begin and where they end, although their areas of responsibility, approaches and the tools they use are completely different. The overlap or matching zone of the controller and manager jobs can be illustrated using Venn diagrams (Figure 2).
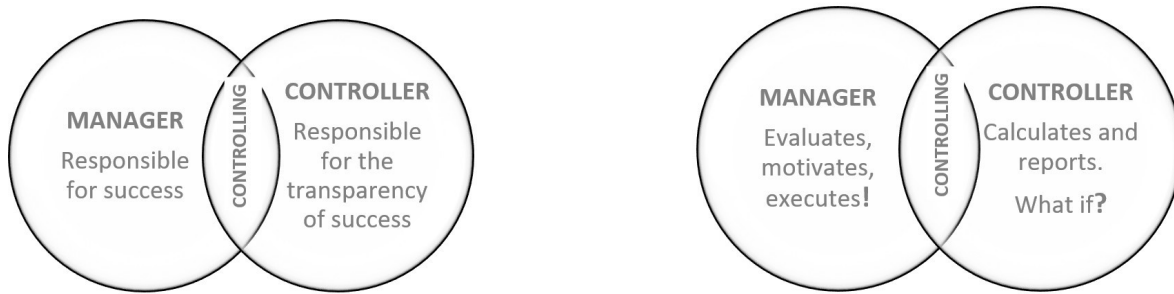
Figure 2 The relationship between controller and manager
Source: Osmanagić Bedenik, 2007, 100

A previous analysis of the tasks and responsibilities of the controller has already indicated difficulties in efforts to precisely limit the responsibilities of the controller. The existence of overlap in the tasks and responsibilities of controllers and managers further complicates this attempt. Although it is useful to know the job description for each specific job, there are views that in the case of managers and controllers, precise and detailed descriptions are not even necessary because they lead to bureaucratization. Instead of specific job descriptions and specifications, it is better to have appropriate guidelines (Blažek et al. 2014, 34). Guidelines work by unifying, and job descriptions lead to mutual distancing. Hence, interpreting Figure 2, several conclusions can be drawn, i.e. guidelines regarding the division of tasks.

Management is responsible for decision making and implementation.

Controlling is not management. The controller prepares decisions, coordinates individual activities and, if necessary, monitors the implementation of decisions (Luković, 2009, 35). They are not responsible for the implementation of decisions.

The controller should provide information that is relevant to the decision. Their contribution is measured by the relevance of the information used for decision making.

The manager is responsible for defining the company's goals, and the controller should deal with defining certain dimensions of goals: specificity, reality, measurability, divisibility and time dimension.

Finally, the manager is responsible for the success of the company, and the controller for the transparency of success.

The essence is that the manager deals with the management of the company or their sector, just as a pilot flies an airplane. The manager is responsible for their own controlling, they are responsible for whether the plane will land at the target airport. So what is the job of a controller? The controller must act as a flight controller, they are the guide or co-pilot (co-driver). They must indicate the optimal flight plan. They look ahead, read the budget just as navigation device "reads" the map. The controller needs to find a way, enable the company to reach the point of profitability (breaking point) and to position itself within the profit zone. In fact, they should enable the company to land in the area of profit and show and prove the financial viability of the proposed path (Blažek et al. 2014, 35). To this end, the controller must ensure that the manager thinks through costs, revenues, contributions, financial constraints and thus realizes their own controlling.

It may happen that the set goals and plans are not realized in the expected way, as it is possible to redirect the plane to another airport due to the storm. Deviations cannot be avoided, but unforeseen deviations can. Also, one should avoid the unpleasant and very often difficult decision-making situation in

conditions of surprise. That is why the controller must constantly ask the question "what if" a situation or an unforeseen event occurs. Also, the controller must continuously compare the achieved results with the budget (plans) and must report on deviations. However, that is not enough. The key is what to do with this deviation. Instead of re-examining, accusing, looking for culprits, etc., the focus should be on potential solutions, what to do and how to do it, which all implies the need for corrections in the coming period (Blažek et al. 2014, 37).

CONCLUSIONS

In accordance with the set goal, the analysis was conducted in order to answer the question who the controller is. The controller is a person with multidisciplinary knowledge, primarily in the field of accounting and finance, but also in the field of information technology, organization, strategic and operational management, etc. The controller must like numbers, understand the language of numbers, think in numbers, he must measure, compare and analyze. A good controller should have experience gained through practice in the areas such as accounting, finance, internal control or internal audit. A good controller does not have to speak loudly but his work and the effects of his work are clear, transparent, crucial, guiding and inevitable for the whole company.

The controller has a great responsibility, and performs various and very specific tasks. Regardless of how the tasks are defined, the controller is expected to be a navigator, co-driver, economic conscience of the company, common sense of the company, information providers, change agent etc.The controller, as a business partner of the management, should provide quality information for decision-making and at the same time, determine the direction of the company's movements in accordance with future projections and expectations.Thus, the controller appears both in the role of strategist and in the role of tactician.

The basis of the successful work of the controller is cooperation and partnership with the management. Finally, the simplest way to describe the relationship between a controller and a manager is as follows: "a controller is a representative of management accounting and he is a special accountant of management" (Blažek et al. 2014, 209). That is why it is said that an accountant becomes a controller when he sells his services to management.

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RESTATEMENTS OF FINANCIAL STATEMENTS: CAUSES AND CONSEQUENCES

Vladimir Obradović∗

University of Kragujevac, Faculty of Economics, vobradovic@kg.ac.rs

Nemanja Karapavlović

University of Kragujevac, Faculty of Economics, nkarapavlovic@kg.ac.rs

Abstract: *According to International Financial Reporting Standards (IFRSs), companies should present at least one comparative amount for each amount presented in their financial statements. Comparative amounts can be equal to the amounts presented in the financial statements prepared and published in previous year(s), but can also be different from that amounts due to restatements of prior financial statements. The purpose of this paper is to discuss changes in accounting policies and corrections of prior period errors as the main reasons for restatements of previously published financial statements in order to generate comparative information, and to examine the frequency and practical implications of these restatements in Serbia. Retained earnings and loss as equity components are the positions of the statement of financial position (balance sheet) that are most affected by restatements. Therefore, the empirical part of research, which is conducted in Serbia, is based on comparisons of the amounts of retained earnings and loss in the statement of financial position at the end of one year (original amounts) and the amounts of the same positions presented as comparative information in the statement of financial position relating to the end of the next year (comparative amounts). We examine whether there are significant differences between original and comparative amounts and, in the cases where the differences exist, the cause(s) of the differences. In addition, we examine the quality of disclosures regarding restatements in the notes to the financial statements in Serbia.*

Keywords: *restatements of financial statements, changes in accounting policies, corrections of prior period errors, comparative information, retained earnings, loss*

JEL Classification: *M41*

∗ Corresponding author

INTRODUCTION

According to International Financial Reporting Standards (IFRSs), i.e., International Accounting Standard (IAS) 1 – Presentation of Financial Statements (paragraph 38) and the International Financial Reporting Standard for Small and Medium-sized Entities (IFRS for SMEs, paragraph 3.14), a company shall present comparative information related to at least one preceding year (the end of the year for the positions of the statement of financial position and the whole year for the positions of other financial statements) for all amounts presented in the financial statements for the current year. Comparative information enables users of financial statements to identify the direction and intensity of changes in financial statements positions.

Comparative information is not always equal to the information that was previously published, i.e., the information published in the previous financial statements. In other words, the information presented in the financial statements for one year, i.e., original information, does not always become comparative information in the future. Changes in accounting policies and corrections of prior period errors are the main reasons for differences between original and comparative information. In general, when accounting policies are changed in the current period or prior period error is detected in the current period, original information affected by the policy or error is restated in order to generate comparative information in the financial statements for the current year.

The subject of the paper is restatements of information in financial statements, i.e., the process of transformation from original to comparative information. The aim of the paper is to explore the reasons and consequences of changes in accounting policies and prior period errors and to examine the frequency and practical implications of restatements of the financial statements in Serbia. Consequently, the next section of the paper reviews the literature regarding changes in accounting policies and prior period errors and formulates the research questions. Thereafter, methodological aspects and results of empirical research of the practices of restatements of financial statements in Serbia are presented and discussed.

LITERATURE REVIEW

In IAS 8 – Accounting Policies, Changes in Accounting Estimates and Errors (paragraph 5) and the IFRS for SMEs (paragraph 10.2) accounting policies are defined as "the specific principles, bases, conventions, rules and practices applied by an entity in preparing and presenting financial statements". Management of a company is responsible for the formulation and consistent application of accounting policies. As an internal financial reporting regulation, accounting policies should be in accordance with the external financial reporting regulation, i.e., accounting (financial reporting) laws, bylaws, and standards.

Accounting policies of a company applying full IFRSs should be in accordance with all applicable IASB's standards (labelled as IFRS and IAS) as well as all interpretations (labelled as IFRIC and SIC). If standards and interpretations do not offer a solution to a particular accounting problem, a company (i.e., its management) should develop specific accounting policy with reference to (a) the requirements of IFRSs dealing with similar problems, (b) the Conceptual Framework for Financial Reporting, (c) the requirements of financial reporting standards other than IFRSs (e.g., national and regional financial reporting standards) and accepted industry practices consistent with IFRSs and the Conceptual Framework (Doupnik & Perera, 2012, 89). In any case, the development of accounting policies should be based on judgments, and accounting policies should result in relevant and reliable information. In general, a company should consistently apply its accounting policies for similar transactions and other events (Van Greuning, Scott & Terblanche, 2011, 50). The mentioned

consistency in applying accounting policies is a prerequisite for the comparability of financial statements from period to period (Palea, 2013, 25).

However, an accounting policy is subject to change if the change (a) is necessary for applying the requirements of a standard or an interpretation or (b) would enhance reliability and relevance of information in financial statements (Melville, 2019, 63). This means that changes in accounting policies can be divided into (a) imposed changes, which are caused by new, revised, or amended standards or interpretations, and (b) voluntary changes, which are caused by the presumption that new accounting policies would provide better information than the old ones.

In the case of an implied change in accounting policy, a company should adhere to transitional provisions (if any) in new, revised, or amended IASB's documents. If transitional provisions do not exist or an accounting policy is changed voluntarily, the change is accounted for retrospectively, which means that comparative amounts are restated in order to be presented "as if the new accounting policy had always been applied" (Melville, 2019, 63). The early adoption of a new document, which is normally permitted by the IASB, is not considered as a change in accounting policy (Rota, 2015, 99) implying that retrospective accounting is not performed.

The users of financial statements need to know which accounting policies are used in the process of financial statements preparation, whether those policies are changed in comparison to previous periods, and what the effects of changes are (Weetman, 2006, 77). Therefore, disclosures on accounting policies should be an inevitable part of the notes to the financial statements. In addition to the mentioned information on accounting policies, according to IAS 8 (paragraph 29), a company should explain the reasons why the voluntary change in accounting policies enhance the reliability and relevancy of financial statements.

When developing accounting policies for some accounting problems, companies can choose between options offered by IFRSs. In such situations, companies should disclose the options they selected in the notes to the financial statements. Chaudry et al. (2015, 118) point out that it is not necessary to explicitly specify (in the notes to the financial statements) accounting policies regarding the situations for which only one accounting treatment is available, but that many companies routinely do so.

According to Busuioceanu (2013, 18), the information presented in financial statements „is reliable when it does not contain significant errors, is not biased and accurately represents the transactions and events". Financial reporting errors are the omissions and misstatements in financial statements resulting from non-use or misuse of the available information (Zlati, Antohi & Cardon, 2019, 1). From the aspect of the period of origin, they can be divided into (a) current period errors and (b) prior period errors. Current period errors should be corrected until financial statements' authorisation and they affect only the financial statements for the current period, while the prior period errors might affect comparative information, i.e., information regarding prior period(s).

Deegan & Ward (2013, 394) point out that corrections of prior period errors do not affect profit or loss in the current period (as the period in which the error is only detected) but affects profit or loss in the periods of the occurrence of errors. Namely, according to IAS 8 (paragraph 42) and the IFRS for SMEs (paragraph 10.21), in the case of detecting a material prior period error, an entity should perform retrospective restatement. In that regard, errors are considered as material if they could, individually or collectively, affect economic decisions made by the users of financial statements (Balaciu & Bogdan, 2008, 381). In addition, an entity should, among other things, disclose the nature of the prior period error and the amounts of the corrections of the financial statements positions affected by the error (IAS 8, paragraph 49; IFRS for SMEs, paragraph 10.23). Changes in accounting estimates are considered as

neither accounting errors nor changes in accounting policies, i.e., they do not cause retrospective restatements. According to IAS 8 (paragraphs 23 and 43) and the IFRS for SMEs (paragraphs 10.12 and 10.21), retrospective application of accounting policies and retrospective restatement in order to correct errors are performed to the extent that they are practicable. The research conducted by Callen, Livnat & Segal (2006) regarding restatements of financial statements over the period 1986-2001 reveals that reactions of investors to restatements caused by errors are generally negative. They point out that, among other things, restatements indicate problems in the accounting system of a company, which might be a consequence of broader operational and managerial problems. According to Ettredge, Li & Sun (2006), financial reporting errors are related to weaknesses in internal control. In that regard, the research of Doyle, Ge & McVay, S.E. (2007) reveals that material weaknesses in internal control are the most likely to be found in small, young, financially weak, and complex companies, as well as companies that grow rapidly or are in the process of restructuring.

In addition to changes in accounting policies and error-correcting, business combinations can cause restatements of financial statements. Namely, according to Grant Thornton (2018, 3-4), a common control business combination as the combination of entities controlled by the same party or parties can be accounted for by using the predecessor value method or the acquisition method. In the case of the predecessor value method, comparative information is restated as if the business combination had taken place at the beginning of the earliest comparative period.

In many (although not all) cases, restatements of assets and liabilities cause restatements of revenues and expenses that determine profit or loss and, therefore, retained earnings or accumulated loss as components (positions) of equity in the statement of financial position. In that regard, a comparison of original and comparative amounts of retained earnings and loss provides a solid basis for studying the importance of restatements in practice and, therefore, the impact of restatements on assessments and decisions made by the users of financial statements.

On the basis of the theoretical and regulatory background presented above, we formulated the next research questions:

What are the frequency and magnitude of restatements of retained earnings and loss in Serbia?

What are the main reasons for those restatements in Serbia?

METHODOLOGY

In order to answer the research questions, we used a sample of 500 randomly selected non-financial Serbian companies, both listed and unlisted, that use full IFRSs or the IFRS for SMEs. Data was collected from general purpose financial statements for 2015 and 2016 of the sample companies available at the official web-site of the Serbian Business Registry Agency. The structure of the sample from the aspect of the legal form of entities is presented in Table 1.

Table 1 Sample structure

Legal form	Frequency	Percent
Limited liability company	282	56.4
Stock company	164	32.8
Public utility company	53	10.6
Social enterprise	1	0.2
Total	500	100.0

Source: Authors' calculation

According to the official balance sheet template applicable for the sample companies in the period of analysis, equity is classified into the next positions: (I) share capital, (II) subscribed but unpaid capital, (III) treasury shares (negative position), (IV) reserves, (V) revaluation surplus on the revaluation of intangible assets, property, plant and equipment, (VI) unrealized gains on securities and other gains included in other comprehensive income, (VII) unrealized losses on securities and other losses included in other comprehensive income, (VIII) retained earnings, (IX) non-controlling interests, and (X) loss (negative position).

Of the mentioned positions, the focus of the analysis is on the amounts of retained earnings (VIII) and loss (X), i.e., their original amounts presented in the balance sheets related to the end of 2015 and comparative amounts presented in the balance sheet related to the end of 2016. As original and comparative amounts refer to the same moment (the end of 2015), differences between them reveal the effects of restatements. In this regard, it is important to note that financial statements for 2015 and 2016 were prepared in accordance with the unchanged framework for financial reporting – the same Accounting Law (adopted in 2013), the same bylaws arising from that law, and the same Serbian official translations of full IFRSs and IFRS for SMEs. Therefore, it is expected that changes in accounting policies of the sample companies made in 2016 are related to voluntary decisions and transition from the IFRS for SMEs to full IFRSs or vice versa. In general, a period of stability in the regulatory framework (such as 2016) is suitable for analysis of the effects of restatements in financial statements because the effects of factors beyond companies' control are minimized.

In order to clearly observe the effects of restatements, we rely on the net amount of retained earnings and loss (retained earnings minus loss) in further analysis. In the cases where the difference between original and comparative net retained earnings/loss exists, we study the notes to the financial statements in order to find out the reasons for restatements.

RESULTS AND DISCUSSION

In 45 (9%) sample companies comparative net retained earnings/loss is different from the original one, while in the rest 455 (91%) sample companies the mentioned net amounts are equal. Comparative net retained earnings/loss is higher than the original one in 13 companies, The situation is opposite in the rest of 32 companies, including four companies whose net comparative earnings/loss is only one thousand RSD (all of the financial statements amounts in the sample companies are expressed in thousands of RSD) lower than the original one. These differences can be explained by rounding errors, and therefore they are neglected in further analysis (i.e., comparative and original amounts are considered as equal in these cases). This means that 41 companies (8.2%) really restated retained earnings and/or loss. Since the effects of restatements of retained earnings and loss are predominantly negative, we conclude that the process of restatements more often results in deterioration of reported financial position and performance than in their improvement.

By reviewing the notes to the financial statements of the companies with a real difference between comparative amount of net retained earnings/loss and the original one (41 cases), we find that error correction is the main reason for differences. Namely, in 21 cases prior period errors are clearly stated as the reasons for restatements, or explanations in the notes indicate errors as reasons for restatements. In 5 cases restatements are caused by changes in accounting policies. In one case both errors and changes in accounting policies are causes of restatements. In one case restatements are caused by common control business combination. In 13 cases we cannot determine why comparative amounts of retained earnings and/or loss differ from their original amounts by reading the notes to the financial statements. One company states that it did not change its accounting policies in 2016, but we cannot identify whether

restatements are caused by error corrections or there is another reason. Some companies disclose changes in amounts of financial statements positions due to restatements but do not clearly specify the reason(s) for restatements.

On the basis of the review performed, we conclude that error correction is the main reason for restatements. In the cases where only accounting errors (but not changes in accounting policies) cause restatements (21 cases), comparative net retained earnings/loss is lower than the original one, while in 5 cases the situation is opposite. This means that errors more often make financial position and performance favourable than unfavourable (therefore, corrections of error have opposite effects).

In 4 cases (three related to error corrections and one related to changes in accounting policies) a positive amount of net retained earnings/loss transformed into negative amount after restatements. In other cases, the sign of the mentioned net amount is not changed (although the amount itself is higher or lower) after restatements.

Table 2 Tests of normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Original net retained earnings/loss	0.389	500	0.000	0.283	500	0.000
Comparative net retained earnings/loss	0.388	500	0.000	0.285	500	0.000

Source: Authors' calculation

Of the companies that restated their retained earnings and/or loss (41 companies), 18 (43.9%) are limited liability companies, 17 (41.5%) are stock companies, and 6 (14.6%) are public utility companies. This means that 6.4% of limited liability companies in the sample, 10.4% of stock companies in the sample, and 11.3% of public utility companies in the sample are involved in restatements. We conclude that stock companies and public utility companies are relatively more involved in restatements than limited liability companies.

Table 3 Wilcoxon Signed Ranks Test

	Comparative net retained earnings/loss – Original net retained earnings/loss
Z	-2.263
Asymp. Sig. (2-tailed)	0.024

Source: Authors' calculation

In order to find out whether the changes in net retained earnings/loss are statistically significant, i.e., whether restatements due to changes in accounting policies, error corrections, and other reasons are statistically significant, we perform Wilcoxon Signed Ranks test. The mentioned non-parametric test is chosen because previously performed tests of normality (Table 2) show that empirical distributions of both original net retained earnings/loss and comparative net retained earnings/loss do not approximate to normal and that therefore parametric tests are not suitable. The significance of Wilcoxon test is lower than 0.05 (Table 3), which means that there is a statistically significant difference between original net retained earnings/loss and the comparative one. Median net retained earnings/loss (Table 4) decreased from 68,163 thousand RSD before restatements (original) to 67,160 thousand RSD after restatements (comparative). According to Cohen criteria (Pallant, 2011, 233), the effect size is small (r = 0.101).

Table 4 Descriptive statistics

	N	Percentiles		
		25th	50th (Median)	75th
Original net retained earnings/loss	500	-32,440	68,163	356,802
Comparative net retained earnings/loss	500	-37,858	67,160	358,608

Source: Authors' calculation

CONCLUSIONS AND RECOMMENDATIONS

We find that the vast majority of companies in Serbia do not restate comparative amounts of retained earnings and loss in their statements of financial position. The restatements are more pronounced in stock companies and public utility companies than in limited liability companies. This finding can be explained by differences in accountability of the mentioned legal form of companies. Stock companies and public utility companies are generally more publicly accountable, and therefore more attention is paid to their accounting policies and detection and correction of accounting errors.

Regarding the companies that restate the mentioned amounts, we reveal three reasons for restatements: error corrections, changes in accounting policies, and common control business combination (in only one case), wherein error correction is the most dominant single type of causes of restatements. Error corrections decrease net earnings/loss in most cases. This means that equity and net income are more likely to be overstated than understated when an error is made. In addition, this means that there is room for improvement of internal control systems in not a small number of companies in order to prevent accounting errors or at least to detect and correct them before authorization of the current period financial statements with the ultimate goal of enhancing financial statements faithfulness. The research results imply that companies in Serbia rarely change their accounting policies voluntarily.

The difference between comparative amounts of net retained earnings/loss and original ones is statistically significant, but the effect size is very small. This means that, in general, restatements slightly change retained earnings and loss. Due to the fact that prior period accounting errors (i.e., those that are detected in the current period) are corrected when preparing the current period financial statements, comparative amounts are more reliable than the original ones. Therefore, in situations where both original and comparative amounts are available, it is better for financial statements analysts to rely on comparative amounts (as more reliable).

The empirical research indicates that the quality of disclosures regarding restatements in the notes to the financial statements in Serbia is not quite satisfactory. Some companies fail to disclose information (requested by the applicable standards) on the reasons and effects of restatements. Further research conducted in Serbia on a larger sample but also in surrounding and other countries can provide more specific evidence on the quality of disclosures on restatements and degree of compliance with the applicable standards. In addition, further research conducted in other countries, as well as research focused on additional financial statements positions, can provide a basis for more detailed evaluation of reasons and effects of restatements in Serbia. The most important limitation of the research stems from the fact that accounting errors are corrected if they are previously detected, if they are material, and if it is practical to correct them. Therefore, the evidence on frequency and effects of error corrections cannot provide a complete basis for conclusions on the frequency and effects of error making and therefore conclusions on faithfulness of originally presented financial statements.

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SITUATION APPROACH IN FOREIGN CURRENCY TRANSLATION

Jasmina Bogićević[*]
University of Kragujevac, Faculty of Economics, jasminab@kg.ac.rs

Biljana Jovković
University of Kragujevac, Faculty of Economics, bjovkovic@kg.ac.rs

Zlata Đurić
University of Kragujevac, Faculty of Economics, zdjuric@kg.ac.rs

Abstract: Intensive expansion of multinational companies and the number of their foreign subsidiaries has contributed to the growing importance of many issues connected with their raising international operations. These affiliates prepare set of financial statements in various currencies. In other to appropriate evaluate the multinational company's financial position and performance the financial statements of parent company and its foreign subsidiaries must be consolidated. However, it is not possible to consolidate financial statements denominated in different currencies. Therefore, it is necessary to restate the all foreign affiliates' financial statements in a single currency. The situational approach is a reliable basis for the restatement of their financial statements. It is not based on the subsidiary characteristics, but on the relationship between the parent company, on the one hand, and its affiliates, on the other hand. It affects the choice of method for translating foreign affiliates' financial statements, and thus impacts the financial position and performance of the multinational company. The main objective of this paper is to emphasize the role of situation approach in foreign currency translation process, considering above all, its implications on the liquidity and profitability of multinational companies. In other to identify the implication of situation approach to foreign subsidiaries financial statement restatement, it is necessary to consider the translation procedure separately in integrated foreign entity and self-sustaining foreign entity. Hence, the paper discusses the essence of situation approach, foreign currency financial statements translation in both integrated foreign entities and self-sustaining foreign entities.

Keywords: Situation approach, Foreign currency translation, Financial statements, Integrated foreign entities, Self-sustaining foreign entities.

Jel Classification: M41

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[*] Corresponding author

INTRODUCTION

Multinational companies (MNCs) establish affiliates in foreign countries in order to introduce new products and services, penetrate foreign markets, maximize long-term profitability and diversify business risk. These foreign affiliates can prepare financial statements in a variety of currencies. In other words, they can prepare a set of their financial statements in domestic national currency (local currency) or in foreign currency (parent company`s currency and the third currency).

Therefore, the financial statements of MNC members are presented in different currencies. It is not possible to consolidate their financial statements' contents denominated in various currencies. It is necessary to restate and express them in single currency.

This restatement procedure makes possible presentation of multinational company consolidated financial statements. It is also used for segment reporting, inflation accounting and foreign currency hedging. Foreign currency restatement process is used in the performance assessment of MNC as a whole, its foreign subsidiaries, and their managers. Different methods can be applied in the process of foreign subsidiaries' financial statements restatement.

The choice of the foreign subsidiary's financial statements restatement method is determined by the situational approach. The basis of the situational approach is the relationship between the parent company and its branches. In this regard, foreign entities can be divided into two groups. The first group refers to foreign entities that are relatively independent in relation to the parent company (self-sustaining entities). The second group represents foreign entities that are relatively dependent in relation to their parent company. The financial statements of the first category of foreign entities are translated using the current rate method (integrated foreign entities).

The financial statements of the second category of foreign entities are remeasured using the temporal method. The application of these methods has different effects on the amounts of individual items in the balance sheet and income statement. Hoyle, Schaefer and Doupnik (2017) point out that the application of different method can have a significant impact on consolidated financial statements. The reason for this is the application of different exchange rates (historical exchange rate, current exchange rate and averaged exchange rate) for the restatement of individual items in the financial statements. Therefore, it can be rightly said that the situation approach designs financial statements of multinational company.

Since the balance sheet of relatively independent subsidiaries is translated using the current rate method, the effect of this accounting procedure is presented within equity. In contrast, the balance sheet of relatively dependent foreign entities is remeasured by applying the temporal method, and the effect of this restatement process is incorporated into the income statement of a multinational company. Therefore, it can be concluded that the situation approach, as a rule, does not affect liquidity indicators, but affects some profitability indicators.

The objective of this paper is to explain the role of situation approach in foreign currency restatement process, and its implications on some financial performance of multinational companies. The research question is formulated as follows: Does the situation approach to foreign entities' financial statements restatement affect the liquidity and profitability of a multinational company? The paper consists of three parts. The first part describes the essence of the situation approach. The second section is devoted to the foreign currency financial statements translation of self-sustaining foreign entities. The third one describes the foreign currency financial statements remeasurement of integrated foreign entities.

THE ESSENCE OF SITUATION APPROACH

The situation approach affects the choice of restatement method for foreign subsidiaries' financial statements. This choice is based on the relationship between the parent company and its subsidiaries. Depending on this relationship, the current rate method and the temporal method can be used. The application of these methods has different effects on the amounts of individual items in the balance sheet and income statement.

The situation approach is based on the choice of a functional currency. Functional currency is the dominant currency used by the foreign subsidiary in its day-to-day operations (Moffett, Stonehill, Eliteman, 2009). It is very important to determine the appropriate functional currency (Domanovic, Bogicevic, 2016). The American Financial Accounting Standards Board (FASB) adopted the concept of a functional currency in 1981. In its Statement of Financial Accounting Standards No. 52 (SFAS 52), Foreign Currency Translation, the FASB (1981) lists several relevant criteria that should be considered both individually and in aggregate when choosing a functional currency. Those indicators are: cash flows, sales prices, sales markets, expenses, financing and intercompany transactions and arrangements. Although there are six factors on the list of criteria for selecting a functional currency, cash flows are considered to have the greatest impact. The functional currency selection is based on the mutual relations between the parent company and its foreign subsidiaries. In this regard, foreign entities can be divided into two groups. Hoyle, Schaefer and Doupnik (2017) point out that FASB created the concept of functional currency to determine wheather a specific foreign operation is integrated with its parent or self–contained and integrated with a local economy. Moffett, Stonehill, Eliteman (2009) point out that foreign subsidiary is characterized based on its degree of independence of the parent firm. The first group refers to foreign entities that are relatively independent in relation to the parent company (self-sustaining entities) and produce and sell mainly within the local boundaries, majority of their cash transaction of a business generally take place in a currency of the country in which they operate.

The second group represents foreign entities that are not relatively independent in relation to the parent company. These integrated entities as a rule sell products of parent company. In other words, their activities represent a direct continuation of the activities of the parent company. Regular activities of these foreign actors directly affect the cash flows of the parent company. In that case, the currency of the parent company, ie the parent currency represents their functional currency, and the temporal method is used for the purpose of recalculating the financial statements of these foreign subsidiaries. Their functional currency is different from the local currency. Regular activities of these foreign actors directly affect the cash flows of the parent company. In that case, the currency of the parent company, ie the parent currency represents their functional currency, and for the purposes of recalculating the financial statements of these foreign branches, the temporal method is used. Foreign entities operating in hyperinflationary economies exclusively use the perspective of the parent company and, accordingly, the currency of the parent company always represents their functional currency.

Most foreign entities use the local currency as their functional currency precisely because the largest number of money transactions takes place in the national currency of the country in which the foreign entity operates. In addition, the foreign entity has the largest number of sales markets in its country, and also uses local sources to finance its activities. The literature cites the example of Toyota Motor Corporation, which has more than 800 foreign subsidiaries and uses only local currency (Filomena, 2011). A foreign entity may also have multiple functional currencies. *De facto*, for every business activity abroad, a selective approach regarding the functional currency should be applied, which implies the

possibility of coexistence of a larger number of them. For example, a foreign entity may sell the products of the parent company and hence, the currency of the parent company (parent's currency) is the functional currency. However, production and sales can also be done locally, so the functional currency for these activities would be the local currency. Exon Mobil Oil applies both parent's currency and local currency. MNC *Coca Cola* uses 69 local currences (Filomena, 2011).

The selected functional currency must be used consistently. Consistent application of the chosen functional currency arises from the need to minimize or completely eliminate the ability of companies to manipulate financial statements (Bogićević, 2011). The functional currency of a foreign entity can be changed only if the initially defined criteria for its selection have changed significantly (Choi, Meek, 2008).

FOREIGN CURRENCY FINANCIAL STATEMENTS TRANSLATION OF SELF-SUSTEINING FOREIGN ENTITIES

Most foreign entities do their business in the local economic environment independent of their parent companies. As they are separate entities from their parent company, they are treated as self-sustaining affiliates. The functional currency of these entities is local currency. The local currency represents the foreign currency from the perspective of the parent company.

Table 1 Czech Subsidiary Balance sheet: Current rate method

Items	Czeck koruna (CZK)	Euros before CZK depreciation (0,038€=1CZK)	Euros after CZK depreciation (0,032€ =1CZK)
			Current rate method
	1	2	3
Cash	6.000	€228	€192
Accounts receivable	12.000	456	384
Inventories	18.000	684	576
Fixed assets	36.000	1.368	1.152
Short-term liabilities	18.000	684	576
Long-term debt	24,000	912	768
Stockholders' equity	30.000	1.140	1.140
Translation gain (loss) €			**(180)**
Equity	30.000	1.140	960

Source: Authors` calculation

The financial statements of this category of foreign entities are translated for the purpose of their consolidation. Self-sustaining entities use the current rate method for the translation of their financial statements. This method is the most applied in the world today. There are two key reasons for the popularity of this method: it is the simplest method and its effect does not pass through the income statement. In other words, translation losses/gains (translation adjustment) are not included in the calculation of consolidated net income (Moffett, Stonehill, Eliteman, 2009). The current rate method is the simplest option for the foreign affiliates' financial statements restatement. As a single current exchange rate is used to convert all assets and liabilities of foreign affiliates denominated in foreign currency, this method also occurs under the alternative name of the single rate method. The historical exchange rate is used only for the net assets translation. There is no generally accepted opinion on the income statement items translation when using this method. Thus, for example, the American SFAS 52

recommends the use of the exchange rate on the day of recognition of income and expenses, although it also allows the use of appropriate weighted average exchange rates for pragmatic reasons. In its original version, International Accounting Standard 21 The Effects of Changes in Foreign Exchange Rates (IAS 21) allowed the possibility of selective application of the current and weighted average rates for translating income statement items. However, after the revision of its initial version (1993), the exclusive application of the weighted average exchange rate was propagated.

In order to consider the effects of the application of the current rate method on liquidity and profitability, Tables 1 and 2 show the balance sheet and income statement of the hypothetical Czech subsidiary of Germany based MNC. In the illustrated example, it is assumed that inventories are kept at a lower market value, as well as that the linear depreciation rate of fixed assets is 10%.

In the first numerical column of the Czech subsidiary balance sheet the items are expressed in the local currency, ie in Czech crowns (CZK), and in the second column the amounts in euro are shown, at the exchange rate of 1 Czech koruna = 0,038 euro. If the CZK depreciates and, accordingly, the exchange rate is 1 CZK = 0,032 euro, items of balance sheet translated by using the current rate method is shown in the third numerical column. Translation loss of 180 euro led to a reduction in equity of MNC.

Table 2 Czech Subsidiary Income statement: Current rate method

Items	Czeck koruna (CZK)	Euros before CZK depreciation (0,038 € =1 CZK)	Euros after CZK depreciation (0,032€ =1 CZK) Current rate method
	1	2	3
Sales	80.000	€3.040	€2.560
Cost of goods sold	40.000	1.520	1.280
Depreciation costs	3.600	136,8	115,2
Other expenses	16.000	608	512
Income before tax	20.400	775,2	652,8
Income tax 15%	(3.060)	(116,3)	(97,9)
Translation gain (loss) €			Shown in Balance sheet
Net income (loss)	17.340	658, 9	554,9

Source: Authors` calculation

Based on the data presented in financial statements, Table 3 shows the impact of the current rate method on liquidity and profitability.

Table 3 Liquidity and profitability indicators: current rate method

Ratio indicators	Euros before CZK depreciation (0,038 €=1 CZK)	Euros after CZK depreciation (0,032€ =1 CZK)
Current ratio	2	2
Quick ratio	1	1
Operating profit margin	25,5%	25,5%
Return on sales	21,7%	21,7%
ROE	57,8%	57,8%
ROA	28,3%	28,3%

Source: Authors` calculation

It is evident that if the current rate method is used for foreign subsidiary's financial statement translation, after the depreciation of the local currency compare to the parent currency, profitability indicators (ROA

and ROE) as well as liquidity ratio indicators do not change after the exchange rate fluctuations. It could be explained by the fact that all relevant items are translated using the same exchange rate (current exchange rate).

FOREIGN CURRENCY FINANCIAL STATEMENTS
TRANSLATION OF INTEGRATED ENTITIES

Integrated foreign operations depend on the parent company and sell its products. Their operation represents a direct extension of the parent company`s operation. Hence, their regular activities directly affect the parent company`s cash flows. The functional currency of this entity group is the currency of the parent company (parent currency). The temporal method is used to remeasure their financial statements.

According to the temporal method, monetary items, such as cash, receivables and liabilities (short-term and long-term), are remeasured at the current exchange rate. Exchange rates reflecting their original measurement bases are used to restate non-monetary items. Accordingly, assets presented in the financial statements in foreign currency at historical cost are translated at historical exchange rates. Similarly, non-monetary items recognized in the balance sheet of a foreign subsidiary at current market values are translated using the current exchange rate.

Table 4 Czech Subsidiary Balance sheet: temporal method

Items	Czeck koruna (CZK)	Euros before CZK depreciation (0,038€ = CZK)	Euros after CZK depreciation (0,032€ =1CZK) Temporal method
	1	2	3
Cash	6.000	€228	€192
Accounts receivable	12.000	456	384
Inventories	18.000	684	576
Fixed assets	36.000	1.368	1.368
Short-term liabilities	18.000	684	576
Long-term debt	24,000	912	768
Stockholders' equity	30.000	1.140	1.140
Translation gain (loss) EUR			Shown in Income statement
Equity	30.000	1.140	1.140

Source: Authors` calculation

Table 5 Czech Subsidiary Income statement: temporal method

Items	Czeck koruna(CZK)	Euros before CZK depreciation (0,038€ =1 CZK)	Euros after CZK depreciation (0,032 €=1 CZK) Temporal method
	1	2	3
Sales	80.000	€3.040	€2.560
Cost of goods sold	40.000	1.520	1.520
Depreciation costs	3.600	136,8	136,8
Other expenses	16.000	608	512
Income before tax	20.400	775,2	391,2
Income tax 15%	(3.060)	(116,28)	(97,92)
Translation gain (loss)			36
Net income (loss)	17.340	658, 92	329,28

Source: Authors` calculation

It is evident that the translation gain does not affect the equity. According to the temporal method, this translation gain is incorporated into the Income Statement, *ie*. it affects the result (see Table 5).

The impact of the temporal method on integrated foreign entity liquidity and profitability is shown in Table 6.

Table 6 Liquidity and profitability indicators: Temporal method

Ratio indicators	Before CZK depreciation (0,038€ =1 CZK)	Euros after CZK depreciation (0,032 € =1 CZK) Temporal method
Current ratio	2	2
Quick ratio	1	1
Operating profit margin	25,5%	15,3%
Return on sales	18,7%	12,9%
ROE	57,8%	28,9%
ROA	28,3%	15,5%

Source: Authors` calculation

It can be concluded that the change in the exchange rate does not affect liquidity indicators, but affects all indicators of profitability of foreign integrated entity.

CONCLUSION

Growing the MNC activities at the global level has increasingly accentuated the importance of situation approach in foreign currency translation. Situation approach determines the selection of foreign entities` financial statements restatement method. It also determines the functional currency of foreign entity. The functional currency represents the key postulate of situation approach.

Local currency (foreign currency from the perspective of parent company) is the functional currency of self-sustaining entities. The current rate method is used for the translation of self-sustaining foreign entities' financial statements. The effect of their balance sheet translation is presented in MNC`s Consolidated balance sheet. It influences the level of Equity. The liquidity ratios and profitability ratios are the same before and after the translation process of these financial statements.

Functional currency of integrated entities is parent currency. Their financial statements are remeasured using temporal method. The effect of their balance sheet remeasurement is presented in MNC`s Consolidated income statement and it affects the result.

Higher recalculated amounts of operating profit and net profit using the current rate method offer significantly better profitability indicators compared to these indicators determined on the basis of the temporal method.

Presenting the effects of the foreign entity`s balance sheet restatement within the Equity or as a determinant of net income in MNCs` Consolidated financial statements undoubtedly causes differences between the profitability indicators when these two methods are applied. Namely, the determined different amounts of operating result and net result when different methods are applied, despite the unchanged amount of Sales, cause differences in partial profitability indicators. Different amounts of operating result and net result, equity and total assets, when these two methods are applied, lead to different global profitability indicators. Liquidity ratios are identical for both methods.

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THE IMPACT OF OTHER COMPREHENSIVE INCOME ON THE RELATIONSHIP BETWEEN NET INCOME AND COMPREHENSIVE INCOME

Nemanja Karapavlović*
University of Kragujevac, Faculty of Economics, nkarapavlovic@kg.ac.rs

Vladimir Obradović
University of Kragujevac, Faculty of Economics, vobradovic@kg.ac.rs

Abstract: *Comprehensive income is the change in owners' equity during a reporting period from transactions and other events, other than those changes resulting from transactions with owners in their capacity as owners. Comprehensive income is also a sum of net income (profit or loss), i.e., net income after deducting income tax, and net other comprehensive income, i.e., other comprehensive income after tax on other comprehensive income. Net other comprehensive income reflects the changes in owners' equity during a reporting period arising from transactions other than contributions by and distributions to owners that are directly included in owners' equity and that are not recognised in net income (profit or loss). Those are some gains and losses arising from changes in current value of assets and liabilities. The aim of the paper is to examine whether comprehensive income is significantly different than net income (profit or loss) as a consequence of adding the components of net other comprehensive income to net income. We also examine whether there is a significant difference between (1) the return on assets calculated by using net income and the return on assets calculated by using net comprehensive income as numerator and (2) the return on equity calculated by using net income and the return on equity calculated by using net comprehensive income as numerator.*

Keywords: *net other comprehensive income, net income, net comprehensive income, IFRS, ROA, ROE*

JEL Classification: *M41*

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* Corresponding author

INTRODUCTION

According to International Accounting Standard (IAS) 1 – *Presentation of Financial Statements*, comprehensive income (CI) is defined as "the change in equity during a period resulting from transactions and other events, other than those changes resulting from transactions with owners in their capacity as owners" (International Accounting Standards Board (IASB), 2018, paragraph 7). CI is a sum of net income (NI), i.e., profit or loss, and other comprehensive income (OCI). Net comprehensive income (NCI), i.e., CI in net amount (after taxation), is a sum of (1) NI (profit or loss), reflecting the amount after deducting income tax, and (2) net other comprehensive income (NOCI), i.e., OCI after tax on OCI (Obradović & Karapavlović, 2017, 117). NCI of a period is equal to NI of a period if a reporting entity has no component of OCI over that period.

NI (profit or loss) is the total of income less expenses, excluding the components of OCI. As a main component of CI and primary indicator of a company's financial performance (Detzen, 2016, 760) NI shows "the amount of value added in a business cycle beginning with the procurement of production factors and ending with sale of products to customers. This value added (income) is the basis for assessing performance of management in the realisation of the business plan" (Škarić-Jovanović, 2010, 106). OCI comprises items of income and expenses that are not recognised in NI (profit or loss) as required or permitted by International Financial Reporting Standards (IFRSs) (IASB, 2018, paragraph 7). The abovementioned definition of CI is based on equity as the element of the statement of financial position, while the concept of CI is based on the premise that recognition and measurement of assets and liabilities are the key financial reporting issues (Walton, 2011, 20).

The objective of this paper is to examine whether adding NOCI to NI makes NCI substantially different from NI. We also examine whether there is a significant difference between (1) the return on assets (ROA) calculated by using NI and the ROA calculated by using NCI as numerator and (2) the return on equity (ROE) calculated by using NI and the ROE calculated by using NCI as numerator. We formulated the research hypotheses as follows:

H₁: Components of NOCI make NCI significantly different from NI.

H₂: There is a statistically significant difference between the ROA computed by using NI as numerator and the ROA computed by using NCI as numerator.

H₃: There is a statistically significant difference between the ROE computed by using NI as numerator and the ROE computed by using NCI as numerator.

LITERATURE REVIEW

CI is different from NI by amounts of some items that are included in NI but are not encompassed by the process of determination of NI. Generally, all of an entity's income and expenses for a reporting period should be taken into account when calculating NI (profit or loss) for that period. However, some items of income and expenses arising from changes in the current values of assets and liabilities should be excluded from the calculation of NI (profit or loss) if this would provide more relevant or more faithful information.

Such items are presented as components of OCI (Melville, 2019, 29). Škarić-Jovanović (2012, 30-31) points out that presentation of OCI has three objectives. The first is consistency in presentation of income and expenses. This aim is explained by the fact that components of OCI affect equity but are not consequences of transactions with owners, and in that sense are in line with definitions of income and expenses prescribed in the Conceptual Framework for Financial Reporting. The second objective of OCI

presenting is to enable users of financial statements to assess relevance of those statements and to understand how components of OCI may affect future NI (profit or loss). In that regard, different components of OCI will have different importance for different users of financial statements. The convergence between IFRSs and US Generally Accepted Accounting Principles (GAAP) is the third objective of OCI presenting. In essence, components of OCI include non-realized value changes of assets and liabilities, i.e., those value changes that still have not been confirmed by transactions with third parties (Stojilković & Spasić, 2002, 15). Those assets and liabilites are not held because of expected value changes. However, value changes are possible and should have been adequately treated in accounting. Components of OCI resulted from factors normally viewed as beyond the control of management (for example, changes in market prices of owner-occupied properties and plant and equipment). Therefore, NI is considered as measure of management's performance, while NCI is considered as a measure of company's performance (Young & Cohen, 2013, 399). According to IAS 1, the components of OCI are (IASB, 2018, paragraph 7):

- changes in revaluation surplus,
- remeasurements of defined benefit plans,
- gains and losses arising from translating the financial statements of foreign operation,
- gains and losses from investments in equity instruments designated at fair value through OCI,
- gains and losses on financial assets measured at fair value through OCI,
- the effective portion of gains and losses on hedging instruments in a cash flow hedge and the gains and losses on hedging instruments that hedge investments in equity instruments measured at fair value through OCI,
- for particular liabilities designated as at fair value through profit or loss, the amount of the change in fair value that is attributable to changes in the liability's credit risk,
- changes in the value of the time value of option when separating the intrinsic value and time value of an option contract and designating as the hedging instrument only the changes in the intrinsic value,
- changes in the value of the forward elements of forward contracts,
- insurance finance income and expenses from contracts issued within the scope of IFRS 17 Insurance Contracts excluded from profit or loss, and
- finance income and expenses from reinsurance contracts held excluded from profit or loss.

The components of OCI can be divided into (a) the components that can be subsequently, i.e., in future periods, reclassified to the profit or loss, i.e., included in NI, and (b) the components that cannot be subsequently included in NI. Individual financial reporting standards specify whether and when the amounts previously recognized in OCI should be reclassified to profit or loss (i.e., whether and when reclassification adjustments should be performed). According to IAS 1, an entity should disclose reclassification adjustments relating to components of OCI in the period of reclassification to profit or loss, in order to provide financial statements users with the information necessary to assess the effects of such reclassifications on profit or loss (Deegan & Ward, 2013, 387).

The research conducted on the sample of 90 companies from the USA (Ketz, 1999, 79-96) reveals that the average values of NI and NCI are not significantly different. Kreuze & Newell (1999, 53) find that, in the majority of 100 randomly selected companies from the Fortune 500 list, CI and NI are not significantly different. Ngmenipuo (2015) and Păşcan (2014) reveal that the earnings per share (EPS) computed on the basis of NI and the EPS computed on the basis of CI are not significantly different. However, Mahmood & Mahmood (2019) on the sample of 100 companies of different business activities in the USA find that, on average, NI and NCI are significantly different in most companies, as well as that most companies have a negative OCI. Lapková & Stašová (2014)

examined, among other things, whether ROA calculated by usage of NI as numerator is different in relation to ROA calculated by adding the items of OCI that can be reclassified into profit or loss to NI as numerator. According to the same principle, the influence on ROE was examined. They find that the items of OCI that can be reclassified into profit or loss have an influence on these two profitability indicators only in the case of financial institutions, but not in the case of non-financial companies. The studies focused on the companies in non-financial sector in the Republic of Serbia (RS) (Obradović & Karapavlović, 2015; Obradović & Karapavlović, 2017) reveal that difference between NI and NCI is not statistically sigificant, whereas Obradović & Karapavlović (2017) also find that there is no statistically significant difference between the ROE calculated by using NI as numerator and ROE calculated by using NCI as numerator.

RESEARCH SAMPLE AND METHODOLOGY

Our sample initially comprised 500 randomly selected Serbian non-financial companies of different size, legal form, and prevailing activity. The research is based on individual financial statements available at the official website of the Serbian Business Registers Agency and relies on hand-collected data from Income Statements and Statements of Other Comprehensive Income of each company included in the sample for the period 2014 to 2016, and Statements of Financial Position of each company included in the sample on 31 December 2014, 2015, and 2016. In the process of sample selection, we identified some financial statements with an adverse opinion or with a disclaimer of opinion, and we excluded companies with such financial statements from our sample. This is the reason why the number of companies in the sample varies during the observed period. The structure of final sample is shown in Table 1.

Table 1 Sample structure

	2014		2015		2016	
	Number of companies	%	Number of companies	%	Number of companies	%
SIZE						
Micro	33	6.83	34	7.10	34	7.13
Small	153	31.68	151	31.52	147	30.82
Medium-sized	193	39.96	190	39.67	191	40.04
Large	104	21.53	104	21.71	105	22.01
Total:	483	100.00	479	100.00	477	100.00
LEGAL FORM						
Limited liability company	275	56.94	275	57.41	275	57.65
Stock company	156	32.30	153	31.94	151	31.66
Public utility company	51	10.56	50	10.44	50	10.48
Social enterprise	1	0.21	1	0.21	1	0.21
Total:	483	100.00	479	100.00	477	100.00
PREVAILING ACTIVITY						
Production	228	47.20	225	46.97	226	47.38
Trade	88	18.22	88	18.37	88	18.45
Service	164	33.95	163	34.03	160	33.54
Holding company	3	0.62	3	0.63	3	0.63
Total:	483	100.00	479	100.00	477	100.00

Source: Authors' calculation

RESEARCH RESULTS

The analysis reveals that the changes in revaluation surplus, actuarial gains or losses on defined employee benefit plans and gains or losses on financial instruments available for sale are the most frequent components of OCI in the observed companies in all the three observed years. On (three-year) average, these components can be found in the Statement of Other Comprehensive Income of 26.1%, 12.40% and 11.80% companies, respectively. The presence of the rest OCI components is negligible, or they do not exist in the sample companies. The observed companies have 0.44 components of OCI on average, and none of the companies has more than three components. On average, 31.20% of companies have at least one OCI component. In the case of 7% companies, there is the position of tax on OCI, while the remaining companies do not have that position, which means that their gross OCI and NOCI are equal. In the case of close by 65% companies, there are no components of OCI, which means that their NCI is equal to NI.

Table 2 Results of Paired Samples Test for NI and NCI

	2014	2015	2016
	TOTAL SAMPLE		
t	-1.026	-0.578	-1.163
df	482	478	476
p	0.306	0.564	0.245
eta square	0.002	0.000	0.002
	COMPANIES THAT HAVE OCI		
t	-1.026	-0.581	-1.164
df	162	148	154
p	0.307	0.562	0.246
eta square	0.006	0.002	0.009

Source: Authors' calculation

As the significance of Paired Samples Test is higher than 0.05 (Table 2) in all three years, we conclude that there was no statistically significant difference between NCI and NI at the sample level. The measure of effect size (eta square) denotes a small difference between NCI and NI according to the Cohen's criteria (Pallant, 2011). If we only observe companies with at least one component of OCI, the conslusion stays the same, because the significance of Paired Samples Test is also higher than 0.05.

Table 3 Results of Paired Samples Test for ROA_{NI} and ROA_{NCI}

	2014	2015	2016
	TOTAL SAMPLE		
t	-2.393	-2.002	-0.609
df	482	478	476
p	0.017	0.046	0.543
eta square	0.012	0.008	0.001
	COMPANIES THAT HAVE OCI		
t	-2.416	-2.021	-0.608
df	162	148	154
p	0.017	0.045	0.544
eta square	0.035	0.027	0.002

Source: Authors' calculation

In order to test the second research hypothesis, two indicators of ROA are computed for each sample company – ROA_{NI} (computed by dividing NI with average total assets) and ROA_{NCI} (computed by dividing NCI with average total assets).

The results of Paired Samples Test for ROA_{NI} and ROA_{NCI} presented in Table 3 show that in 2014 and 2015 there was statistically significant difference between ROA_{NI} and ROA_{NCI} at the sample level and also in the case of companies that have at least one component of OCI. The measure of effect size denotes a small difference between those two indicators. In 2016 there was no statistically significant difference between ROA_{NI} and ROA_{NCI}.

In order to test the third research hypothesis, two indicators of ROE are computed for each sample company – ROE_{NI} (computed by dividing NI with average owners' equity) and ROE_{NCI} (computed by dividing NCI with average owners' equity). Companies whose liabilities are higher than its assets at the end of 2014, 2015 and 2016 are excluded from the analysis because it is imposible to determine their ROE. There was statistically significant difference between ROE_{NI} and ROE_{NCI} only in 2014 at the sample level and also in the case of companies that have at least one OCI component (see Table 4). That difference iz small at the sample level, whereas in the case of companies that have at least one OCI component that difference is close by moderate. In 2015 and 2016 there was no statistically significant difference between ROE_{NI} and ROE_{NCI}.

Table 4 Results of Paired Samples Test for ROE_{NI} and ROE_{NCI}

	2014	2015	2016
TOTAL SAMPLE			
t	-2.834	-1.261	1.034
df	446	443	438
p	0.005	0.208	0.302
eta square	0.018	0.004	0.002
COMPANIES THAT HAVE OCI			
t	-2.878	-1.272	1.034
df	152	139	142
p	0.005	0.205	0.303
eta square	0.052	0.012	0.007

Source: Authors' calculation

CONCLUSIONS

We have analyzed practice of financial reporting on CI of Serbian non-financial companies in order to examine whether adding NOCI to NI makes NCI substantially different from NI. About 65% of companies in the sample do not have any component of NOCI, which means that NI and NCI of those companies are equal. The most frequent components of OCI in the observed companies are the changes in revaluation surplus, actuarial gains or losses on defined employee benefit plans and gains or losses on financial instruments available for sale. We have found that there is no statistically significant difference between NI and NCI. It means that, in generally, components of NOCI do not make NCI substantially different from NI. In this regard, we should reject the first hypothesis. However, in some individual cases, NCI is very different from NI. Therefore, these two kinds of income should be considered together in analysing financial statements of companies. We have also found that there is a statistically significant difference between the ROA computed by using NI as numerator and the ROA computed by using NCI as numerator in 2014 and 2015, whereas there is no such a difference in 2016. It means that the second

hypothesis can be partially accepted. In other words, we do not have enough empirical support to conclude that the difference between two types of ROA is constantly presented over time. The third hypothesis can also be partially accepted, because we have found that there is statistically significant difference between ROE computed by using NI as numerator and ROE computed by using NCI as numerator only in 2014. In 2015 and 2016 there was no statisticaly significant difference between two previously mentioned profitability indicators.

The fact that we have analyzed companies from only one country is the main limitation of this paper. In that regard, a more detailed comparison between developing countries (such as RS) and developed countries should be performed in further research. The second limitation of this paper is the fact that financial statements of some companies (about 13% of companies in our sample) were not subject of external audit.

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TRACKING TAX HAVEN OWNERSHIP IN SERBIA

Stefan Vržina

University of Kragujevac, Faculty of Economics, Kragujevac, stefan.vrzina@kg.ac.rs

Abstract: Foreign investors play an important part in the transition and post-transition economies. They are often headquartered in developed countries with high tax burden and high regulatory requirements. Therefore, they conduct their investments in host countries through the entities in tax havens. A presence in the tax havens enables foreign investors to move their funds from a host country to tax havens, thus registering the important portion of their profit in the low-tax jurisdictions and paying less world-wide corporate tax. Moving profit to such jurisdictions is known as profit shifting. This paper analyzes ownership structure of companies in Serbia by searching for tax haven entities in their ownership structures. Contrary to the traditional approach that treats each tax haven in the same manner, the paper follows a modern approach that divides tax havens into two groups: sink and conduit tax havens. A list of CORPNET Research Group is used with 24 sink and five conduit tax havens. Research results suggest that a significant part of foreign direct investments in Serbia has been routed through the tax havens, in particular the Netherlands, Cyprus and Switzerland. In addition, research shows that many Serbian individuals also tend to organize their domestic investments through the tax havens. Research results may be of interest to many interest groups, in particular to auditors and national tax authorities.

Keywords: foreign direct investments, tax havens, ownership structure, profit shifting, transfer pricing.

JEL Classification: G32, H26, M41.

INTRODUCTION

The importance of tax havens for modern companies is unquestionable. At least 30% of world-wide foreign direct investments (FDI) stock is intermediated through tax havens, with tax haven FDI links being particularly strong between colonial powers and their current and former colonies (Haberly & Wojcik, 2015). In particular, tax havens enable multinational companies (MNCs) to avoid world-wide corporate tax liabilities (Dharmapala, 2008).

Since tax havens enable tax avoidance, they erode tax revenues of non-tax haven countries. Therefore, tax havens are under increasing global scrutiny in recent years (Dharmapala, 2008; Richardson et al., 2020). One of the starting points for understanding the FDIs through tax havens is to analyze the ownership structure of companies in order to understand the importance and origin of tax haven entities. In addition, better understanding of FDIs through tax havens is important as they may alter the accuracy of macroeconomic estimations of FDI volumes (Sutherland & Anderson, 2015).

Aim of the paper is to examine the extent to which Serbian companies are owned by tax haven entities. More specifically, the paper is aimed at examining the extent to which MNCs use tax havens to organize investments in Serbia and at the extent to which Serbian individuals use tax havens when investing in Serbia. The paper contributes to the relevant literature in three ways. First, a modern approach in analysis of tax havens is employed, dividing them on sink tax havens and conduit tax havens. Second, contrary to the traditional approach that considers tax havens as tropical and remote islands, the importance of tax havens within the European Union (EU) is emphasized. Third, prior research on tax haven ownership in companies in Serbia and neighboring countries is relatively scarce.

I believe that research results may be of interest to many interest groups. Auditors may benefit from the research results, particularly regarding transfer pricing auditing.

National tax authorities may be interested in research results as the presence of tax haven entities in ownership structure may be an indication of profit shifting. Research results may also be useful in accounting ethics discussions as tax haven operations are, in particular, available only to large companies and MNCs.

Rest of the paper is structured as follows. Second section of the paper gives an overview of the academic literature on tax havens and presence of tax haven entities in ownership structure of companies. Third section describes context analysis, sample development and research methodology. Fourth section presents research results, while fifth section of the paper concludes.

LITERATURE REVIEW

Tax haven entities are highly popular among modern companies. In particular, operations in tax havens are primarily used by multinational corporations (MNCs). Motives for the existence of tax haven entity in the company ownership structure should be primarily found in tax avoidance opportunities, assuming that companies with tax haven entities in their ownership structures are more likely to shift profits to tax havens (Fuest & Riedel, 2012).

However, tax avoidance should not be considered as the only motive, as companies may also tend to organize tax haven ownership in order to ensure anonymity of their owners (Istok & Kanderova, 2019).

Figure 1 presents the basic modalities in which a company may be connected with tax haven entities. Afrasinei et al. (2016) state that the company may be connected with related-party tax haven entities in three ways, as company may:

- be owned by tax haven entity (tax haven company A);
- have subsidiary in tax haven (tax haven company B) and
- have other related party in tax haven (tax haven company C).
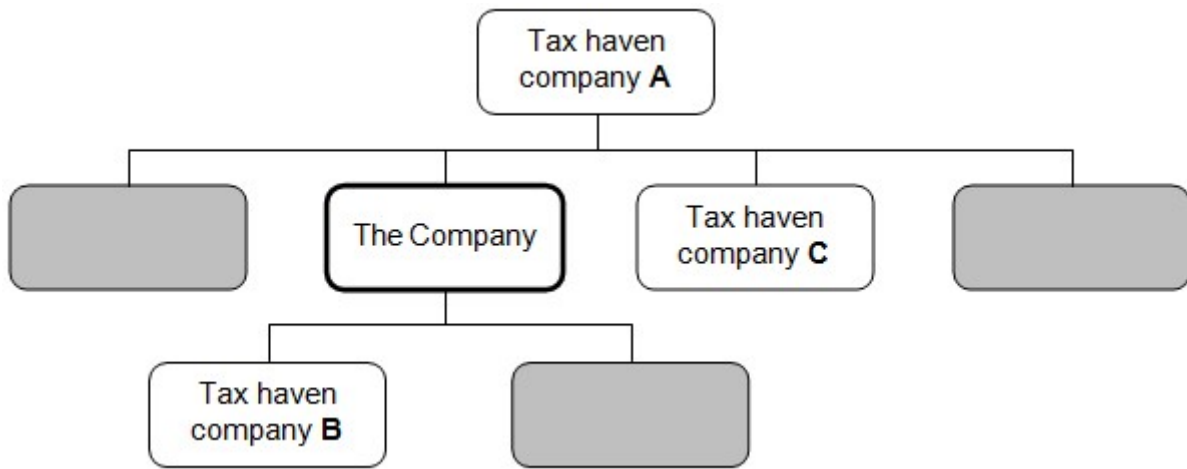
Figure 1 Modalities of tax haven connections of the company

Source: Author.

Traditional approach to the tax haven analysis treats each tax haven in the same manner. However, in the last ten years the importance of distinction between sink and conduit tax havens is emphasized . Sink tax havens are considered as the final destinations for shifted profit, while conduit tax havens are considered only as an intermediary in the profit shifting to sink tax havens.

Table 1 List of the largest sink and conduit tax havens

Panel A. Sink tax havens	
Anguilla	Liberia
Bahamas	Liechtenstein
Belize	Luxembourg
Bermuda	Malta
British Virgin Islands	Marshall Islands
Cayman Islands	Mauritius
Curacao	Monaco
Cyprus	Nauru
Gibraltar	Saint Vincent and Grenadines
Guyana	Samoa
Hong Kong	Seychelles
Jersey	Taiwan
Panel B. Conduit tax havens	
Netherlands	Switzerland
Republic of Ireland	United Kingdom
Singapore	

Source: Garcia-Bernardo et al. (2017).

As a result of CORPNET Research Group efforts, Garcia-Bernardo et al. (2017) study the largest tax havens in the world and indentify 24 sink and five conduit tax havens. Their list of tax havens is presented in Table 1. In particular, it is important to note that as much as five EU members are listed as tax havens – three (Cyprus, Luxembourg and Malta) as sink tax havens and two (Republic of Ireland

and the Netherlands) as conduit tax havens. Furtherly, United Kingdom, as a former EU member, is also listed as the conduit tax haven.

Many of listed sink and conduit tax havens have a large network of double taxation treaties signed with other countries. MNCs tend to organize their foreign investments in these tax havens in order to avoid withholding tax payments on the basis of double taxation treaty provisions. Some research (Neumayer, 2007; Barthel et al., 2010) find that countries with larger network of signed double tax treaties are able to attract larger volume of FDIs.

Many authors analyze tax haven ownership of companies. In particular, a significant portion of this research specifically addresses transition and post-transition European countries, since tax morale in many of these countries is relatively low (Torgler, 2003). For instance, Istok & Kanderova (2019) show that number of Slovak companies with tax haven ownership connections continuously increases.

Pelto et al. (2004) argue that the FDIs from Cyprus to Eastern European countries is relatively large, with significant share of Cypriot investments are considered to be of Russian origin. Bitzenis (2004) stresses that Cyprus and Luxembourg are at the top of the table of FDI inflows in Bulgaria. Furtherly, he finds that an important share of such inflows addresses investments by Greek MNCs. Kokko & Kravtsova (2012) find considerable FDI inflows to Ukraine from Cyprus and Virgin Islands. In addition, many of inflows are investments of Ukrainian citizens that tend to organize their domestic investments through the tax havens.

Deichmann (2013) points to the Netherlands as the highly important investor in Croatia. In addition, many United States companies organize their investments in Croatia through the Dutch entities. Afrasinei et al. (2016) stress that many listed Romanian companies have tax haven entities in their ownership structures, mainly incorporated in Cyprus, the Netherlands and Luxembourg, but also in British Virgin Islands, Cayman Islands, Belize and Switzerland. Vržina (2017) finds that many Serbian companies are directly and majority owned by tax haven entities primarily incorporated in the Netherlands and Cyprus.

CONTEXT ANALYSIS AND DATA

Serbia is country with large network of bilateral double taxation treaties, including many sink and conduit tax havens appearing on the list of Garcia-Bernardo et al. (2017). In addition, Serbia has favorable rules regarding deductibility of related-party expenses in tax balance. If calculated in accordance with Organization for Economic Co-operation and Development (OECD) Transfer Pricing Guidelines, such expenses are, in general, fully deductible in tax balance. Hence, the only limitation regards related-party interest deductibility as such interest is deductible in the tax balance up to the amount of four times the amount of shareholders' equity.

From 1 January, 2013, the statutory corporate tax rate in Serbia is set at 15%. In the world-wide context, such tax rate may be treated as relatively low. In addition, companies may benefit from the extensive list of tax incentives provided by the Serbian government and report effective corporate tax rate significantly lower than the statutory tax rate. Vržina & Janković (2019) argue that many companies in Serbia, including subsidiaries of MNCs, are able to even report null effective corporate tax rate.

On the other hand, transition and post-transition countries are known to have relatively low statutory corporate tax rates. This may discourage profit shifting from such countries to tax havens. On the contrary, this may encourage profit shifting from high-tax countries to transition and post-transition countries (Gravelle, 2009; Lazar, 2014) as companies may perceive these low-tax countries as substitutes for traditional tax havens. In order to detect the tax haven entities in the ownership structure of Serbian

companies, a sample of hundred largest companies in Serbia is developed, based on their operating revenue in 2018. Although these companies account for only less than 0.1% of the total number of companies in Serbia, they have reported as much as 30.3% of the operating revenue of all Serbian companies in 2018 (Agencija za privredne registre, 2020).

Regarding geographical structure of the sample, most of the companies (52) are headquartered in Belgrade region, followed by 28 companies headquartered in Vojvodina region. With only 14 and six companies, Šumadija and Western Serbia region and South and Eastern Serbia region, respectively, have been the least represented in the sample. As of 1 July, 2020, most of the sampled companies (72) operated as limited liability companies, followed by 20 joint stock companies. In addition, there are seven public enterprises and one branch of foreign company.

The data on the ownership structure of the sampled companies is collected from the official business registers. For joint stock companies the data is collected from Central Securities Depository and Clearing House of the Republic of Serbia (2020), while for other sampled companies the data is collected from Serbian Business Register Agency (2020).

The following five modalities of tax haven ownership is analyzed in the paper:

- full direct tax haven ownership (where a company is 100% owned by tax haven entity);
- full indirect tax haven ownership (where a company is 100% owned by non-tax haven entity, which in turn is fully owned by tax haven entity);
- partial direct tax haven ownership (where a company is less than 100% owned by tax haven entity);
- partial indirect tax haven ownership (where a company is owned by non-tax haven entity, which in turn is owned by tax haven entity, with at least one of these ownerships being less than 100%) and
- combined tax haven ownership (a combination of partial direct and partial indirect tax haven ownership).

I have looked for tax haven entities with substantial share of the ownership, with at least 5% of the ownership rights, as it is believed that substantial owners may influence the behavior of the company in terms of related-party transactions and profit shifting. Therefore, this paper significantly differs from previous research on the tax haven ownership structure of Serbian companies (Vržina, 2017), as previous research considers only direct tax haven ownership, looking for tax haven entities with more than 50% of the ownership rights. The analysis of ownership structures has been conducted on 1 July, 2020.

Although there are different lists of tax havens, there is used the list of tax havens developed by CORPNET Research Group and presented in Garcia-Bernardo et al. (2017). Therefore, there is used a list of sink and conduit tax havens presented in Table 1. Such modern approach to tax haven analysis may be useful to better understand the ways in which Serbian companies organize their tax haven operations as well as the importance of EU tax havens for Serbian companies.

RESEARCH RESULTS

Out of the hundred sampled companies, there are 32 companies in which tax haven ownership is not possible as:

- seven companies are public enterprises;
- four companies are fully domestically state-owned;

- three companies are at least 50% domestically state-owned, but there is no other substantial owner in the ownership structure and
- eighteen companies are fully owned by individuals, citizens of Serbia.

It is interesting that each of the remaining 68 companies in the sample have foreign entity as a substantial owner in the ownership structure. In this regard, 35 companies have substantial owner(s) headquartered in tax havens, while 33 companies have substantial owner(s) headquartered in non-tax havens.

Table 2 presents geographical distribution of tax haven entities found in ownership structures of Serbian companies. As much as 16 companies have substantial owner headquartered in the Netherlands. In fact, the Netherlands are the highly important source of inward FDIs to the Serbia (Bitzenis & Žugić, 2016). This finding confirms that the Netherlands are one of the leading countries for routing investments throughout the Europe (Nakamoto et al., 2019). In addition, an important share of FDIs has been conducted through Cypriot and Swiss entities.

It is interesting to note that investors prefer conduit over sink tax havens to organize investments in Serbia. In fact, as much as 23 companies had substantial owner incorporated in conduit tax havens, contrary to only nine companies having substantial owner from the sink tax havens. In addition, three companies have substantial owners from both sink and conduit tax havens.

Five sampled companies have at least two substantial owners from different tax havens in their ownership structure. Three companies have Dutch, Swiss and Cypriot entities in their ownership structure. Furtherly, these three companies all belong to the same business group. Two companies have Dutch and Swiss entities in their ownership structures. In addition, only one sampled company has tax haven substantial owner outside the Europe.

Table 2 Headquarters of tax haven substantial owners in sampled companies

Country	Companies	Country	Companies
Panel A. Sink tax havens			
Cyprus	5	Liechtenstein	1
Hong Kong	1	Luxembourg	2
Panel B. Conduit tax havens			
Netherlands	16	Netherlands and Switzerland	2
Switzerland	4	United Kingdom	1
Panel C. Both sink and conduit tax havens			
Netherlands, Switzerland and Cyprus	3		

Source: Author

Results presented in Table 2 confirm the importance of tax havens within the EU. As much as 28 sampled companies have at least one substantial owner headquartered in the EU countries (Cyprus, Luxembourg and the Netherlands). These EU tax havens are suitable for routing FDIs to Serbia, as they have signed double taxation treaty with Serbia. Entities from other EU tax havens, Malta and the Republic of Ireland, do not appear to have important share in ownership structures of Serbian companies, despite the fact that these countries have also signed double taxation treaty with Serbia.

There are at least eleven sampled companies that are believed (from business magazines, interviews of the owners and other business media) to be owned by Serbian citizens, but are officially owned by tax haven entities. In addition, six of these eleven companies are part of the same business group. Four of these eleven companies have Cypriot entities in their ownership structures, two companies have Dutch

entities, two entities have both Dutch and Swiss entities, while remaining three companies have Dutch, Cypriot and Swiss entities in their ownership structures.

Regarding the presence of MNCs in Serbia, there are at least thirteen sampled companies that are part of world-wide MNCs, having substantial tax haven owner in their ownership structures. These MNCs are originally founded in non-tax haven countries. Nine of these companies are owned by Dutch entities, two are owned by Luxembourg entity, one is owned by Cypriot entity and one is owned by entity from Hong Kong.

Table 3 Modalities of tax haven ownership in sampled companies

Country	Full direct	Full indirect	Partial direct	Partial indirect	Combined
Cyprus	4				1
Great Britain	1				
Hong Kong			1		
Liechtenstein				1	
Luxembourg	2				
Netherlands	10		3	2	1
Switzerland	3	1			
Netherlands and Switzerland				1	1
Netherlands, Switzerland and Cyprus				3	

Source: Author

Table 3 presents the analysis of different modalities of tax haven ownership of sampled companies. Most of the sampled companies (20) are fully and directly owned by tax haven entities, followed by seven companies with partial indirect tax haven ownership. Only one company is fully and indirectly owned by tax haven entity.

Table 4 Headquarters of non-tax haven foreign substantial owners in sampled companies

Country	Companies	Country	Companies
Austria	6	Italy	2
Bosnia and Herzegovina	1	Korea Republic	1
China PR	1	Montenegro	1
Croatia	3	Romania	2
Denmark	1	Russia	4
France	1	Slovenia	5
Germany	1	United Arab Emirates	2
Hungary	1	Russia and Austria	1

Source: Author

Although they have substantial owners headquartered in non-tax haven countries, it may be interesting to look into ownership structure of companies without tax haven ownership. Table 4 presents geographical structure of non-tax haven foreign substantial owners in sampled companies. In total, 15 different countries appear in the table.

Among 15 mentioned countries, there are three countries that, according to KPMG (2020), have lower statutory corporate tax rate than Serbia – Bosnia and Herzegovina (10%), Hungary (9%) and Montenegro (9%). Despite the fact that they are not listed in the Garcia-Bernardo et al. (2017) list of tax havens, these countries may be attractive for profit shifting, as Serbia has signed double taxation

treaties with these countries. Also, Hungary or Russia may be found in some other tax havens lists (Gravelle, 2009).

DISCUSSION AND CONCLUSION

In this paper, I have conducted the empirical research in order to find tax haven entities in ownership structure of the largest companies in Serbia. In this regard, I have studied the sample od a hundred largest companies in Serbia, according to the operating revenue in 2018. I have searched for tax haven entities with at least 5% of ownership rights. In addition, I have used a list of sink and conduit tax havens, developed by CORPNET Research Group (Garcia-Bernardo et al., 2017).

Research results showed that as much as 35 companies have tax haven ownership links. There are even companies with more than one tax haven entity in their ownership structures. In particular, I have found 16 companies with Dutch entities in their ownership structures. This finding is consistent with prior research (Deichmann, 2013; Afrasinei et al., 2016) finding that the Netherlands are the important source of FDIs to Serbia and other transition and post-transition countries. However, this finding is contrary to the Afrasinei et al. (2016) as they point to the Cyprus as the most important FDI source. Besides the Netherlands, many companies have ownership links with Cypriot and Swiss entities.

I have also found that investors in Serbia prefer to use conduit tax havens rather than the sink tax havens. In addition, research showed that many Serbian investors and MNCs tend to route their investments through the tax havens. These findings are also consistent with some prior research (Pelto et al., 2004; Kokko & Kravtstova, 2012; Nakamoto et al., 2019).

Regarding the modalities of tax haven ownership, most of the companies have been fully and directly owned by tax haven entities. The second most important modality is partial and indirect tax haven ownership.

Research results may have many implications. First, auditors should recognize that presence of tax haven entities in ownership structures is an important red flag that may increase the risk of audit engagement. Second, national tax authorities should pay attention to base erosion and profit shifting to tax havens. In this regard, the biggest problem should be found in the fact that Serbia has signed double taxation treaties with many of studied tax havens. Third, tax haven operations should be perceived as unethical in discussion about the ethics in accounting as they increase the income inequality in society and the difference between large and small companies.

However, the research results should be considered in the light of some limitations. Well-known limitations of sampling procedure may be attributed to this paper. In addition, it is possible that research results would significantly differ if some other list of tax havens was used. Future research should study the ownership structure of companies in neighboring countries in order to compare the results with presented findings. In addition, future research may study other modalities of tax haven connection, such as subsidiaries in tax havens or the existence of other related-party entities in tax havens.

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IMPACT OF ERP IMPLEMENTATION ON USERS AND ORGANIZATIONAL PERFORMANCE

Dragana Parč

University of Kragujevac, Faculty of Economics, dragana.parc@outlook.com

Abstract: *The development of information and communication technologies in recent years has changed not only everyday life of people, but also the manner of organizing business operations of entities. The most significant achievement in the area of information technologies is prescribed to the occurrence of integrated information system (Enterprise Resource Planning Systems - ERP). In that context, the focus of this research is directed to identification of the effects of ERP software implementation. Basic aim of the paper is to identify the effects of software implementation on the user level of satisfaction and organizational performance of companies. For the purpose of realization of the set objectives, 32 companies in the Republic of Serbia of various activities have been surveyed. In methodological sense, qualitative and quantitative research methodology has been used in the paper based on descriptive and statistical analysis. For the needs of the research of statistically significant differences between two groups of companies the descriptive statistics, non-parametric Mann-Whitney test and non-parametric Spearman correlation coefficient have been used. The most important result of the paper implies statistically significant differences between segmented groups when it comes to the level of user satisfaction and the level of realized financial and non-financial performances, such as flexibility, efficiency of business process and cost control.*

Keywords: *Enterprise Resource Planning Systems (ERP), User satisfaction, Organizational performance, ERP Success.*

JEL Classification: *M 20, M40, M15.*

INTRODUCTION

We are witnesses of accelerated, dynamic and unpredictable development in the area of information and communication technologies. Information technologies have changed the entire humanity radically. The organization of accounting process and functioning of accounting information system (AIS) has not been bypassed by these changes. The most significant achievement in the area of information technologies is prescribed to the occurrence of integrated information system *(ERP)*. The term ERP (*Enterprise Resource Planning Systems)* was defined for the first time by Gartner group at the beginning of 1990s. It represents software system that combines and integrates all related processes of companies and serves to users for managing all functions in a company (Swartz & Orgill, 2001).

High degree of connection of functions and processes is realized by creating unique database. Basic aim of creating comprehensive information infrastructure is establishing the flow of quality information continually and consistently within all functions. Timely production of accurate and precise information has the aim to improve productivity, efficiency and effectiveness of companies. Therefore, the basic motive of generating huge investments into implementation of these systems represents performance improvement (Ifinedo, et. al., 2010).

Contrary to integrated information system, traditional accounting softwares that are present in accounting practice years back, are made of autonomous, isolated and non-integrated business areas that demand the creation of separate databases. The existence of large number of databases in a company causes negative effects. Doubling information, aggravated control of business functions, long business process and inconsistency of reporting and observing company performance are just some of the main deficiencies of traditional accounting software that affected the creation of non-quality information support to the process of decision making and process of managing competitive position.

Precisely, the specificities of ERP software and traditional accounting software (accounting softwares) and their effects are the focus of this paper. In that context, basic aim set by this paper is to observe the impact of implemented software both on productivity and user performance, and on organizational performance (such as flexibility, efficiencies of business process, etc.). Additional objective is to identify, through empirical research, the differences in available user support by consultants and vendor of software and point at their connection with realized user performance. In the paper we will apply quantitative and qualitative methodology of research based on the descriptive and statistical analysis. Statistical data process is realized with the help of computer software IBM SPSS (Statistical Package for Social Sciences, Version 26.0). For determining statistical significance of the results has been tested using the 95% confidence interval.

The structure of paper, apart from the introduction and conclusion, is made of two parts. Primarily, based on relevant literature that contains theoretical attitudes and the results of empirical research, the general conclusions on the observed research subject will be presented in the first part of the paper. Then, in the second, empirical part of the paper, the comparison of results of empirical research with presented foreign publications, research and reports will be carried out more specifically. In accordance with the carried out analysis concluding, remarks will be presented.

LITERATURE REVIEW

A number of empirical research considered the effects of practical application of ERP system. For the needs of literature research Huang and Yasuda divided the research implementations of ERP software into three segments: pre-implementation, implementation process and post-implementation. For the

purpose of identifying key factors of success and failure the largest number of research is exclusively directed to the third segment, and it will be the subject of research in this paper segment.

The literature implies the fact that ERP implementation is one of more complex decisions made by companies. The ERP implementation is considered large-scale project in the sense of scope, expenses, time and human resources that are included in the process itself (Umar, et. al., 2016). Large scope of needed and invested resources additionally limit company in future time period, thus timely consideration of positive and negative implementation impacts is very important. As foreign researches state, the failure rate in the ERP implementation is high (Abugabah & Sanzogni, 2009). Identified failure rate in American companies is approximately from 50 to 75%. The literature describes that 51% of American companies considers that their application of ERP is not successful, and 70% of all ERP projects fails to completely carries it out (Umble, et. al., 2003; Umar, et. al., 2016). Simultaneous research made by the consultant company that is specialized for ERP software, Panorama Consulting Solutions indicated negative effects of implementation.

The research from 2014 shows that there is over 55% of exceeded project budget, while with over 75% of projects the deviation from defined project plan was evident. At the same time 41% of respondents have the opinion than ERP has brought a half of expected benefits. At the same time, the research shows that out of all these projects, 58% passed planned budget, and that 65% of projects faced the delay and could not be finished in accordance with planned duration (Panorama Consulting Solutions, 2014; Umar, et. al., 2016).

Considering these facts at the time, Umar, Khan, Agha and Abbas in the paper from 2016, identified 60 critical factors that have the largest influence on the success of ERP software implementation. The impact of organizational culture, perceived user satisfaction, their participation and motivation for changes, as the authors state, represent some of the critical factors by which the success of implementation is being determined. The agreement in the fact that human factor represents one of the crucial factors is offered by Sumner as well in his research, stating that they play the key role in the entire process (Sumner, 2000). If positive impact of human factor is omitted, it is inevitable that a company will face the omission of perceived positive effects in the future.

Contrary to this research, a few foreign authors imply positive effects of ERP implementation. The latest report of Panorama Consulting Solutions agency from 2020 shows that the level of satisfaction with implementation is higher than 50%. Successful ERP system implementation can lead to the reduction of supplies, reduction of development cycle of a product, improvement of user service, improvement of efficiency (productivity), profitability and improvement of efficiency through more successful realization of customer service (Beheshti & Beheshti, 2010). However, these benefits cannot be realized if the employees in organizations do not use information solutions in adequate and corresponding way during the realization of organization tasks (Sun & Bhattacherjee, 2011). Changing the existing information system known to employees, by new more contemporary system will cause a slowdown of entire company functioning due to the resistance to changes and lack of knowledge. Thus, installation and use of ERP system demand core change of work manner of employees, through systematic approach to elimination of resistance to changes and initial and continuing education of all employees.

Training implies desirable functional changes in skills, knowledge, attitudes social and work behavior for the purpose of easier realization of company objectives. In that context, the contribution to interpretation of the effects of user satisfaction and resistance will be provided by the research of authors Wang and Chen, from 2005. Empirical research that is based on the survey of 600 different Taiwanese companies once indicated high level of correlation when it comes to the impacts of user performances, and the quality of implemented system.

Basic empirical research on which the comparison of the obtained results will be based is the research made by Owusu-Mainu, Dankyi-Twum, Konadu and Ohene-Amoako. This empirical research is carried out in Ghana in 2019. The research was based on the survey of 50 companies. The research results implied the fact that the implementation of ERP software affects positively the organizational and user performances.

The support of a good quality to the process of decision making, improvement of efficiency, productivity and flexibility, as well as other organizational performances are only some of the identified success factors of implementation. At the same time empirical research by the group of researchers from Sri Lanka, equally indicates positive effects of ERP software implementation. Due to this reason, the research based on the sample of 103 respondents will be also considered further on.

The users of accounting software are individuals that use the application in performing everyday activities, have knowledge on how the system functions and in which way the interaction with other users in company is being established (Liu, et. al., 2011). Precisely these scarce researchers on the degree of user satisfaction affected the need for their additional consideration. The ascertainment that the user of accounting software during everyday activities creates the benefits that contribute to the realization of set objectives and performances, leads to the significance of identifying their degree of satisfaction. Starting from the assumption that the users of accounting software can timely identify to what extent implemented software facilitates the realization of everyday duties empirical research was realized.

METHODOLOGY

Research methodology

Conducted research is directed to the effects of ERP software implementation, i.e. to user and organizational performances in the companies in the Republic of Serbia upon the implementation of ERP software. More precisely, the research deals with the effects of ERP software implementation on the realization of everyday activities of users and achieved organizational performances. In that sense, basic objective set in this paper is to consider the impact of implemented software both on user productivity and performance, and on organizational performances as well.

Additional objective refers to the identification of differences in the quality of available user support by software consultant and seller. Whether frequent user support by consultant and seller can contribute to more efficient realization of everyday activities of users, is one of the questions that empirical research should enlighten.

For the needs of research, the survey of 18 mandatory questions was created. By the method of random sampling, the survey was sent to over 200 e-mail addresses, out of which 32 respondents gave responses to research questions.

The examination of the level of realized performances by software implementation in the companies in the Republic of Serbia was carried out on the basis of 32 companies.

In accordance with the set objectives, the sample was segmented into two groups. The first group of respondents in the sample was made of companies that have ERP software implemented, while, opposite to them, the second group of respondents implemented traditional accounting software.

Statistical data processing was realized with the support of computer software IBM SPSS (Statistical Package for Social Sciences, Version 26.0). For determining statistical significance the level of trust $p = 0.05$ was used.

In order to examine the significance of implementation effects between the two groups of companies, descriptive statistics, non-parametric Mann-Whitney test and non-parametric Spearman correlation coefficient were used.

SAMPLE ANALYSIS

In the structure of sampled companies, 18 companies implemented ERP software which makes 56.3% of the total sample. Remaining part of the sample is made of 14 companies implementing traditional accounting software, which makes 43.8% of the sample. The sample structure according to implemented software is shown in Table 1.

Table 1 The structure of companies according to implemented software

	Percentage of participation in the sample
ERP	56.3
Traditional software	43.8

Source: research results.

Dominant part in the sample is occupied equally by small and large companies, each making 34.4% of the sample. The largest part of companies with implemented ERP software comes precisely from identified dominant part. The sample structure of companies segmented according to their size is shown in Table 2.

Table 2 The structure of companies according to their size

	Percentage of participation in the sample
Micro legal entity	12.5
Small legal entity	34.4
Medium legal entity	18.8
Large legal entity	34.4

Source: research results.

When it comes to activity, 9 companies in the sample are from manufacturing which makes 28.13% of the sample. The largest part of companies with implemented ERP software comes precisely from identified dominant segment. The sample structure of companies according to their activity is shown in Table 3.

Table 3 The structure of companies according to their activity

	Percentage of participation in the sample
Mining	3.125
Manufacturing industry	34.375
Energy, gas, steam supply and air-conditioning	3.125
Water supply and wastewater management	0
Wholesale and retail trade	15.625
Traffic and storage	6.250
Information and communication	9.375
Finance and insurance activity	3.125
Administration and additional activities	0
Construction and manufacturing	9.375
Other	15.625

Source: research results.

The research of user satisfaction with accounting software demands additional segmentation of surveyed respondents. Out of 32 surveyed users of accounting software, 78.1% respondents are females, i.e. 21.9% users are males. The sample structure according to sex can be seen in Table 4.

Table 4 The structure of repsondents according to sex

	Percentage of participation in the sample
Male	21.9
Female	78.1

Source: research results.

Regarding the age structure, it can be said that the sample is very diverse. Dominant participation in the structure is occupied by age groups of 19-25, 35-40 and 55-60 years of age with 15.6 % participation in total number of respondents. Contrary to that, age group of 45-50 years of age occupies the least part of the sample with only 3.1 %. Table 5 shows the structure of sample according to age group.

Surveyed users of accounting software can be segmented according to the level of education. Dominant participation in the total number of respondents is occupied by the respondents that gained university education, with the total of 46.9%.

Table 5 The structure of respondents according to age

	Percentage of participation in the sample
19-25	15.6
25-30	9.4
30-35	12.5
35-40	15.6
40-45	12.5
45-50	3.1
50-55	9.4
55-60	15.6
60-	6.3

Source: research results.

Contrary to that, slight participation in the total number of respondents is occupied by the respondents that have vocational education, with 3.1%. Table 6 shows the sample structure according to the degree of education.

Table 6 The structure of respondents according to the degree of education

	Percentage of participation in the sample
Primary education	0
Secondary education	21.9
Higher education	3.1
Bachelor	46.9
Master	28.1
PhD	0

Source: research results.

Surveyed users of accounting software can be segmented according to their working position. Dominant participation in the sample is occupied by the users that are employed as accountants in the surveyed companies with the total of 31.3 % of the total number of respondents and their superiors

with 25.0% participation. Table 7 shows the sample structure according to working position of employees.

Table 7 The structure of respondents according to working position

	Percentage of participation in the sample
Accountant	31.3
Business administrator	6.3
IT sector	15.6
Chief accountant	25
Finance and banking officer	3.1
Operation manager	6.3
Controller	6.3
Financial statement specialist	3.1
General manager	3.1

Source: research results.

Since the sample is made of 32 companies, it can be said that the basic statistical assumption on the scope of observation is satisfied. On the basis of identified data dispersion, the Kolmogorov-Smirnov distribution normality test showed that analyzed variables in the sample do not have normal distribution. Therefore, non-parametric tools of statistical processing will be used in the paper.

RESULTS AND DISCUSSION

The first part of the analysis refers to the comparative analysis of user satisfaction by implemented ERP software and traditional accounting software.

The following can be listed in everyday activities of users: collection, control and data entry, their further processing and recording, adjustment and changes, reporting and analysis of financial statements, managing monetary flow and support in the decision making process. The results of descriptive statistics regarding these activities are shown in Table 8.

Table 8. Descriptive statistics of evaluated improvement of user action in the process of everyday activities realization

		Min	Max	Mean	Std.Deviation
Collection, control and data entry	ERP	2	5	4.06	1.056
	Traditional software	2	5	3.79	1.051
Processing and recording	ERP	2	5	4.28	0.895
	Traditional software	1	5	3.93	1.269
Adjustment	ERP	1	5	3.72	1.179
	Traditional software	1	5	3.36	1.277
Reporting	ERP	3	5	4.28	0.669
	Traditional software	1	5	3.79	1.251
Financial statements analysis	ERP	1	5	4.06	1.056
	Traditional software	1	5	3.64	1.447
Managing monetary flows	ERP	1	5	3.78	1.06
	Traditional software	1	5	3.36	1.336
Support in decision making	ERP	2	5	4	0.84
	Traditional software	1	5	3.14	1.231

Source: research results

Identified arithmetic mean implies differences in perceived degree of user satisfaction by ERP software and traditional accounting software. The degree of user satisfaction is considerably higher when it comes to application of ERP software. The employees that perform their everyday activities on this software have evaluated that its implementation would contribute to data processing and recording processes to greatest extent, as well as to the reporting process (Mean = 4.28). High prices of user satisfaction are recorded when it comes to other activities as well. The users consider that ERP system with all its characteristics contributes to facilitated collection of data, control and their entry into the system (Mean = 4.06), as well as the analysis of financial statements (Mean = 4.06) and creation of more quality information basis for the needs of decision making (Mean = 4.00). In comparison with the results of other empirical research significant deviations cannot be identified. Empirical research performed in Ghana and Sri Lanka also identifies high level of user satisfaction when it comes to ERP system application. Large number of surveyed users in Sri Lanka expressed high level of satisfaction when it comes to its distribution to the activity of everyday data collection and their further recording (Mean = 3.789). At the same time, when it comes to the application of ERP system, respondents of empirical research in Sri Lanka and Ghana evaluated that it contributes to a great extent to the decision making process (Mean = 3.96; Mean = 4.02). It is necessary to emphasize that there is a difference in the chosen methodology and the scope of research, however, regardless of that, research results imply the congruence of the presented facts.

Further analysis is directed to the establishment of the significance of differences in attitudes. Kolmogorov-Smirnov test for normality of distribution has shown that the analyzed variables do not have normal distribution. In that context, for the purpose of identifying key differences, non-parametric Mann-Whitney test was used. The analysis showed that the level of significance (Asymp. Sig. (2-tailed) = 0.041) is most significant when it comes to user activity in the process of making business and financial decisions. This means that there is statistically significant difference in the attitudes of users of both types of software regarding the contribution of the software to the process of decision making.

The results imply that the users of ERP system express significant higher level of satisfaction when it comes to the quality of information support of this software. Higher level of information support can contribute to a great extent to the realization of defined objectives and strategies; for this reason it can certainly be one of more significant steps to their realization. The results of non-parametric test are shown in Table 9.

Table 9 The result of non-parametric evaluation test of the significance of user performance

	Support to managerial decision making
Mann-Whitney U	74.500
Wilcoxon W	179.500
Z	-2.047
Asymp. Sig. (2-tailed)	0.041
Exact Sig. [2*(1-tailed Sig.)]	0.049

Source: research results.

The following analysis aspect refers to the identification of non-financial and financial performances conditioned by the application of ERP software and traditional accounting software. For the purpose of identifying statistically significant differences realized upon the implementation of various software, non-financial and financial performances were analyzed at the same time. The application of non-parametric Mann-Whitney test implied the existence of statistically significant differences between

realized effects of ERP software implementation and traditional software. The analysis showed that the respondents marked that ERP software implementation contributes to a great extent to the reduction of business process, improvement of flexibility of business operation and costs control. The results of testing are shown in Table 10.

Table 10 The results of non-parametric evaluation tests of significance of non-financial and financial performance

	Reduction of business process	Improved flexibility	Improved costs control
Mann-Whitney U	76.500	77.000	68.500
Wilcoxon W	181.500	182.000	173.500
Z	-1.952	-1.956	-2.264
Asymp. Sig. (2-tailed)	0.050	0.050	0.024
Exact Sig. [2*(1-tailed Sig.)]	0.059	0.065	0.027

Source: research results.

In comparison with the results of foreign empirical research the deviations cannot be identified. Contrary to the research made in paper, empirical research in Sri Lanka showed the existence of significantly higher level of flexibility of companies upon the implementation of ERP system. Scarce empirical research limit the possibility of the comparison of results from the aspects of other dimensions, it can still be said that identified research results comply with the set theoretical and empirical assumptions.

The last part of analysis is related to the examination of the influence of consulting support on user performance. In this regard, it is necessary to perform the assessment of relation between consulting support and satisfaction of users with implemented software solution.

Non-parametric correlation coefficient will show in which way the level of support by consultants has impact on efficient realization of everyday activities of users. The question whether the support of the vendor or software manufacturer is available to you after the training and the implementation period, was positively answered by 30 respondents. Dominant participation in the sample is realized by the users who assessed the level of available consulting support by the highest mark (46.67%). The results of calculated non-parametric correlation coefficient are shown in Table 11.

Table 11 The results of non-parametric correlation coefficient of the level of consulting support and activity improvement

			Collection, control and entry of data	Processing and recording	Adjustment	Reporting	Analysis of financial statement	Managing money flows	Support to decision making
Spearman's rho	Degree of support	Correlation Coefficient	0.688**	0.596**	0.536**	0.503**	0.454*	0.573**	0.563**
		Sig. (2-tailed)	0.000	0.001	0.002	0.005	0.012	0.001	0.001
		N	30	30	30	30	30	30	30

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

Source: research results.

The results of analysis show that higher level of consulting support encourages improvement of everyday activities of users. Identified correlation coefficient between the degree of support and user satisfaction when performing everyday activities indicates the existence of a high level of connection. The research results indicate the conclusion that a high degree of support by consultants largely enhances collection, control, and entry of data. Since the transfer of data into new implemented system is very demanding task, the realization of this task would be almost impossible without the support of consultants. In this context, identified high level of connection and high level of significance (Sig. (2-tailed) = 0.000) makes sense. As for the other activities of users, the research results indicate a moderate and also significant level of connection. Scarce researches on effects of consulting support limit the possibility of comparison with previous empirical research.

However, empirical research of the authors Wang and Chen, from 2005 can contribute to the interpretation and consideration of the impact of consulting support. Empirical research which is based on surveying 600 different Taiwanese companies, showed that high level of consulting support and high level of quality support contributes to the creation of more efficient communication, reduction of conflicts and organizing ERP system of better quality (Wang & Chen, 2005). In that context, comparative research results lead to the conclusion that the level of support represents key factor that contributes to the success of implementation upon the termination of project as well. Creating and maintaining positive effect of user performance, reduction of employees' resistance and ERP system of a good quality, is possible with the help of timely and quality consulting support.

CONCLUSIONS AND RECOMMENDATIONS

In accordance with the set basic and special objectives, descriptive and statistical analysis was carried out. Empirical analysis is carried out on the sample of 32 companies, and the focus of the analysis was the software which they use. The sample is segmented into two groups. The first group of respondents was made of companies that implemented ERP software, while contrary to them, the second group of companies has classic accounting software implemented.

The results of empirical analysis indicate some differences in realized user and organizational performances. By using non-parametric Mann-Whitney test, research results indicated that there is significant statistic difference between identified groups, when it comes to the support by consultants in the process of decision making. In that context, the results indicate that information support of better quality is being created upon the implementation of ERP software. At the same time, establishing higher degree of flexibility, reduction of business process and better costs control are key organizational performances that indicated statistically significant difference between identified groups.

Comparative analysis of theoretical considerations and research results indicates that the implementation of ERP software contributes to the realization of more efficient both user and organizational performances. Since the users of accounting software are the holders of accounting process, it can be considered that their satisfaction by implemented software determines to the greatest extent the success of generating positive effects. In that context it was examined whether the user support as the part of implementation process has the impact on the degree of realized user performances. In the paper used non-parametric correlation coefficient. Results of non-parametric correlation coefficient imply that there is high and medium connectivity degree. In this context, the conclusion can be made that the higher degree of user support upon the implementation affects the reduction of employees' resistance and improvement of the level of user satisfaction. Due to this reason, the level of user support can be identified as the key factor that establishes positive growth of user and organizational performances of companies.

A lack of the surveyed users could be the basic limitation of the paper. Nowadays, it is noticeable that there is distrust by the respondents. Respondents' fear itself of the misuse of the data and attitudes presented, somewhat limit the researchers in collecting larger number of data. Lower level of the scope of collected data in some cases cannot indicate all statistically important differences between identified groups. In this context, future empirical research will be directed to the expansion of research both in the aspect of its scope and in the aspect of its content coverage.

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APLIED INFORMATICS AND QUANTITATIVE METODS IN ECONOMICS AND MANAGEMENT

THE SIGNIFICANCE OF THE ARTIFICIAL INTELLIGENCE CONCEPTS IN RESEARCH PAPERS IN ECONOMICS

Marcela Zembura*

Medical University of Silesia, Katowice, Poland, marcela.zembura@gmail.com

Paweł Lula

Cracow University of Economics, Poland, pawel.lula@uek.krakow.pl

Abstract: *Artificial intelligence (AI) has been constituting a significant concept of many fields of science for last seven decades. It was coined in the area of computer science, but now it is difficult to find research fields which are not influenced by this idea. Contemporary artificial intelligence can be treated as an interdisciplinary area with many subdisciplines, theoretical backgrounds and applications. The main purpose of medical artificial intelligence is to help the clinician in the diagnosis process, treatment protocol development and patient monitoring and care. In management and economics AI methods are used mainly as decision support tools. The authors decided to analyse the importance of AI concepts within economics area and try to identify main subareas related to artificial intelligence in research papers published in economics and registered in the Scopus database in the period 2011-2020. Also relationships between AI concepts identified in research literature and concepts related to economics were studied. The research presented here has ontology-based character. The Computer Science Ontology (CSO) (https://cso.kmi.open.ac.uk/home) was used for description of artificial area, while JEL classification (https://www.aeaweb.org/econlit/jelCodes.php) formed a formal description for the economics area. Models of relationships between these two areas were built using bipartite graphs.*

Keywords: *Artificial intelligence, economics, research productivity analysis, ontology-based exploratory analysis of documents, bipartite models.*

JEL Classification: *A12, C63.*

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* Corresponding author

INTRODUCTION

Assuming that artificial intelligence can have a huge impact on contemporary research projects realizing in economics, the authors have defined the following objectives for their work:

- developing a research methodology allowing to identify, classify and evaluate references to concepts relating to artificial intelligence and economics in scientific papers,
- analysis of relationships between artificial intelligence and economic concepts in the light of content analysis of abstracts of scientific publications published in the area of economics,
- identification of artificial intelligence and economic areas which are studied simultaneously.

The authors chose ontology-based approach for their analysis.

LITERATURE REVIEW

The most common definition of artificial intelligence (AI) was coined by John McCarthy and defines it as the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings (e.g. Caplan, 2020). Over the past years, AI applications have been reported in many fields of study such as: costumer service, accounting, financial services, healthcare, human resources.

There are many concepts associated with AI. It is worth to consider the most important.

- *Ambient intelligence* (AmI) is a multi-disciplinary approach which aims to enhance the way environments and people interact with each other. The ultimate goal of the area is to make the places we live and work in more beneficial to us. *Smart homes* concept is one example of such systems but the idea can be also used in relation to hospitals, public transport, factories and other environments (e.g. Augusto, 2008). In healthcare AmI is used as home-based tele-monitoring system to provide constant observations of patient's blood pressure, oxygen saturation and weight (e.g. Madigan, 2008) and as home-based stroke telerehabilitation system (e.g. Chen et al. 2020).
- *Decision support systems* (DSS) are mostly computer and internet-based information systems that can create and assess management alternatives, as well as facilitate knowledge communication between stakeholders (e.g. Carmona et al. 2013) DSS are also used in medicine to aid clinicians in making diagnostic and therapeutic decisions in patient care. They can simplify access to data needed to make decisions, provide reminders and prompts at the time of a patient encounter and alert clinicians when new patterns in patient data are recognized (e.g. Payne, 2000).
- *Bayesian network* (BN) is a graph-based model of joint multivariate probability distributions that captures properties of conditional independence between variables (e.g. Friedman, 2000). Bayesian network is popular in statistics, machine learning and other artificial intelligence areas. BN are very effective in combining various data sources such as in operational risk analysis and in tracking a very large number of variables like in biotechnology (e.g. Kenett, 2012).
- *Intelligent robots* (IR) are a combination of computer engineering, software engineering, control engineering, electronic engineering, mechanical engineering, and systems design engineering (e.g. Juang, 2019). International Journal of Intelligent Robotics and Applications fosters the dissemination of new discoveries and novel technologies that advance developments in robotics and their broad applications (International Journal of Intelligent Robotics and Applications, 2020). Robots are being used in assembly, packaging, medicine, customer service capacity in retail stores and hotels and as open source systems with AI capability, this way, users can teach

their robots to do custom tasks based on their specific application, such as small-scale agriculture ("How artificial intelligence is used in today's robots", 2018)

- *Machine learning* (ML) is an evolving branch of computational algorithms that are designed to emulate human intelligence by learning from the surrounding environment. Techniques based on machine learning have been applied successfully in diverse fields ranging from pattern recognition, computer vision, spacecraft engineering, finance, entertainment, and computational biology to biomedical and medical applications (e.g. Naqa and Murphy, 2015). Machine learning currently plays an essential role in the medical imaging field, including computer-aided diagnosis, image segmentation, image registration, image fusion, image-guided therapy, image annotation, and content-based image retrieval (e.g. Shen et al. 2015).

- *Natural language processing* (NLP) is an area of research and application that explores how computers can be used to understand and manipulate natural language text or speech to do useful things. NLP researchers aim to gather knowledge on how human beings understand and use language so that appropriate tools and techniques can be developed to make computer systems understand and manipulate natural languages to perform desired tasks (e.g. Chowdhury, 2003). Nowadays NLP is used to create spoken dialogue systems and speech-to-speech translation engines and identify sentiment and emotion toward products and services (e.g. Hirschberg and Manning, 2015).

- *Genetic algorithms* (GA) are stochastic search algorithms which act on a population of possible solutions. They are loosely based on the mechanics of population genetics and selection. They can be applied to search on discrete spaces, so can be used to search rule sets, representations of computer programs or computer structures and neural network architectures (e.g. Shapiro, 2001).

- A *knowledge-based system* (KBS) is a system that uses artificial intelligence to solve problems. Knowledge-based systems focus on using knowledge-based techniques to support human decision making, learning and action. Such systems are capable of cooperating with human users and are being used for problem solving, training, and assisting users and experts of the domain for which the systems are developed (e.g. Akerkar and Sajja, 2009).

- *Swarm Intelligence* (SI) is an Artificial Intelligence discipline that studies the collective behaviors of artificial and natural systems such as those of insects or animals. SI techniques are typically inspired by natural phenomena, and they have exhibited remarkable capabilities in solving problems that are often perceived to be challenging to conventional computational techniques (e.g. Li and Clerc, 2019).

- *Game theory* (GT) is a mathematical theory dealing with models of conflict and cooperation. It finds many applications in economics and in other social sciences but also in evolutionary biology (e.g. Tijs, 2003). It should be emphasized that GT has much longer history than artificial intelligence (achievements of Oskar Morgenstern and John von Neumann are worth mentioning in this context) but now is considered very often as a part of artificial intelligence.

METHODOLOGY

The authors have defined the following objectives for their work:

- developing a research methodology allowing to identify, classify and evaluate references to concepts relating to artificial intelligence and economics in scientific papers,
- analysis of relationships between artificial intelligence and economic concepts in the light of content analysis of abstracts of scientific publications published in the area of economics,
- identification of artificial intelligence and economic areas which are studied simultaneously.

Table 3 General categories for economics and artificial intelligence area

General categories for economics (according to JEL Classification System)	General categories for artificial intelligence (according to Computer Science Ontology)
General Economics and Teaching	Ambient Intelligence
History of Economic Thought, Methodology, and Heterodox Approaches	Bayesian Networks
Mathematical and Quantitative Methods	Cellular Automata
Microeconomics	Cognitive Systems
Macroeconomics and Monetary Economics	Common-sense
International Economics	Constraint satisfaction problems (CSP)
Financial Economics	Decision Support Systems
Public Economics	Decision Theory
Health, Education, and Welfare	Expert Systems
Labor and Demographic Economics	Formal Logic
Law and Economics	Game Theory
Industrial Organization	Genetic Algorithms
Business Administration and Business Economics. Marketing. Accounting. Personnel Economics	Heuristic Programming
Economic History	Inference Engines
Economic Development, Innovation, Technological Change, and Growth	Intelligence Analysis
Economic Systems	Intelligent Control
Agricultural and Natural Resource Economics. Environmental and Ecological Economics	Intelligent Robots
Urban, Rural, Regional, Real Estate, and Transportation Economics	Intelligent Systems
Miscellaneous Categories	Intelligent Tutoring System
Other Special Topics	Knowledge-based Systems
	Machine Learning
	Medical Computing
	Multiagent System
	Natural Language Processing
	Planning Algorithms
	Soft Computing
	Swarm Intelligence
	System Theory

Source: JEL Classification System (https://www.aeaweb.org/econlit/jelCodes.php?view=jel), Computer Science Ontology (http://cso.kmi.open.ac.uk/home).

The following steps were necessary to achieve the goals stated above:

- preparation of a data set with abstracts of papers published by European authors in the field of economics in the period 2011–2020,
- identification of concepts appearing in abstracts and related to economics,
- identification of concepts appearing in abstracts and related to artificial intelligence,

- building a model of relationships between concepts belonging to these two areas of science,
- analysis of contribution of artificial intelligence issues in research papers from the field of economics.
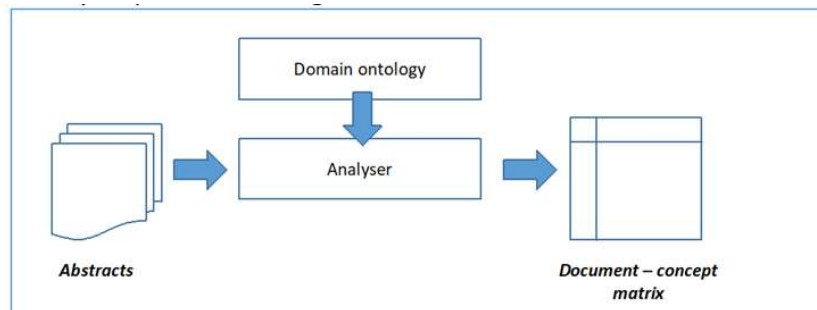
Figure 5 The structure of the concept identification system

Source: own elaboration

The data set consisted of abstracts of 124460 research papers prepared in the field of economics by authors from 36 European countries from 2011 to 2020 and registered in the Scopus database. Identification of concepts was performed by ontology-based system using two classifications:

- *JEL Classification System* proposed by American Economic Association to identify concepts related to economics[*],
- *Computer Science Ontology* (CSO) to identify concepts from the AI area[**].

$$C=\begin{bmatrix} c_{11} & \cdots & c_{1n} \\ \vdots & \ddots & \vdots \\ c_{n1} & \cdots & c_{nn} \end{bmatrix}$$
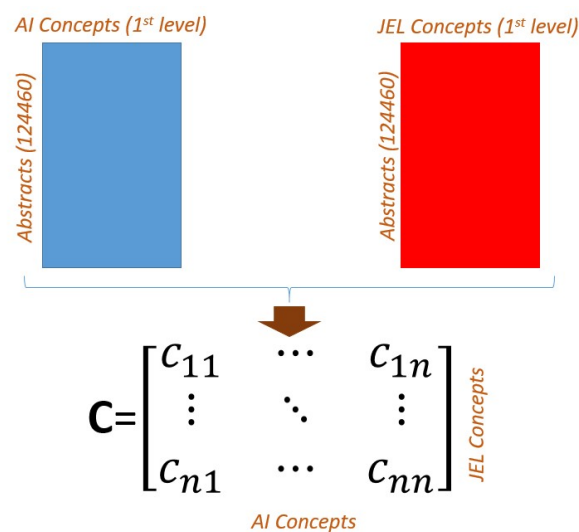
Figure 6 Co-occurrence matrix of concepts related to economics and AI

Source: own elaboration

First all concepts, which were identified in abstracts, were assigned to general categories defined for economics and artificial intelligence area and during further steps the analysis was performed at the level of these main categories. The structure of general categories for two fields studied here is presented in the Table 1. The identification of concepts was conducted by a parser designed and implemented by the authors in R language. The general idea of the process of concepts identification is presented in Fig. 1.

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[*] https://www.aeaweb.org/econlit/jelCodes.php?view=jel

[**] http://cso.kmi.open.ac.uk/home

The detailed description of the concept identification system was presented in (Kovaleva et al., 2020). Having two document-concept matrices, for two studied areas, the co-occurrence matrix of concepts was calculated (Fig. 2).
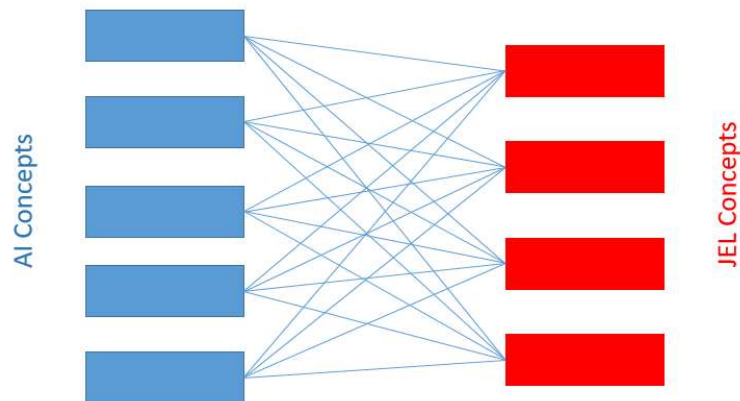
Figure 7 Bipartite model of relationships between concepts related to economics and AI

Source: own elaboration

The c_{ij} element of the co-occurrence matrix **C** informs how many times the i-th concept related to economics and the j-th concept related to artificial intelligence appeared at the same abstract. The **C** matrix allowed to build a bipartite graph model showing relationships between economics and artificial intelligence concepts (Fig. 3).

The bipartite model allowed to formulate some conclusions on concepts' significance and relationships between them.

RESULTS AND DISCUSSION

During the first phase of the research, the analysis of occurrence frequency for all concepts existing in the Computer Science Ontology was performed. The results, aggregated for general concepts, are shown in Fig. 4.
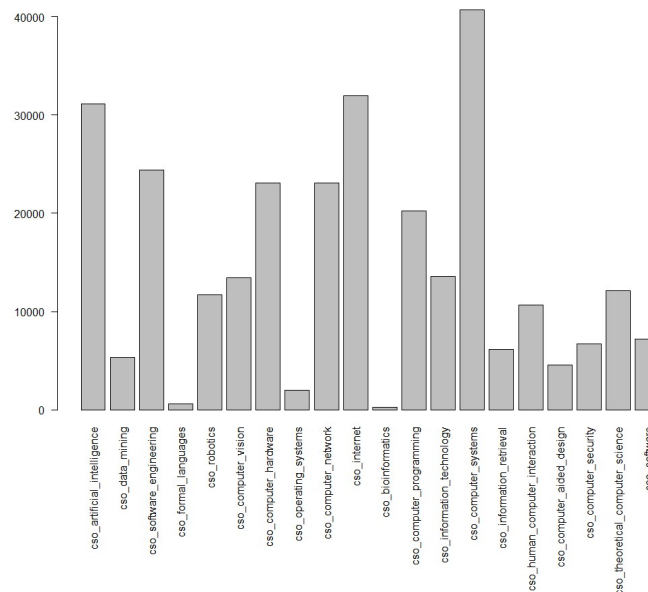
Figure 8 The popularity of concepts related to computer science in research papers from the field of economics registered in the Scopus database in 2011-2020

Source: own elaboration

The general concept *computer systems* is the most popular in papers related to economics. Artificial intelligence is located in the third position in terms of prevalence (31166 papers contain terms related to AI and it represents 25% of all studied documents).

The distribution of AI concepts over AI subareas is presented in Fig. 5.
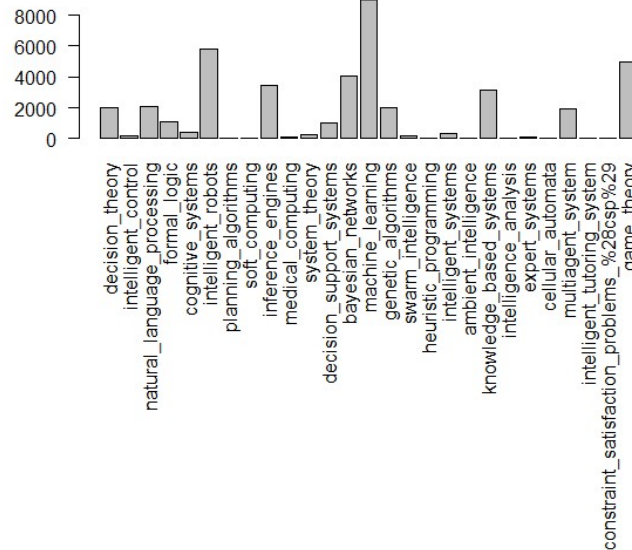
Figure 9 The popularity of concepts related to artificial intelligence in research papers from the field of economics registered in the Scopus database in 2011-2020

Source: own elaboration
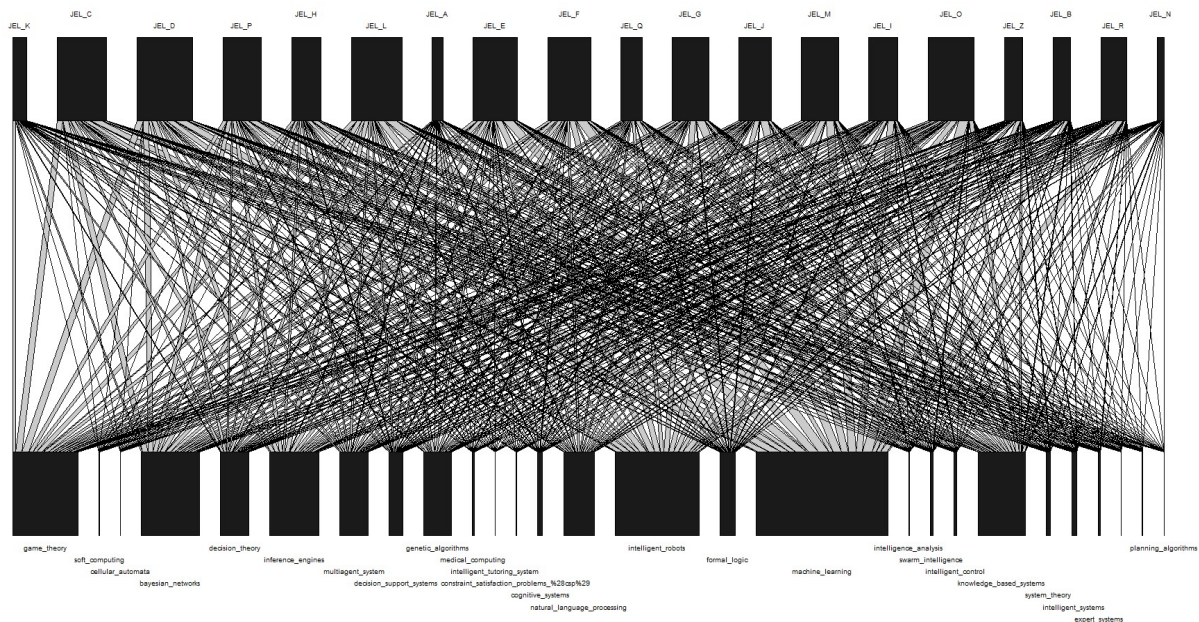
Figure 10 The bipartite model of relationships between concepts related to economics and artificial intelligence in research papers from the field of economics registered in the Scopus database in 2011-2020

Source: own elaboration

The list of the most popular terms related to *AI* which appeared in abstracts includes: *bayesian, forecasting models, inference, question answering, boosting, agent models* and *cluster analysis*.

To present relationships existing about two studied areas, the bipartite model was created (Fig. 6).

The bipartite model allowed to identify the most common connections between two studied disciplines. Their list is presented in Fig. 7.

	Concepts	N
1	machine_learning/JEL_D	8636
2	machine_learning/JEL_C	8068
3	machine_learning/JEL_L	7806
4	machine_learning/JEL_E	7566
5	machine_learning/JEL_O	7501
6	machine_learning/JEL_F	7443
7	machine_learning/JEL_P	6192
8	machine_learning/JEL_G	6050
9	intelligent_robots/JEL_D	5556
10	machine_learning/JEL_M	5553
11	machine_learning/JEL_J	5257
12	intelligent_robots/JEL_L	5118
13	game_theory/JEL_D	4907
14	intelligent_robots/JEL_O	4812
15	intelligent_robots/JEL_C	4711
16	machine_learning/JEL_R	4646
17	machine_learning/JEL_H	4557
18	machine_learning/JEL_I	4486
19	game_theory/JEL_C	4486
20	intelligent_robots/JEL_E	4444

Figure 11 The most common connections between concepts related to economics and artificial intelligence in research papers from the field of economics registered in the Scopus database in 2011-2020

Source: own elaboration

The results show that among all areas belonging to artificial intelligence, the role of machine learning in economics research is dominant.

CONCLUSIONS AND RECOMMENDATIONS

It was worth to underline that in about 25% of research papers prepared in the area of economics the linkage to AI domain can be found. This fact caused that the authors decided to analyze these connections and tried to evaluate them. It seems that artificial intelligence ideas related to modelling and decision support play the most important role in research papers prepared in economics.

The research process proved that the fusion of ontology-based topic identification and bipartite graph models form a useful tool for this type of analysis.

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FACTORS EXPLAINING SPREAD OF COVID-19 ACROSS COUNTRIES AND INDIAN STATES: AN ECONOMETRIC INVESTIGATION[*]

Somesh K Mathur, PhD

Professor at the Department of Economic Sciences, IIT Kanpur, skmathur@iitk.ac.in

Abstract: *Our study would try to explain the factors affecting spread of COVID19 across countries, regional grouping, Indian states, districts and cities keeping economics of lockdown in mind . We will use cross sectional and time series daily data of COVID19 cases and fatality rates to determine the causes of COVID19 spread across countries, regional groupings and Indian states and districts. The study would help us in determining the magnitude and directions of interventions like lockdown measures to capital health expenditures, share of urban population, immunization, ethnic population, mortality rates, democracy index, governance and rule of law, health infrastructure, poverty, undernourishment, temperatures and humidity, pollution, vulnerable population, among others in determining causes of covid spread and ensuring lives and livelihood across regions.*

Keywords: *Covid 19, Time series, Econometric models, Global crises*

JEL Classification: *C 31, C 32, C 53, I 15*

INTRODUCTION, DATA AND MOTIVATION OF THE STUDY

We have now witnessed over 40 million COVID19 cases across more than 200 covid affected countries with more than ten lakhs deaths and 28 Million recoveries. India has seen over 8 million covid cases, 7 million recoveries but with more than one lakh deaths since January 2020. We (states of India) have crossed the Chinese number of covid infections of 90000 infections and are second in the tally among 215 covid affected economies. Death rate in India is though low at less than 1.51 against global average of more than 3.05 Death rates. Death rates are deaths as a ratio of total infections. India now has a recovery rate of more than 90 percent. Worrying are daily additions of nearly fifty thousand new cases and the high growth rates of covid cases. At this rate, we would have in India around 10.2 million cases by end of February, 2021. This is happening when India is increasingly opening the economy. Could there have been a better way which could have ensured lives and livelihood for all. This is one question that we address in this paper.

The mutating virus is known for its speed, scale, scope, seasonal and waves of re-emergence, spread and gross uncertainty regarding its termination. Spanish flu, 1918-1920, though affected 500 million people across the world with 50 million deaths. India, among many are reeling under the health, economic and security crises due to pandemic outbreak, the grand lockdown measures taken by India and other countries across the world and due to containment measures taken at the Chinese border with India.. Countries are faced with the decision of how much to open up their economies keeping the covid 19 spread in mind. What causes its spread across countries, regional groupings and in Indian states and districts?

These are the motivation behind this study keeping in mind that rich countries with better health capacities and lower population densities were impacted more at least initially. We enumerate the data below and use OLS with robust standard errors, count data regression, spatial regression, FGLS, Panel regression, nonparametric plots and Artificial Neural Network for our analysis. We have used cross sectional data at various point of times of all 215 countries of the world, various regional groupings like the 27 EU countries, 54 African nations,19 Latin American countries and 34 East Asian and Pacific nations, all Indian states and districts. Time series using daily data from January till date and panel study for all Indian states have been also performed to understand the economics of the lockdowns. The data sets are all lying with the author and will be reproduced on demand.

According to the IMF(2020), Latin American and Caribbean are impacted the most in terms of decline in GDP per capita followed by middle east and the north Africans, then Europeans and North Americans, followed by South Asians and the least impact is nations of the East Asian countries. We need to know the factors explaining such trends. The paper addresses this issue. In South Asia, India has seen a decline of negative 9 percent fall in GDP this year due to the grand lockdown and the host of vulnerabilities existing before the strike of the pandemic in early 2020. These relate to the domestic factors like the weak balance sheet of NBFCs, reality sector and infrastructure sector, among others while the trade war and recession in the rest of the world reduced growth rates leading to fall in the imports and exports of India.

The paper is divided into FIVE sections. Section I is Introduction, Data and Motivation of the Study, section II is Objectives of the Study section II is on Factors Affecting Spread of COVID 19 across countries including lockdown Stringency Index and Some Non Parametric Plots, Section III is on What explains Covid Spread across 215 Covid Affected Economies using Count Data Regressions in September 2020,Section IV is on What factors explain Covid 19 spread across 32 Indian States and districts in May 2020 and October 2020, last section gives Conclusions and Policy Recommendations

OBJECTIVES OF THE STUDY

Identifying the factors and magnitude of such factors impacting all covid cases, active cases, covid recoveries, covid fatalities and GDP per capita across 215 countries of the world, 35 East Asia and Pacific Region, 54 African nations, EU27 and 19 Latin American Regions and in Indian states and districts keeping economics of lockdown in mind.

Why despite reproduction rate fal;ling across countries the covid infections and fatalities have gone up. This study identifies socio economic politico, health, environmental and policy lockdown factors

Why were developed nations impacted more economically and in terms of health crises initially?

How much should we relax the lockdown measures keeping the spread minimum? Did lockdown impact more of GDPs across countries or covid cases, recoveries and fatalities?

WHAT EXPLAINS COVID SPREAD ACROSS 215 COVID AFFECTED ECONOMIES USING COUNT DATA REGRESSIONS IN SEPTEMBER 2020

We have used count data regressions to explain covid active cases, covid cases, covid fatalities, covid recoveries and GDPs per capita across 215 countries of the world. Count data regression assumes Poisson probability densities in our study. Such regressions are used when the data is non normal and takes non negative integer values and as in our case the data throws up right tailed probability distributions using non parametric plots.

The data takes non negative integer values depicting lower values(lower covid infections) impacting many countries of the world coming with high probability while there are maybe ten countries which have high cases with high probability. The latter includes the US, India and many Latin American countries and now under the second wave of infections, the European nations like the UK, Spain, France and Germany.
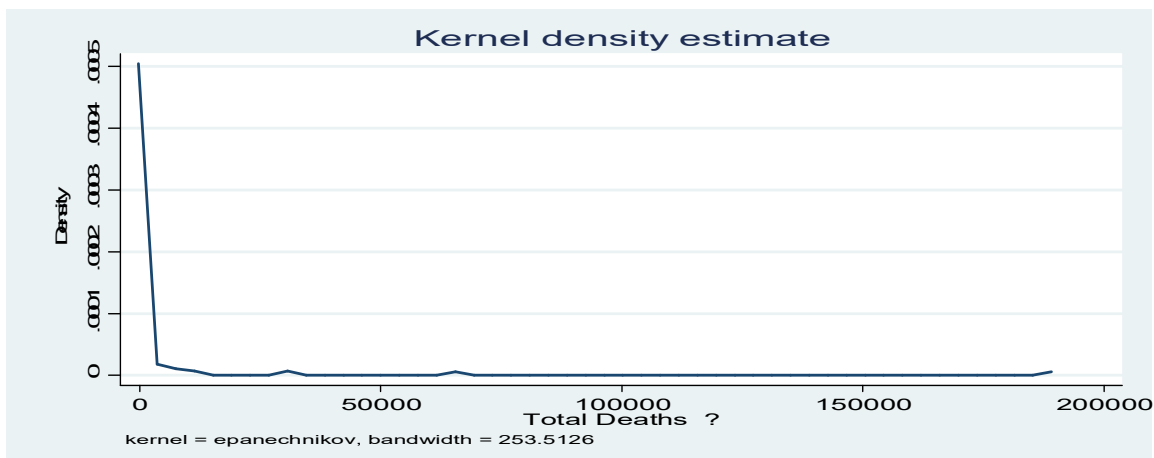
Figure 12 Non Parametric PDF of Covid fatalities across 215 Covid Affected Economies in September 2020

The count data regressions use maximum likelihood estimation procedure. The count data regression model like the logit model gives the estimate of the incidence rate ratio which can be better interpreted than the normal parametric coefficients. While logit regresses uses log of odds ratio as its dependent variable, count data regresses uses log of lamda as its dependent variable. Lamda being mean and variance of the distribution. The diagrams I and II shows the non parametric pdf of the covid fatalities and GDPs per capita across countries in September 2020 justifying use of count data regression for our study because of the right tailed nature of the variables.
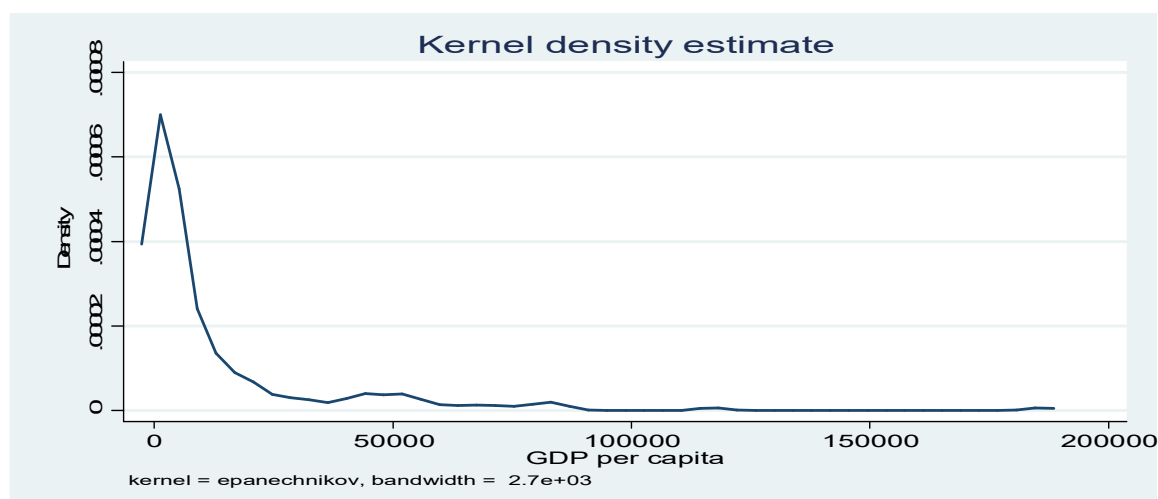
Figure 2 Non Parametric PDF of GDP per Capita across 215 Covid Affected Economies in September 2020

Tables II shows the Poisson regressions of covid fatalities, covid cases and GDP per capita on host of its macro determinants. Incidence Rate Ratio estimates are reported. The results take care of endogeneity, multicollinearity and specification bias if any (see the appendix section at the end) as such econometric issues naturally happens in cross country study at one particular point of time. The other limitation of the study is that while performing stata codes the number of observations are lost maybe because the stata algorithm may be considering uniformity of the data across variables.

Table II above shows that the following variables have significant impact on the covid fatalities by looking at the p values. Higher Population aged 60 and above and higher index of stringency leads to higher covid fatalities while better governance leads to reduction in covid fatalities. IRR helps us to gauge the magnitude of the changes in the dependent variable as well. Better Governance leads to approximately 36 per cent reduction in covid fatalities while higher lockdown stringency leads to 3.5 percent increase in covid fatalities. Higher population above 60 leads to more than 11 percent increase in covid fatalities. Higher Capital health expenditures at 6 percent level of significance reduces covid fatalities by nearly one percent.

The latter means that we need to equip our hospitals with greater capital health infrastructure also signifying that this covid virus probably affects the entire body starting from pulmonary infections to vascular. Unemployment is also weakly related with covid fatalities with 7 percent increase in covid fatalities due to unemployment. The other factors like BCG immunization, malaria incidence, share of urban population, debt to GDP, number of doctors and nurses, democracy, undernourishment, population density are insignificant in explaining covid fatalities across countries. We also tried another specification by including stringency square as one more explanatory variable. This specification did not show robust inverted u shaped relationship between average lockdown index and covid fatalities.

Table II also shows that the following variables have significant impact on the total covid cases by looking at the p values. Capital Health expenditures and debt to GDP ratio reduces covid case across countries while index of stringency and population above 60 increased the covid cases across countries. Capital health expenditures and debt to GDP reduces covid cases by one and two percent respectively. Aged population and index of stringency increased cases by thirteen percent and four percent respectively across 215 countries in September, 2020. We also tried another specification by including stringency square as one more explanatory variable. This specification did show robust inverted u shaped relationship between average lockdown index and covid cases.

Table 1 Explaining Covid Fatalities, Covid Infections and GDP per capita across Countries in September 2020

Independent variables	Total deaths	Total cases	gdppercapita
capitalhealthexpirunus	0.995677***	.9955486**	1.001504**
	(0.0022321)	(. 0019314)	(0.0007167)
BCG	0.984983	1.001549	
	(0.01590)	(.013557)	
MALARIA	1	1	
	(6.49e-08)	(5 .98e-08)	
undernourishmentpop	0.9888	.9678682*	
	(0.0112)	(. 0179106)	
democracyindex2 019eiu	1.259	1. 218496*	1.050922
	(0.1859)	(. 1265362)	(.059022)
unemploymenttotaloflaborforceilo	1.077***	1.02715	1.043379
	(0.0411)	(. 0412588)	(.021218)
debtofgdpl	0.9846	.9851133**	.98736***
	(0.010)	(. 0063971)	(.003617)
urbanpopulationshare	1.010911***	1.007756	1
	(0.00649)	(. 0066803)	
doctors16	0.9999	.9999967	1.00001**
	(0.0010)	(3 .33e-06)	(6.18e-06)
popproportionover6016	1.1198**	1.130831***	.915568**
	(0.0010)	(. 0297618)	(.036208)
populationdensity	0.9991263	.9991279	1.000104
	(0.0010)	(. 0007509)	(.000700)
governancerating06	0.6410**	.9775722	2.06256***
	(0.0982)	(. 1183524)	(.2S4279)
index_stringency	1.03559***	1.04229***	1.00925
	(0.0140)	(. 0084864)	(.00717)
healthexpofgdpl7			.80032***
			(.050822)
lifeexpentancy			1.02822**
			(.009973)
totalcases			1
			(1.84e-06)
totaldeaths			.999979
			(.00006)
urbanpopulationshare			1.00080
			(.002717)
brodbandsubslOOppl			1
			(4.24e-12)
cons	103.9351	528. 3494	
	(148.4)	(743. 5336)	
Number of observations		42	55
Pseudo R2	0.85910	0 .8845	0.7018

Note: The poisson regression estimates are IRR estimates.

Source: Compiled results of Poisson Regressions

What explains GDP Per capita acroso covid affected economies in the month of September,2020? Better Governance across countries leads to maximum 106 percent improvement in GDP per capita, index of stringency has positive but insignificant impact on GDP per capita across countries, More doctors increases GDP per capita across countries, debt to GDP reduces GDP per capita across countries by two percent, unemployment increases GDP per capita across countries by 4 percent signifying that probably disruptive technologies like automation, Robotics and driverless vehicles,among others are impacting the GDP per capita across countries, higher life expectancy improves GDP per capita to the tune of two percent while higher capital health expenditures promotes GDP per capita while covid casesand covid deaths do not have significant imapct on GDP per capita across countries.

It is to be noted from our study, using oxford stringency index, lockdowns do not have imapct on GDP per capita across countries . Maybe submeasures defining Oxford University Stringency Index are having negative imapct on GDP per capita across countries. They include, work place closing, restrictions on domestic and international travel and public gatherings,among others. Grand lockdowns have surely increased covid fatalities and covid cases but the relationship may turn out to be polynomial in nature between lockdowns and covid infections..

Deep learning model ANN, Artificial Neural Network,are also applied to subset of covid affected economies, 125 in all using R Studio codes. BCG vaççinations , Health expenditures, urbanization and governance in that order matters for explaining covid cases, among others as of May 1 across 125 covid affected economies. The model has one input, one output layer and one hidden layer with two nodes. Output is weighted average of nodes. Nodes are in turn weighted average of variables.

WHAT FACTORS EXPLAIN COVID 19 SPREAD ACROSS 32 INDIAN STATES AND DISTRICTS IN MAY 2020 AND OCTOBER 2020?

Again, for saving time and space we do not show the count data regressions on Indian states data set on May 2020 and again in October 2020 in the text. They are available with the authors which show the magnitude of various factors affecting variability in state GDPs and covid infections. We summarize the results below-

Count data regression and spatial regression of covid cases across 32 Indian states on number of green spots in states, number of tests done in different states, population above 65, mortality rates, health expenditures, number of hospital beds, population density, average annual temperatures, humidity, malaria incidence, pollution levels, undernourishment, urban population share, immunization and internet usage a proxy for media reach.

All variables are significant and come with right signs except health expenditures and BCG immunization. Green spots, number of hospital beds, internet usage, and incidence of malaria, high temperatures, and capital health expenditures reduces covid infections.

Pollution (polynomial relationship), population density (spatial with changing impact), mortality rates, urbanization, undernourishment in states, humidity and population above 65 and number of tests done causes higher covid infection in Indian states. Covid data on Indian states from covidindia.org as of August, 2020

Count data has used MLE based on Poisson density function. Lakshadweep has zero covid cases among relatively some very low number for covid cases in north east states. That is why we found count data regression relevant and robust.

Covariates show that Indian state GDPs impacted more by GST collection, investments, education and health expenditures, among others. Covid cases are still more prevalent in richer states but are reaching

rural areas. Unemployment leads to lower resources to fight the pandemic. Capital health expenditures and higher health expenditures and total tests done reduce cases. Their maybe two-way relationships of state GDPs and cases with health expenditures. Capital health expenditures acts as a good instrument for health expenditures and IV and GMM estimators are robust to reducing capital health expenditure in reducing covid cases and fatalities across Indian states. Although, Reproduction rate has come down for India, it is still above 1. AP, TN and southern states, along with Delhi and J and K are doing quite well in terms of doing testing. Surveys in Delhi are indicating that antigen tests in general may show that immunity are key to fighting the pandemic. It is to be noted that in case of Indian states covid deaths have negative impacts on state GDPs across states. This may be due to the fact that around 35 percent of deaths in India are happening in the age of 45 and 60(see diagram VII below). This relatively younger population may be more exposed to the covid infections and may not have incomes to support their long run health care once affected. Provision of health cards and making accessible large budget medical insurance are key to support the vulnerable population.
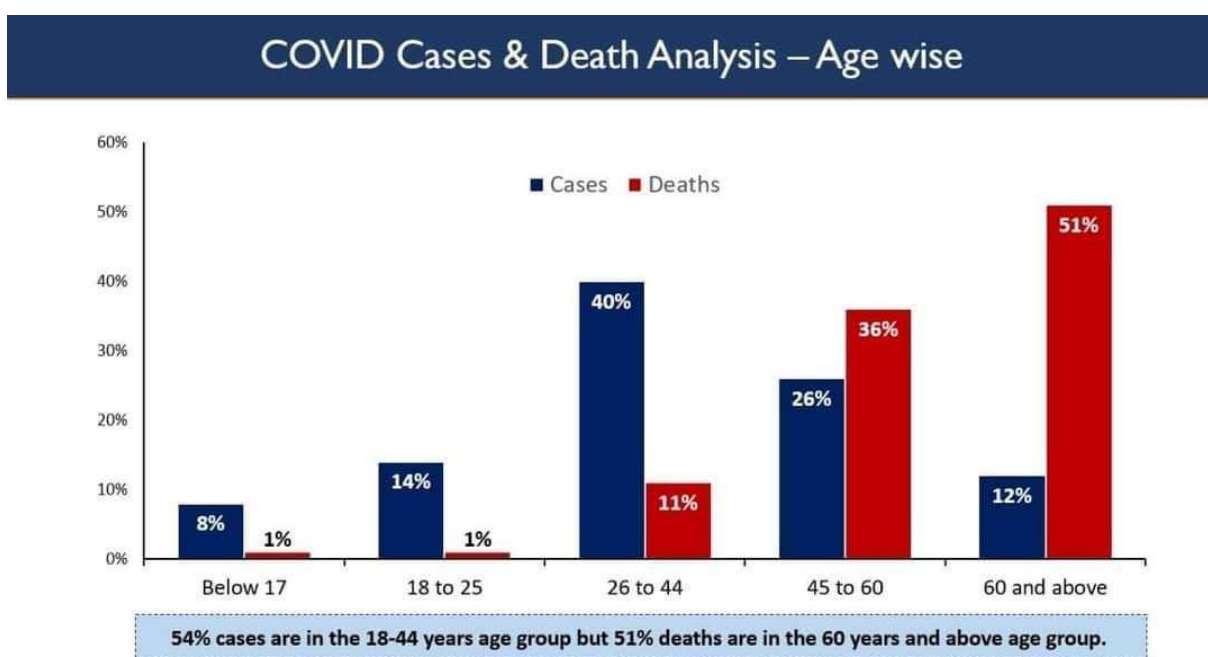
Figure 3 Age wise Profile of Covid cases and Covid Fatalities in India

Source: Ministry of Health, GOI

What explains covid spread, covid fatalities and covid recoveries across Indian states and union Territories on October 26 Th, 2020 as compared to May 2020? We used Poisson and spatial regressions for our work. Orange zones and population density reduces covid cases in October. Population density which came out to be positive using spatial regression in May 2020 is now having negative impact meaning probably information campaigns are important at least in the rural area for reducing covid cases. Number of tests done and poverty increases number of cases in October 2020. Ro is declining and maybe be nearing one and one of the reasons that cases are still touching fifty thousand per day is more number of tests are being done in India now, touching more than 100 million tests. In May 2020 green spots, number of hospital beds, internet usage, and incidence of malaria, high temperatures and capital health expenditures reduced covid cases across Indian states. Pollution, population density, mortality rates, undernourishment, humidity and vulnerable population, aged, people with co morbidities increased cases in May 2020. Immunity with social distance measures and patience are the key to fight the covid battle along with demographic dividend in terms of higher younger population and family values to take care of the elders. Higher incomes surely help to fight the covid battle on sustained basis. Stringency in India had positive impact on cases using time series data and panel data (see below) and

if quadratic relationship are accounted as in case of all 215 countries across the world, average lockdowns indices have inverted u shaped relationships with covid cases

District level analysis of India using count data regression, spatial regression and pictorial plots are shown at the end in the appendix tables. Sub districts hospitals, population density, urban population and sub centers of primary health care facilities matters for covid spread at district level. Interestingly, look at the histogram below. More than 200 districts out of 735 districts in India shares border with 6 to 7 districts, 150 districts share its borders with 5 to 6 districts in India and so on.

CONCLUSIONS AND POLICY RECOMMENDATIONS

- The lockdowns sub measures across the 215 affected countries including India seems to have more detrimental impacts on GDPs while having positive impact on covid cases, fatalities and covid active cases. We did not find evidence of lockdowns having impacted GDPs across countries as it seems that countries which had adopted supply side and demand side measures to raise the aggregate supply and demand in the economies have been able to stem the detrimental impact of lockdowns on the economy. The lockdowns seems to have polynomial relationship with covid infections(robust) and GDP s across countries. Grand Lockdowns in India seems to have increased covid cases and infections in India. We should have had partial lockdown with commensurate use of fiscal and monetary measures to increase demand and adopt supply side measures like provision of wage subsidy to sustain employment. Rural and urban employment guarantee schemes should be strengthened.
- The study has used cross sectional and time series daily data of covid cases and growth rates and fatality rates to determine the causes of covid spread across 215 countries and indian states and districts. Cross country regressions do have econometric issues of multicollinearity, specification bias and endogeneity. The study takes care of such issues
- The study would help determine the magnitude and directions of interventions like stringency index to capital health expenditures, share of urban population, immunization, poverty, undernourishment, temperatures and humidity, pollution, vulnerable population, among others in ensuring lives and livelihood across regions.
- Various econometric and mathematical models are applied along with nonparametric approach to data analysis. Deep learning models would help us to analyze dynamic nature of the data.
- The study would model Indian states that have led the corona war and suggest new models of integrated and inclusive development, education and health care systems to take care of economic and health crises confronting economies all over.
- Covid 19 is likely to impact the developed nations more than the developing nations in terms of reduction in GDP numbers. Unemployed in south Asia would be around 200 million people with 100 million people falling below the poverty line.
- Solidarity budget whether by printing notes or borrowing domestically and abroad needs to take care of lives and livelihood. Social distancing and patience would matter along with international surveillance of viral infections by multilateral institutions along with upgrading R and D in vaccination research
- What can reenergize the Indian economy? One, through trade and integration with Asia, Latin American economies, Oceania and African countries, by strengthening governance and democracy with decentralization, ICT reach, strengthening civil society, renewable, strengthening rural capacities, businesses, universities, technology and science and engineering education, health capacities and vaccination r and d, 4IR moving forward from electricity and steam engines to digitalization, AI, ML and deep learning.

- Vocal on local does not mean challenging the law of comparative advantage given by Ricardo and others. Changing comparative advantage in your favor is the key and can happen with 4IR, and that can happen with AI, deep learning, technology. E-governance, digitalization, provider of pharmacy to the world, automation. Will that effect employment. Did computers reduce employment?

- Surely as we relax lockdown measures cases would go up. However, at least in India death rates are low while recovery rate is above 97 percent. All governance factors, rule of law, effective governance and regulatory quality have inverted U shaped relationship with covid cases. Therefore, if governance measures are relaxed covid cases would go up. Numbers of physicians, hospital beds, higher temperatures, higher capital health expenditures, and democracy reduces covid cases.

- PDFs of covid cases rightly skewed. For stabilizing economy fiscal and monetary measures through DBT would help, hand over dual aadhar card to migrants and shift production to rural areas for ensuring livelihood and lives. For increasing demand relax income tax and indirect tax measures for all.

- MSMEs and banks have their own set of issues, debt and they may use government funds to pay for their own debt. Core is contractualization and casualization of labor and where in employment of contract/ casual labor has been outsourced due to regulations and cost saving exercise of parental organizations. Goes with outsourcing are medical benefits and other decent work conditions for the labor as spelt out in UNs SDGs.

- World evidence has shown that corona is more prevalent among urban population. To sustain lives and livelihoods supply capacities should shift to rural areas where in rural and agricultural MSMEs should play transformation role of agriculture being transformed into industry by focusing on providing alternative energy needs by using biotechnology.

- Agglomeration and clustering in agriculture can sustain growth. Further inland connectivity, high tech construction, promoting trade and outward investments in ports, roads and telecommunications and harboring value chains are key to success. ICT and 4IR technologies can be facilitators to growth process. We need to shift comparative advantage in our favor by adopting the above policies and become *atmanirbhar* in true sense of the word ..

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BUSINESS INTELLIGENCE MODEL BASED ON DATA WAREHOUSING AND MACHINE LEARNING

Nenad Stefanović∗

University of Kragujevac, Faculty of Technical Sciences, nenad@ftn.edu.rs

Jelena Plašić

University of Kragujevac, Faculty of Technical Sciences, jelena.plasic@ftn.edu.rs

Andrijana Gaborović

University of Kragujevac, Faculty of Technical Sciences, andrijana.jovicic@ftn.edu.rs

Abstract: *Data became a critical corporate asset and information turn out to be one of the key components of the competitive advantage and sustainability. In today's digital world, enormous amount of heterogeneous and high-velocity data is generated. This data has huge potential value, but many organizations failed to utilize this large amount of data. In this paper, business intelligence system for advanced analytics based on data warehousing and machine learning models is presented. Its main purpose is to support better business decision making by integrating relevant data form various sources, and transforming it into usable and accessible information and knowledge. In order to demonstrate the effectiveness and usefulness of the proposed BI system, an experiment with the real-world dataset from the retail industry has been carried out. Data has been integrated into the single multidimensional data warehouse. For advanced analytics, such as predictions, classifications, and associations, several machine learning (ML) models have been created. These ML models complement data warehouse reporting with advanced knowledge that can be used for effective decision making and proactive actions.*

Keywords: *Business intelligence, Data science, Data warehousing, Machine learning, Advanced analytics*

JEL Classification*: C 55, C 88, C 89*

∗ Corresponding author

INTRODUCTION

In today's business environment a large amount of data is collected in the company's information systems. Since many managers sometimes do not have the access to data in a timely manner, they make decisions based on their instinctive knowledge or expertise that can result in a reduced productivity and a decision-making process that lacks precision (Ochara and Mokwena, 2016; Rostami, 2014).

Unstructured data requires specialized data modelling techniques and advanced data analytics tools in order to process those data and extract insights and information as needed by organizations. Business intelligence (BI), data science and big data technologies encompass the collection of platforms, services, and tools, as well as data modelling and analytical methods for efficient data integration, storage, processing, and reporting.

The BI system combines several analytical technologies, services and tools for data extraction, transformation, and loading, in-memory storage and processing, data warehousing, machine learning, and cloud-based visualisation and reporting.

The key objective of BI tools is to convert different types of data from different sources into meaningful and valuable information, which is very crucial for businesses (Ritesh and Srimannarayana, 2013).

BI is used by retailers to understand customer needs, optimize price alignment with current trends and determine upcoming trends (Zamba et al., 2018). It is useful for addressing supply chain risks in categories of demand, supply, process and environmental risk in the retail industry, which is crucial for retail companies (Olexova, 2014).

Reliance on adequate and relevant data allows businesses to make effective decisions and ultimately achieve a competitive advantage (Ritesh and Srimannarayana, 2013). According to Liu et al. (2018) the need for continual analysis and innovation to remain competitive through new opportunities is what sets a lot of successful businesses a part from failing ones.

BUSINESS INTELLIGENCE MODEL

Business intelligence (BI) is a data-driven decision support system that combines data gathering, data storage, and knowledge management with analysis to provide input to the decision process.
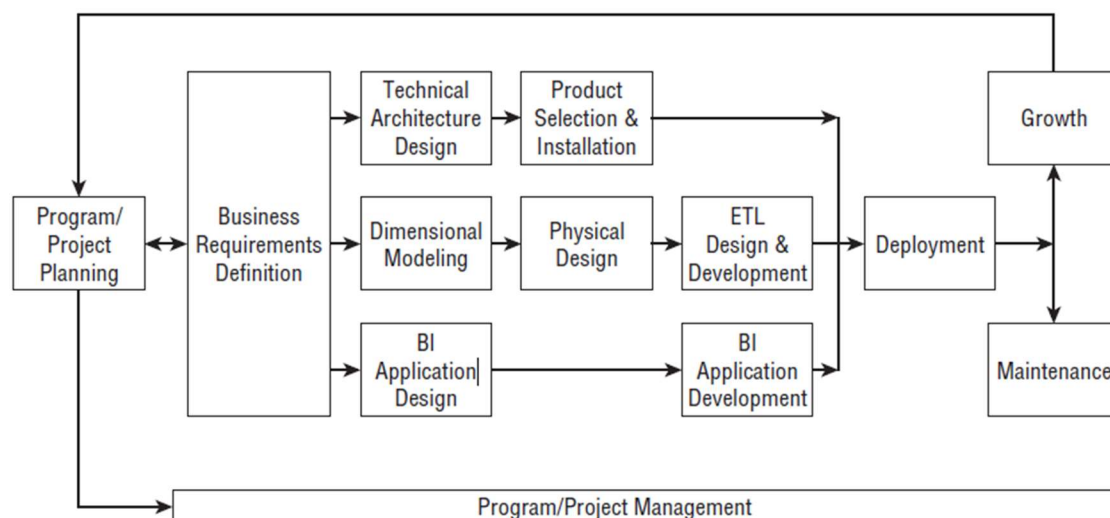
Figure 1 Business Dimensional Lifecycle diagram

Source: Ralph Kimball, Margy Ross, Bob Becker, Joy Mundy, Warren Thornthwaite, The Kimball Group Reader: Relentlessly Practical Tools for Data Warehousing and Business Intelligence Remastered Collection, Wiley, (2015)

Business intelligence uses a large database, typically stored in a data warehouse or data mart, as its source of information and as the basis for sophisticated analysis. Analyses ranges from simple reporting to slice-and-dice, drill down, answering ad hoc queries, real-time analysis, and forecasting (Burstein, 2008). Successful implementation of a data warehouse/business intelligence (DW/BI) depends on the appropriate integration of numerous tasks and components. The Kimball Lifecycle (Business Dimensional Lifecycle) approach to DW/BI implementation is illustrated in Figure 1 (Kimball, 2015). The Lifecycle diagram is the overall roadmap depicting the sequence of tasks required for effective design, development and deployment.

Project Planning and Management - The Lifecycle begins with project planning, which addresses the definition and scoping of the data warehouse project, including readiness assessment and business justification. Throughout the Lifecycle, ongoing program and project management tasks keep activities on track.

Business Requirements - Major opportunities across the enterprise are identified, prioritized based on business value and feasibility, and then detailed requirements are gathered for the first iteration of the DW/BI system development.

Three concurrent Lifecycle tracks follow the business requirements definition:

Technology Track - DW/BI environments mandate the integration of numerous technologies, data stores, and associated metadata. The technology track begins with system architecture design to establish a shopping list of needed capabilities, followed by the selection and installation of products satisfying those architectural needs.

Data Track - The data track begins with the design of a target dimensional model, where data is divided into either measurement facts or descriptive dimensions. Dimensional models can be instantiated in relational databases, referred to as star schemas, or multidimensional databases, known as OLAP cubes. Regardless of the platform, dimensional models attempt to address two simultaneous goals: ease of use from the users' perspective and fast query performance.

The dimensional model is converted into a physical design where performance tuning strategies are considered and extract, transform, and load (ETL) with four major operations: extracting the data from the source, performing cleaning and conforming transformations, delivering the data to the presentation layer, and managing the back room ETL processes and environment.

Business Intelligence Track focuses on identifying and constructing a broad range of BI applications, including standardized reports, parameterized queries, dashboards, scorecards, analytic models, and data mining applications, along with the associated navigational interfaces.

Deployment, Maintenance, and Growth

Deployment represents the convergence of technology, data and end user applications accessible from the business users' desktop. The deployed iteration enters a maintenance phase, while growth is addressed by the arrow back to project planning for the next iteration of the DW/BI system.

Throughout the Kimball Lifecycle, it is necessary to focus on business users by providing them with ongoing support and education, and to make sure that the processes and procedures are in place for effective ongoing operation of the DW/BI. DW/BI acceptance and performance metrics should be measured over time and logged to support marketing of the DW/BI (Kimball et al., 2015).

The purpose of Business Intelligence is to make it possible to combine data from multiple sources, analyze and systemize information, and then disseminate the information to relevant stakeholders. On that way companies are able to see the big picture and make smart business decisions.

According to Howson (2013) increasing competition has further contributed to the complexity and made achieving business growth and sustainability very challenging, therefor involvement in work, consistency and mission further enable an organization's members to understand the need for, and the usefulness of, the system and to make efforts to use it effectively.

Those who adopted the approaches in business intelligence have experienced effective completive advantage and dominance in the market and have excelled in their product delivery to customer satisfaction, as claimed by Kester (2015).

RESULTS AND DISCUSSION

SQL Server provides an integrated platform for predictive analytics that encompasses data cleansing and preparation, machine learning, and reporting. Machine learning uses well-researched statistical principles to discover patterns in large sets of data. Typically, these patterns cannot be discovered by traditional data exploration because the relationships are too complex or because there is too much data. Applying the machine learning algorithms makes it possible to forecast trends, identify patterns, create rules and recommendations, analyse the sequence of events in complex data sets, and gain new insights.

This paper aims to describe how a company can use the knowledge gained from machine learning algorithms to offer existing customers other, complementary products or services of the same company and thus deepen the customer's reliance on the company and reduce the possibility for losing customers.

For this purpose, the company can edit some part of the website so that it has the ability to predict products that the customer might want to buy, based on other products that are already in its market basket, as well as to better understand customer behavior, and make the website adjusted so that items purchased together appear together.
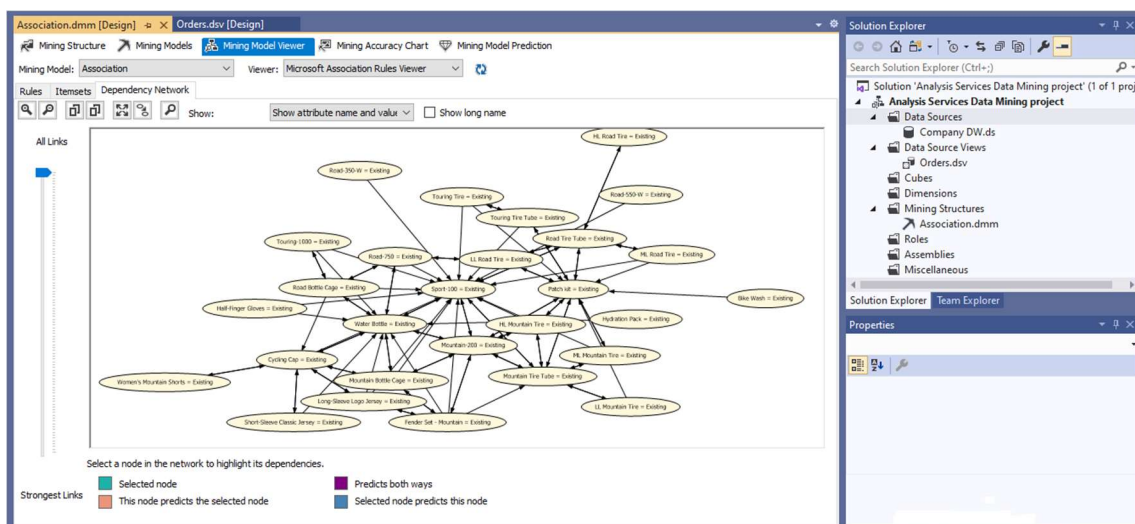
Figure 2 Dependency network view discovered by the Association algorithm

Source: SQL Analysis Services, Screenshot

Dataset that has been used is sourced from multinational manufacturer and seller of bicycles and accessories. The products were classified into five categories: bicycles (mountain, road and tourist), accessories (such as helmets and water bottles), clothing, components and services. The company is based in the United States. There was a huge amount of information of this company in the transaction system, so queries over the transaction database could reveal a lot about the dynamics of business and the nature of data, but in order to obtain better data analysis, a data warehouse and business intelligence were needed.

Therefore, the data warehouse, created by the ETL process, was used, because in that way the data from several sources were stored in tables of dimensions and facts, suitable for OLAP analytical data processing. For market basket analysis, the most convenient is to use machine learning algorithms. In this way, items of customers' historical transactions are available, and it is possible to anticipate additional items that customers might want to buy.

For this purpose, the SQL Server Analysis environment and machine learning Association Rules algorithm, suitable for the needs of market basket analysis, were used.

Once the model is created and processed, the generated results can be viewed through three types of views: Rules, Itemsets, and the Dependency Network.

Figure 2 shows the result in the form of a dependency network, where interactions of different items in the model can be explored. Each node in the view represents an item, while the lines between them represent rules. Prediction connections can be observed by selecting a node. In some cases, there is a two-way connection between the items, which means that they often appear in the same transaction.
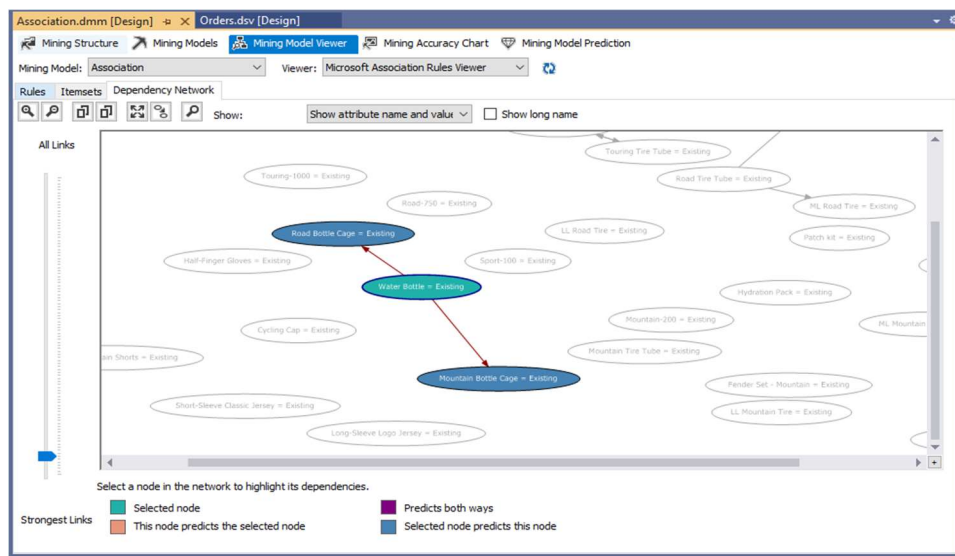
Figure 3 One of the strongest connections between nodes discovered by the Association algorithm

Source: SQL Analysis Services, Screenshot

The line connecting the two items indicates that these items are likely to appear in the transaction together, that is, that customers are likely to purchase these items together. The graph shows all nodes by default, but when complex this can be less clear, so it is possible to zoom in further if necessary to see the details. By filtering, it is possible to see which connections are stronger and which are weaker. The Result carried out in Figure 3 shows that one of the stronger connections is, for example, between the node representing the Water Bottle and the Road Bottle Cage and Mountain Bottle Cage, i.e. that the customers who bought bottle, most often bought some of the two types of bottle holders.

There is also the possability to see the list of itemsets that the model identified as frequently found together, with following attributes: **Support,** i.e. the number of transactions in which the item set appears**, Size,** i.e. number of items in a set of items and **Itemset** - items included in each set of items.

Figure 4 shows the rules that the association algorithm discovered with following attributes: **Probability, Importance,** and **Rule**. The probability describes how likely the result of a rule is to occur. The importance is designed to measure the usefulness of a rule. Although the probability that a rule will

occur may be high, the usefulness of the rule may in itself be unimportant. Each rule can be used to predict the presence of items in a transaction based on the presence of other items.
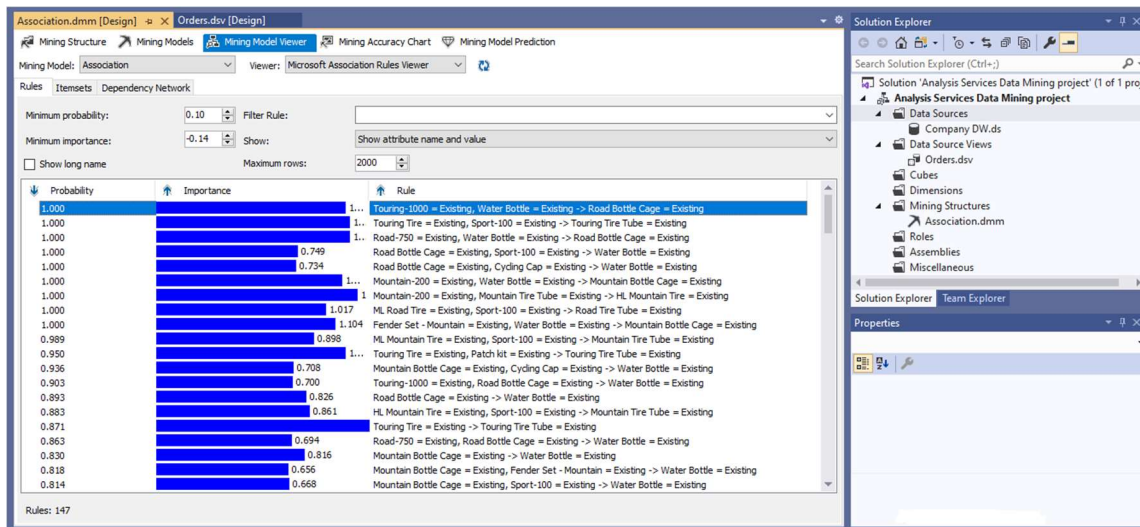
Figure 4 Rules discovered by the Association algorithm
Source: SQL Analysis Services, Screenshot

After the models have been processed, the information about associations stored in the model can be used to create predictions. Prediction queries on an association model can be very useful because they can recommend items to a customer, based on prior or related purchases, find related events and identify relationships in or across sets of transactions.

From the model exploration it has already been known that the Touring Tire product is most often purchased with the Touring Tire Tube product, but it is useful to predict which products to offer to a customer who is already buying these products together. The query was created to display predictions based on two products from the consumer basket, as well as the probability for each predicted product, after which the result of the display is a prediction along with support and probability (Figure 5).

MODEL	$SUPPORT	$PROBABILITY	$ADJUSTEDPROBABILITY
Sport-100	4334	0.291...	0.252...
Water Bottle	2866	0.192...	0.175...
Patch Kit	2113	0.142...	0.132

Figure 5 *Product prediction based on two products from the market basket*
Source: SQL Analysis Services, Screenshot

After deployment of the model in a production environment, users can use it to make reports, create predictions, and make business decisions. This example shows how a market basket can be analyzed using the SQL Analysis Services tool, and how to interpret the obtained results. The company can use the obtained data in order to analyze the sales, streamline business processes and forecast sales and demand, and thus improve the business by cost reduction or revenue increase.

CONCLUSION

The study has presented business intelligence system for advanced analytics based on data warehousing and machine learning models and its impact on the business performance. Systems like this are essential for managing today's global businesses.

Created machine learning model shows how market basket analysis using BI tools can help discovering the patterns in customers purchases and gain the knowledge needed to increase profitability through cross-selling, recommendations, and promotions.

Successful implementation of BI system can help organization to achieve several benefits, such as optimizing organizational efficiency and performance. BI makes it possible for companies to meet emerging business demands that allow them to stay ahead of the competition.

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A SURVEY ON CONSENSUS PROTOCOLS IN PERMISSIONLESS BLOCKCHAINS

Nenad Tomić[*]

University of Kragujevac, Faculty of Economics, ntomic@kg.ac.rs

Violeta Todorović

University of Kragujevac, Faculty of Economics, v.todorovic@kg.ac.rs

Milena Jakšić

University of Kragujevac, Faculty of Economics, milenaj@kg.ac.rs

Abstract: *Each blockchain must have in itself a protocol for achieving consensus among participants. Design and operational features of consensus protocols depend of blockchain type. The subject of the paper are consensus protocols in permissionless blockchains. The aim of this paper is to highlight differences between performances of analysed protocols. The analysis covers six consensus protocols of permissionless blockchain. The comparison is made on the basis of following characteristics: investment costs, energy consumption, safety, throughput and scalability. Results indicate that none of the protocols shows absolute dominance over others regarding all aspects of comparison. The Proof-of-work makes performing an attack significantly hard, but it has big requirements of resources referring to energy and initial investments. Blockchain systems which are designed for the purpose of saving in resource consumption are less resistant to malicious users' attacks. Therefore, it is concluded that preferential performances should be taken into account when selecting a consensus protocol.*

Keywords: *permissionless blockchains, consensus protocols, throughput, resource consumption, scalability*

JEL classification: *C 19, G13, G 14,*

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[*] Coresponding author

INTRODUCTION

The emergence of blockchain technology is related with the emergence of the first cryptocurrency Bitcoin at the end of 2008 (Nakamoto, 2008). It is a technology that enables decentralized database management. Although in general public it is still connected to cryptocurrencies, the blockchain showed its capacity for implementation in a broad context of electronic business. Hence, the blockchain enables smart contract production, as electronic self-executing contractual relationship between two business entities (Szabo, 1997). The visible part of a blockchain is the public ledger of performed transactions, whereby transactions do not mean just fund transfer, but also any form of business activity which affects the record status. The less visible part of blockchain is the consensus protocol that enables the process of data entering to be automated (Crosby et al. 2016).

There are three types of users in blockchain system: nodes, full nodes and miners. An ordinary node could be payer or transaction recipient, but it does not participate in their incorporation into block, nor does it keep the copy of public ledger. In contrast, full node keeps a copy of the public ledger. A miner is a full node which has the ability to create a new block of transactions. Blocks are memory units that contains the information about performed transactions. All network users are equal and there is not a trusted third party (Belloti et al. 2019). System users do not know each other and they cannot be sure that other individuals or groups are not malicious. In order to retain the system integrity, the data must be confirmed and accepted by majority of users, if not by everyone. This means that every blockchain must have a built-in consensus protocol (Bamakan, Matavali & Bondarti, 2020). Only the data that consensus was reached for will be inserted in the ledger. Protocol must define who is authorized to propose the data for the new block, in which way other users confirm the input and is there a reward for it. Blockchain performances such as resource consumption, scalability and safety level, depend of the consensus protocol design (Xiao et al. 2020).

The subject of this paper are consensus protocols in permissionless blockchains. The purpose of the paper is to highlight the key differences between performances of observed protocols. In order to determine advantages and disadvantages, comparative analysis will be used. In the first section of the paper the difference between permissioned and permissionless blockchains will be made. Also, key characteristics of blockchain technology will be represented. Observed consensus protocols will be introduced in the second section. The essence of the third section will be to determine advantages and disadvantages of each protocol in comparison to its competition, through comparative analysis according to the key features.

CHARACTERISTICS OF BLOCKCHAIN

The blockchain is based on the known technologies and methods, such as asymmetric cryptography, Merkle tree and hash function. Asymmetric cryptography is used for digital signature of transactions, while timestamping is applied in order to determine their chronology. Hash value is primarily used to secure immutability of the transactions' content. The blockchain represent a chain of blocks that contain records of certain transactions. The block content depends on the content of previously entered block, because a new status depends upon the previous one as well as upon changes brought by transactions. Because of this, a hash record of the previous blocks is entered into newly added block, thus preventing any change of their content (Oliveira et al. 2020).

Absence of trust among network users represent the basis of blockchain environment. Parties that execute a transaction and that confirm it, do not know each other, so there is a mutual distrust between them. However, with sharing the public ledger among great number of users and signing of transactions,

this issue is surpassed. Transactions are executed in a decentralized manner, with the consensus of a large number of network users. After that, transactions are entered in the public ledger, which is available to every interested party and which displays the current state of the system. This eliminates the need for the intermediary who would transmit and store data (Zheng et al. 2018). Transactions once inserted in the public ledger are irreversible. Transaction blocks are interconnected via hash functions, so each attempt to change the previously added transaction leads to a change in all succeeding blocks. Because of the fact that changes in public ledger are transparent, every abuse attempt is aggravated. If malicious user tries to change the content of all succeeding blocks, he will encounter disagreement with the public ledger already downloaded by other users.

When one of the network users wants to execute a new transaction, he/she firstly applies hash functions to the transaction, and then signs the calculated hash value with his/her own private key. The signature is required for the transaction authentication. The task of other users is to confirm the transaction content and the user who proposed it. This means that digital signature should identify the user and that hash value of the proposed transaction should match the one signed by the user. After the confirmation, one of the network users (it depends on the algorithm) has the opportunity to add transactions into the block and to propose to others to add a new block into the public ledger (Ismail & Materwala, 2019). The suggested block contains the hash value of the previous block, the timestamp and the list of new transactions. In order to accept the suggested block, other users check whether the block size is within limits of referent values, whether it is timestamped so it follows previously added block, and also the hash values of the suggested block, the previously accepted block and each transaction within a block (Antonopoulos, 2014).

According to the basic classification, blockchain systems could be permissionless and persmissioned. There are conceptual differences between these two types in terms of accessibility and roles users could have. Permissionless blockchains could be accessed by any user. Each participant is allowed to take any role in the system, so it could act as a node, full node or miner (Lin & Liao, 2017). Because of above mentioned features, these blockchains are often called public (Salimitari, Chatterjee & Fallah, 2020).

In permissioned blockchain systems, there is a precise selection of available roles for each user. Small number of predetermined and identified users could have the role of miners (Wang et al. 2019). Generally, other users might be free to take roles of nodes and full nodes, or the whole system can be invitation-only. Because of mentioned features, these blockchains are often called private or consortium blockchains. However, this terminology contradicts the real nature of blockchain. One institution could be the initiator of blockchain creation, it could affect the choice of identified and known miners, but it could not completely "own" the system. Such system would be centralized, and that goes against the basic blockchain premise, that it is a decentralized network without a trusted institution. For every business application with a trusted institution it is far better to use some other technology for distributed database management.

CONSENSUS PROTOCOLS IN PERMISSIONLESS BLOCKCHAINS

The design and operational features of consensus protocols depend on the type of blockchain system. Those differences are often so expressed that their cross comparison could be confusing. Namely, choice between two types of blockchains is conditioned by the system purpose. Therefore, the choice of a specific consensus protocol is a consequence of previous choice of blockchain type. Hence, it only makes sense to compare protocols designed for the same type of blockchain. In this section follows a description of basic features of consensus protocols for permissionless blockchains.

Proof-of-work

Proof-of-work (PoW) is the oldest protocol, suggested in 1992 by Dwork and Naor, in order to prevent spam e-mails. In the blockchain technology it was applied for the first time on Bitcoin. It is very computer intensive method, based on SHA-256 hash function. It is competitive, because miners compete to be the first to achieve the solution that allows block insertion. It is very difficult to reach the solution but its credibility check is trivial. In order to find a solution, the miner applies hash function to basic parameters of a new block (hash of the previous block, hash of Merkle tree, hash of transactions inserted in the block) and random variable known as nonce. The resulting hash function should meet certain requirements (for instance, to begin with the string 0000). The mining process means frequent attempts and failures until nonce that meets the requirements is found. After having found a solution, the miner sends to the rest of the network a new block and a nonce. The verification process is trivial and if transactions are valid, the rest of the miners accept the suggested block as a new solution (Salimitari et al. 2017). A block is valid if more than half of the miners agrees with it. The miner whose solution is accepted wins a reward in the form of newly created coins.

The algorithm adapts its difficultness, so if the number of miners increases thus reducing time for block creation, the given requirements would become more demanding. The average time for block creation is 10 minutes, and task difficulty adaption is made on the sample of the last 2016 blocks.

$$D_{new} = D_{current} \; x \; \frac{20160}{T_{2016}} \tag{1}$$

In the equation (1), D_{new} represents a new mining difficulty, $D_{current}$ represents actual difficulty, while T_{2016} represents duration of mining last 2016 blocks expressed in minutes.

Thanks to the compute intensity, this protocol is extremely resistant to the attempts of abuse, because malicious miners need exceptional computing power. For those cryptocurrencies that have developed miners' community, fraud expenses exceed potential benefits (Shanaev et al. 2019). Miners with potent computing systems have greater chance to reach the solution first. This is the reason why miners were firstly buying the latest graphic cards, because they are more potent than processors in the quick calculations. However, nowadays there are specialized devices – ASICs - that are used for mining. The second issue is energy consumption. Since the protocol is competitive and calculations are extensive, the energy consumption is really high. The most of cryptocurrencies are based on the PoW; Bitcoin (and all its forks), Ethereum, Litecoin, Monero, Dash and other enters that group.

Proof-of-Stake

Proof-of-stake (PoS) is the second most popular consensus protocol, suggested in 2011 by Vitalik Buterin. In this protocol, nodes which create blocks are called validators or forgers so the block creation process is called forging, not mining. Contrary to PoW, the competition of nodes in the systems based on the PoS is not technical (Saleh, 2020). This means that there is no direct competition of forgers to be the first one to suggest the solution which meets requirements. Therefore, blockchain system based on PoS are not too computer intensive.

$$Coin\ age = total\ coins\ staked\ x\ number\ of\ days\ those\ coins\ are\ held\ at\ stake \tag{2}$$

There is no reward in the form of newly created coins for block insertion, but the forger gets fees from transactions inserted into a block. Instead of direct competition, the next forger is chosen on the basis of stake amount criterion in the particular currency. The stake is lost in the case of malicious behavior during block creation. There are two methods for the selection of the next forger: the method of coin age and method of hit value calculated on the base of user's private key. The coin age method is formulated according to the equation (2).

The forger with the highest coin age value is selected. Thus, not only that the number of coins in possession is important, but also the possession length (King & Nadal, 2012). If the number of coins had been the only criterion, the forger selection would have been semi repetitive in the best case scenario. However, it is required that minimal possession length is 30 days. This prevents nodes from getting the chance to process transactions suddenly after purchasing a big amount of coins. Also, maximal possession length is limited to 90 days, in order to avoid another possibility that the owner of small amount gets the opportunity to insert the block because of the long possession. This is important because coin investment guarantee that the forger will not behave maliciously.

A method of hit value calculated on the base of user's private key involves encrypting of the last block hash value with user's own private key and then the application of hash function to encrypted value. The first eight digits from the new hash value are taken and they should be lower than the set value. For those users with a lot of coins in the possession, the set value is higher, which increases their chances to be selected as forgers. The shortcoming of PoS is the fact it favors the rich. Nodes with more coins in possession get the opportunity to process transactions, charge a commission and become even richer. Peercoin represents the first cryptocurrency which used PoS, and besides it, this group includes Binance coins, Polkadot, Stellar, and Cardano.

Proof-of-Burn

The Proof-of -burn (PoB) is a competitive protocol, in which nodes do not in terms of computing power, but in terms of amount of money that they invested in the network. Namely, the node that wants to be the next miner has to send amount of coins to no return address known as *the eater address* (Nguyen & Kim, 2018). Since coins in this way disappear from the network, it is said they are burnt. Transactions for coins burning are recorded independently from those included in a block. In that way the node has shown the readiness to be committed to the network. The invested coins increase the chance for the node to be chosen as the miner, but they are not guarantee. Regardless of the burned amount, the process of miner selection is algorithmic, wherein burned amount and time of investment have the significant role. The node with the lowest value of equation (3) will be selected as a miner.

$$Burn\ hash = (internal\ hash)\ x\ multiplier \hspace{2cm} (3)$$

The internal hash is obtained as a hash value of the hash value of burn transaction, time which passes since then and the next block number. The multiplier is obtained as a fraction whose denominator is the number of coins burnt and nominator is a factor which decays their value with the time elapse. The more coins burnt means the higher chance for the node to decrease internal hash in order to get the right to become a miner. But, with time passing, the factor from the nominator will increase the multiplier value and in this way it will decrease those chances. Therefore, early users are not in the considerable lead or, so to say, it is necessary to invest all the time in order to get a chance to create a block. On the other hand, this leads to favoring of nodes that could invest all the time, i.e. to favoring rich participants. The PoB is implemented in the blockchains of cryptocurrencies Slimcoin and Third Generation Coin.

Proof-of-Capacity

The Proof-of-Capacity (PoC), or Proof-of-Space, PoS) is algorithm created with the aim to overcome the issues of great energy consumption (PoW) and of favoring of the rich (PoS, PoB). Miners invest storage space on their hard drives, whereby more free space gives higher chances to be selected for the next block creation (Dziembowski et al. 2015). The process of new block creation has two phases: plotting and mining (Hazari & Mahmoud, 2019). Using the Shabal hash algorithm, the miner makes a draft of all possible solutions for the correct block and calculates how much time the mining of the block

will require. The winner is the miner who finds the block that can be assembled before the others. Since those are really large size documents, the miner with more free space will make more drafts in order to have a higher chance to be the first to assemble the block. Hash functions used in PoC are not computer intensive, so there is no need for the special equipment, nor for great energy consumption. Although, there could be a competition among miners in terms of available storage space. PoC is implemented in blockchain of cryptocurrencies Chia, Burstcoin and Spacemint.

Proof-of-Importance

Proof-of-Importance (PoI) is a protocol designed to improve performances of PoS (Bach, Mihaljevic & Zagar, 2018). Namely, it was noted that in systems based on PoS a large number of users avoid making transactions in order to achieve the better score of coin age. Therefore PoI builds on the idea and chooses the node that will insert the next block according to the score of importance. A score of importance includes three factors: number of coins possessed by the node and period of the possession, the number of users with whom the node performed transactions in the previous period and also number and amount of performed transactions. In order to prevent malicious users from faking the last factor, only net transaction value between two users are taken into account. The value of each transaction which enters the netting process has to be higher than set minimal value. The transaction share in the score of importance is decreasing and it completely disappears 30 days after the execution. In this protocol, nodes that create blocks are called harvesters, so the process itself is called harvesting. The harvester gets transactions fees as a reward. The Proof-of-Believability works on the similar principle so drawn conclusions would be valid for both protocols. PoI is used for reaching consensus in NEM blockchain.

Proof-of-Activity

Proof-of-Activity (PoA) is a hybrid form designed to overcome the limitations of two mostly used protocols, PoW and PoS (Bentov et al. 2014). It was noticed that if there was decreasing of reward in newly created coins, there would arise certain issues with PoW systems in the future. Bearing in mind that those systems are really computing intense and expensive, miners will require the higher reward in the form of transaction fees. As a result, the systems based on the PoW would become so expensive and consequently they would become economically unprofitable for executing transactions. Therefore, the idea was to adopt the best of both mentioned protocols through hybrid form.

The PoA starts as an ordinary PoW, but miners do not create the complete block with performed transactions, but only the header of the empty block. After that, system selects the N validators that will do the block validation and fill it with transactions. The selection is done according to layers of nodes and from each layer a certain node is selected as a representative (Belfer et al. 2020). In this way, it is obtained a broad decentralization of transaction validation. Validators check if the block header meets the criteria and signs the block. The last validator fills the block with transactions and signs. After that, the block is distributed to the rest of the network for validation. The transactions fees are divided between N validators and a miner who created the header of the empty block. This protocol is used in cryptocurrency Decred.

COMPARISON OF OBSERVED PROTOCOLS

Generally, all comparisons of blockchain protocols are founded on two key criteria: safety and costs. In terms of safety, the most important criterion is prevention of malicious users' attacks. While system could not prevent their emergence, it could make their action difficult and pointless, by setting demands which are hardly possible to meet. The system should be designed to discourage efforts of malicious

users. When it comes to costs, this category should be observed as heterogeneously. Some protocols need fixed investment in the expensive equipment, while others demand great energy consumption. These categories are seen separately in the analysis, because high costs in one category do not imply high costs in other one. So, in this paper, energy costs will be considered separately, as well as investment costs.

Bach, Mihaljevic & Zagar (2018) compare protocols from the aspect of scalability and the rewarding policy. Ismail & Materwala (2019) include in the analysis throughput of protocols, scalability, data privacy and complexity. Zhang & Lee (2020) compare protocols from the aspect of scalability and individual restraints. Bodkhe et al. (2020) do the broad analysis which include throughput of the network, scalability, nodes identification, network delays, fees and costs divided by categories. Wang et al. (2019) cites advantages and disadvantages of protocols according to criteria of complexity, centralization level and transaction finality. Bearing in mind representative researches in this field, in this paper the comparison is done on the basis of following characteristics: investment costs, energy consumption, safety, throughput and scalability. The Table 1 presents the results of comparison.

Table 1 Comparative analysis of observed consensus protocols for permissionless blockchain systems

Protocols Characteristics	PoW	PoS	PoB	PoC	PoI	PoA
Investment costs	High	High	High	Medium	Medium	Medium
Energy consumption	High	Medium	Low	Low	Medium	Medium
Safety	High	High	Medium	Medium	High	High
Throughput	Low	Medium	High	Medium	Medium	Medium
Scalability	Low	Medium	Low	Medium	Medium	Low

Source: Author, according to a wide literature.

The ideal protocol would require low investment costs and moderate energy consumption, also high level of safety, high throughput and scalability. In practice, protocols do not have all desirable features. Because of the need for distinctively equipped computing systems, PoW represent extremely negative choice from the aspect of investment costs. Beside high initial investments, this protocol is also the most energy consuming one (Todorović & Tomić, 2019). Thus, PoA which is partly based on PoW, could not have low investment costs nor low energy consumption. PoS, PoI and PoB require initial investment for coin purchase in order to get the right for new blocks creation. From the cost aspect, probably the most favorable solution is PoC, because it implies low initial investments (storage space on the hard drive is much cheaper than specialized devices for PoW) and low energy consumption.

It should be emphasized that neither one of protocols show 100 % of resistance to malicious users' attacks. However, most of protocols show satisfactory high level of resistance to the most dangerous type of attacks, that is the transaction verification attack. In order to carry out that kind of attack, when it comes to PoW, 51% of the network computing power should be collected, which is very expensive investment and hardly economically justified. In PoS, malicious individuals must have very high investment in terms of coin purchase, in order to get the opportunity to control 51% of network (Sayeed & Hector-Gisbert, 2019). The same goes to PoI and PoA as hybrid protocol. PoB and PoC show certain issues. Malicious user in PoB is not penalized in the case of abusive behavior, because he already invested money in the attempt to become a miner (in the PoS for instance, a validator is punished with the entire stake and in PoB only with burnt amount). In PoC, users could have issues with privacy and integrity of their own data, because malicious users found a way to use the mining software for the entrance on the hardware of other users. Throughput of any protocol is not on the level of card payments processors, which are supposed to be able to process acceptable number of transactions in the second. The small number of transactions built into blocks combined with the low block insertion frequency lead to

accumulation of transactions that are not executed. This issue is especially expressed in PoW and in the most popular cryptocurrencies which use it. Only PoB shows bigger throughput, thanks to the extremely high frequency of block insertion.

Scalability could be explained as an ability of system to adapt itself to the increase of demanded services without essential changing of key performances (Laudon & Traver, 2008). Therefore, it is preferable for protocols to maintain same level of fees and to avoid delays due to the accumulation of transactions that are not performed when they become widely used. PoW is known for problematic scalability (Vukolić, 2016). Moreover, PoA must have bad scalability, because it is partly based on PoW and because the reward for miner and validators depends of selected transactions. With the increase of transaction number, validators would seek to process just those transactions which offer higher fees. Also, with the increase of competition in PoB and PoC, the need for addition investment would be intensified, which would make transaction process considerably expensive. The issue arises because neither of those protocols, nor PoA and PoI could test their scalability in practice, because of the low application level.

CONCLUSION

Based on the previously stated, it is clear that neither one protocol shows absolute domination in terms of all comparison aspects. It could be concluded that during consensus protocols selection one should bear in mind priority features. Although it could be assumed that safety is the only rational aspect of comparison, that is not the case in practice. Lately, there is a tendency to combine driving forces of new information revolution with the purpose of achieving the effects of synergy. One of the basic ideas for blockchain systems in the future is their use for communication of devices in the ecosystem of the internet of things. Because those devices have very low computing power and storage space, all technologically intensive protocols are undesirable. Also, transactions that are to be processed should primarily be cheap, which eliminates protocols with great energy consumption. High throughput is very important as well as satisfactory scalability. According to conclusions driven in the third part of paper, those criteria will not be fulfilled by any of the observed protocols.

When it comes to cryptocurrency systems, PoW shows absolute dominance. However, the comparison displays that PoW actually does not have essential comparative advantages in terms of performances, so that in certain aspects (energy consumption and throughput) it is inferior to other protocols. Two key factors which contributed to popularity of PoW could be identified. Firstly, Bitcoin as the first cryptocurrency directed all of attention to blockchain technology and to PoW as its first consensus reaching solution. All cryptocurrencies made as copies of Bitcoin have the same consensus protocol. Secondly, PoW requires high equipment expenses but also it allows miners to get in and out of the business when they want. Mining equipment is highly demanded and it could be sold easily. When it comes to protocols such as PoS, PoI and PoB, miners should investment large amounts for coin purchases in order to compete for mining. In practice, it means that on the one side these systems protect the rich, but on the other side the miner could end up with many coins whose value is constantly declining and disappearing. This is the reason why PoW is more acceptable solution.

The biggest obstacle to the comparative analysis is extremely asymmetric use of mentioned protocols. Performances of individual protocols could not be evaluated completely reliably, and because of this numerous operative solution are not included in the paper. To fully understand consensus protocols another type of blockchain systems should be considered. Hence, this paper is just one side of the complete review. In the future research, authors should also include protocols intended for permissioned blockchain systems. Also, not even this review represents the complete and final picture. Work on the

development and improvement of protocols is an ongoing process, so the analysis of relevant features solution should be done continuously.

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THE PLANNING AND ANALYSIS OF MANAGEMENT INFORMATION SYSTEM AND DESIGN OF MODULAR APPLICATION IN THE FUNCTION OF BUSINESS PROCESSES INTEGRATION

Dragana Rejman Petrović
University of Kragujevac, Faculty of Economics, rejman@kg.ac.rs *

Ivana Nedeljković
University of Kragujevac, Faculty of Economics, ivana.nedeljkovic@kg.ac.rs

Abstract: *The paper objective is modernization of agency business operation through automation and digitalization of the mentioned business processes, by projecting corresponding software solution for the integration of identified business processes. The research in this paper implied the use of observation method, examination method and document analysis, survey and interview methods, associate matrix, Data Flow Diagram (DFD) and Entity Relationship Model (ERM). For MIS design prototype the method for Business System Planning (BSP), Structured Systems Analysis (SSA) and the Systems for managing data bases have been used. The implementation of suggested MIS prototype in the observed agency would lead to: the automation of routine businesses that last long, digitalization of business processes, complete integration of data, by which the quality of communication with key stakeholders would be enhanced and the process of managing and decision-making would be improved, since the agency does not possess management information system.*

Keywords: *Management Information System, Planning, Analysis, Design, Application, Business Process Integration*

JEL Classification: *M150*

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* Corresponding author

INTRODUCTION

The research in this paper started from the problem that was identified as non-application of contemporary software solutions and information and communication technologies in the business operation of a chosen agency and manual performance of business processes, along with the use of application for spreadsheets or text processing.

Having that in mind, the subject of the research in this paper are the business processes of the observed agency related to employer branding, establishment of HR sector, candidate selection, development program and research in HR.

In accordance with the research subject, the research objective has been defined as the development and design of MIS prototype for the support of business processes integration in agency.

The paper objective is modernization of agency business operation through automation and digitalization of the mentioned business processes, by projecting corresponding software solution for the integration of identified business processes.

For the purpose of the improvement of agency business operation the objectives of agency, the objectives of management information system, key business processes and accompanying documentation, as well as the demands of identified stakeholders were analyzed.

Starting from the defined research subject and objective, the following research questions have been set:

- Will MIS implementation enable complete integration of business processes?
- Will data integration be realized by MIS implementation and thus management and decision making processes be improved?
- Will MIS implementation improve the quality and efficiency of communication with key stakeholders?

The research in this paper implied the use of observation method, examination method and document analysis, survey and interview methods, associate matrix, Data Flow Diagram (*DFD*) and Entity Relationship Model (*ERM*). For MIS (Laudon & Laudon, 2012; Kroenke, 2011) design prototype the method for Business System Planning (*BSP*), Structured Systems Analysis (*SSA*) and the Systems for managing data bases have been used.

CURRENT STATE ANALYSIS

The agency for which the planning and analysis of management information system and design of modular application have been performed deals with providing services in the area of human resources, i.e. offers to other companies the services of best candidates selection, monitoring of employees, monitoring of competences and discovery of individual development zones. The entire documentation of agency business operation is in paper and electronic form. During business operation large number of documents is being used. Some of these are: Client inquiry – selection, Description and specification of work position, Action plan of selection, Job advertisement, List of candidates, HR tests, Decision on the chosen candidate, Final report – selection, Invoice – selection, Transfer order – selection, etc.

Business operation of the observed agency is not supported by any information system. Thus the development and implementation of corresponding system for the support in decision making would significantly improve the integration of business processes, management and decision making. The observed agency has modernly designed website that provides basic information on agency, employees,

as well as the description of all services that are being provided. The agency possesses five computers and two printers and has fast Internet access provided.

The communication with business partners is mostly done via e-mail, telephone and by direct communication in agency premises.

DESIGN OF NEW LOGIC PROCESS MODEL

For the purpose of the design of new logic process model, CRUD matrix is being created (Figure 1) in which all the processes and classes of data that appear in business operation of the observed agency have been displayed. Within the matrix 5 subsystems can be discerned and these are: Employer branding, Establishment of HR sector, Candidate selection, Development program and Research in HR. Each of these subsystems represents the service provided by this agency.

Processes \ Data classes	1. Client inquiry-employer branding	2. Condition analysis questionnaire	3. Strategic plan	4. Action plan- employer branding	5. Monthly report-employer branding	6. Final report - employer branding	7. Invoice - employer branding	8. Transfer order employer branding	9. Client inquiry-establishment of the HR sector	10. Meeting list	11. HR assessment questionnaire	12. Condition assessment report	13. HR process assessment report	14. Action plan-establishment of the HR sector	15. Monthly report-establishment of the HR sector	16. Report on the implementation of the agreed steps	17. HR assessment questionnaire 2	18. Condition assessment report	19. HR process assessment report 2	20. Final report - establishment of the HR sector	21. Invoice - establishment of the HR sector	22. Transfer order - establishment of the HR sector	23 – 57. data class
1. Receiving inquiry-employer branding	C																						
2. Analysis of the current situation	R	C																					
3. Strategy development		R	C	C																			
4. Implementation of defined steps			R	R	C																		
5. Closing employer branding			R	R	R	C																	
6. Sending an invoice- employer branding	R					R	C																
7. Receipt of payment- employer branding							R	C															
8. Applying for the establishment of the HR sector									C														
9. Holding an initial meeting									R	C													
10. Defining current processes									U		C												
11. Evaluation of defined processes										U	U	C	C										
12. Planning the establishment of the HR sector			R										R	C									
13. Implementation according to the action plan														U	C								
14. Completion														R	R	C							
15. Redefining the process																	C						
16. Conduct a reassessment																	U	C	C				
17. Comparing initial and final assessment													R						R	C			
18. Sending an invoice- establishment of the HR sector									R											R	C		
19. Receipt of payment- establishment of the HR sector																					R	C	
20 – 47. process (Picture 1b)																							

Subsystem labels shown in the matrix: **Employer branding** (processes 1–7), **Establishment of the HR sector** (processes 8–19).

Figure 1a CRUD matrix

Source: Authors

Figure 1b CRUD matrix

Source: Authors

Structural system analysis implied the creation of hierarchically organized set of diagrams for data flows of various abstraction levels (Kendall & Kendall, 2011) (Figure 2, Figure 3, Figure 4, Figure 5).
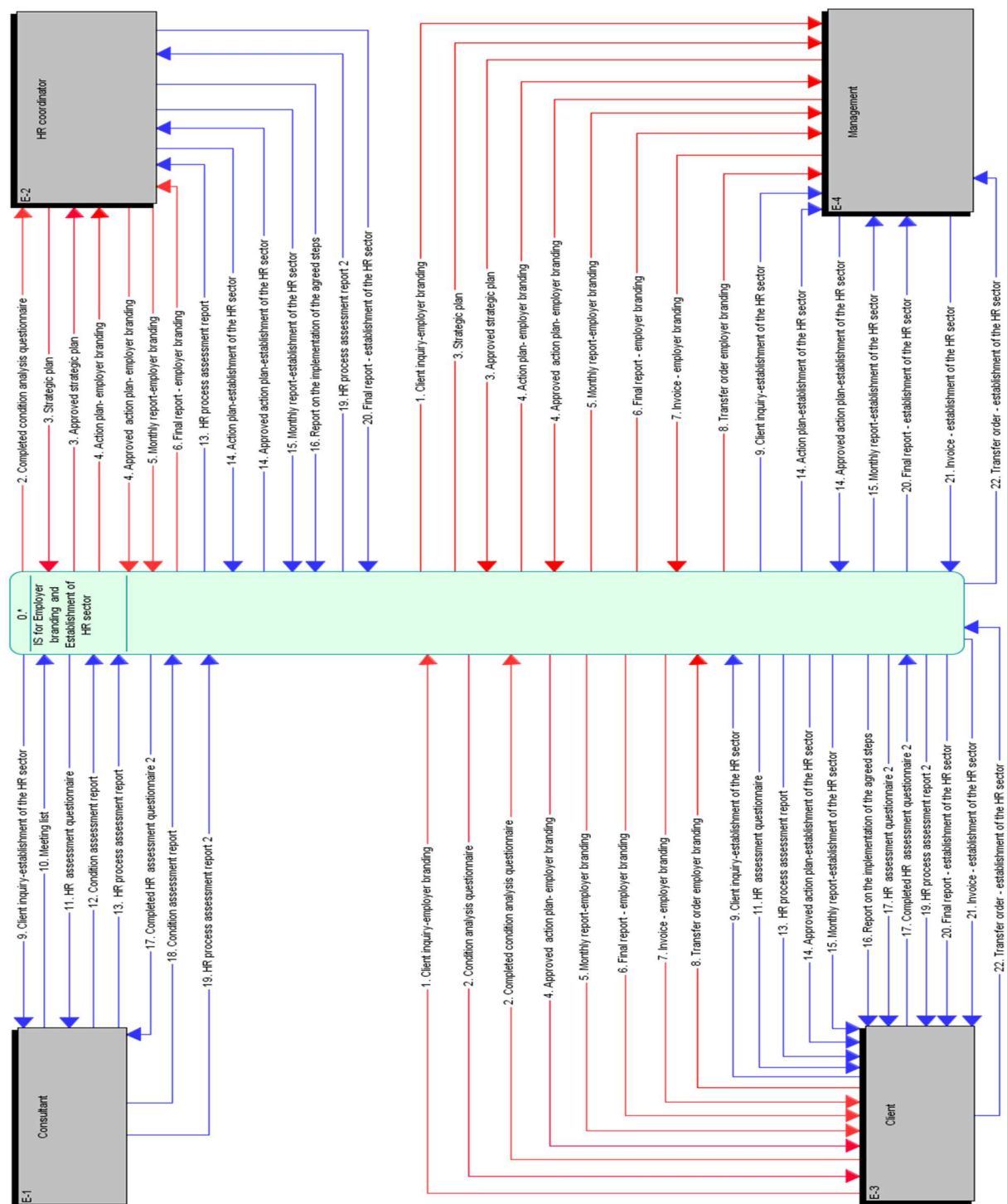
Figure 2: Context diagram for Employer branding and Establishment of HR sector
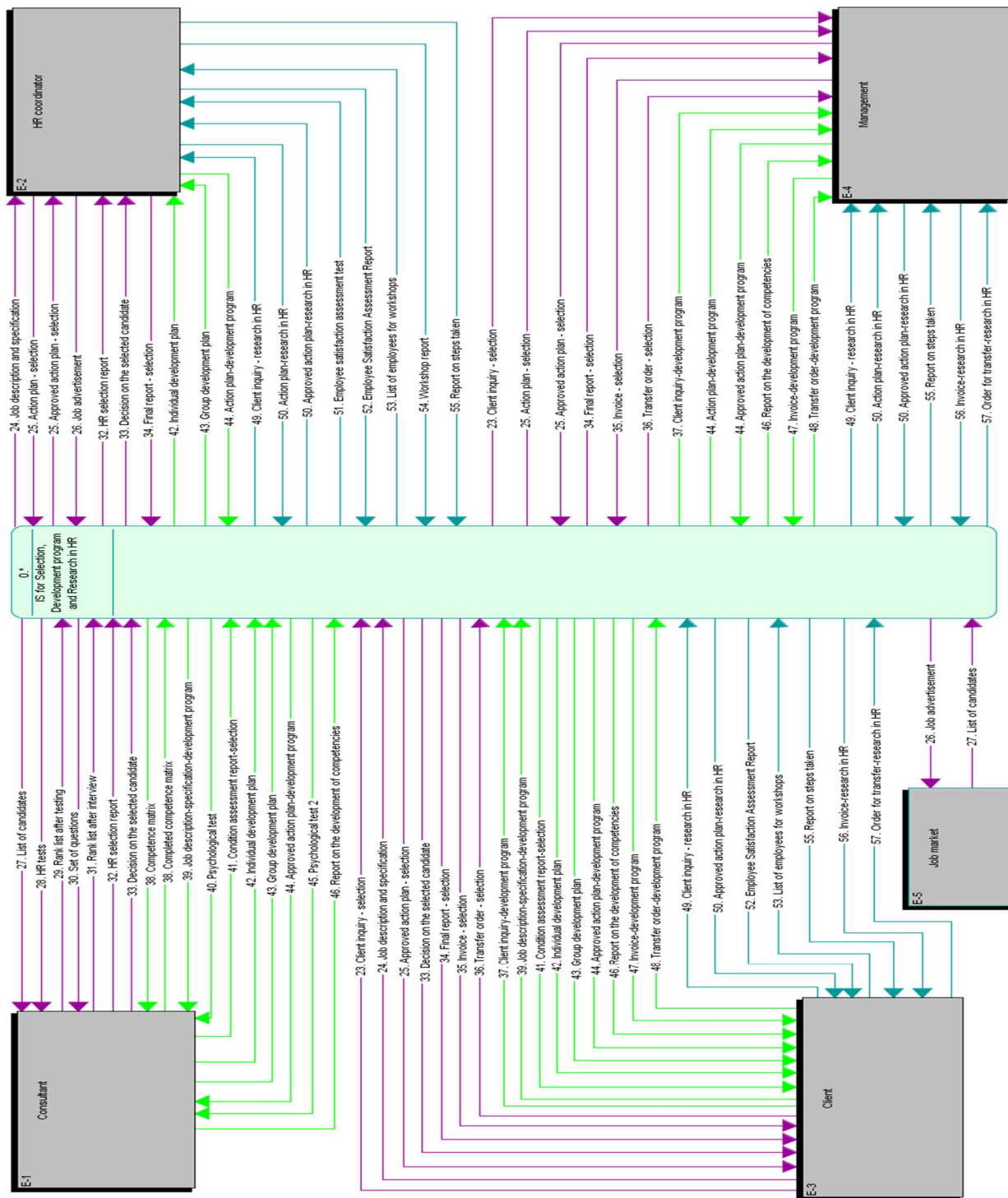
Source: Autors

Figure 3. Context diagram for Selection, Development program and Research in HR
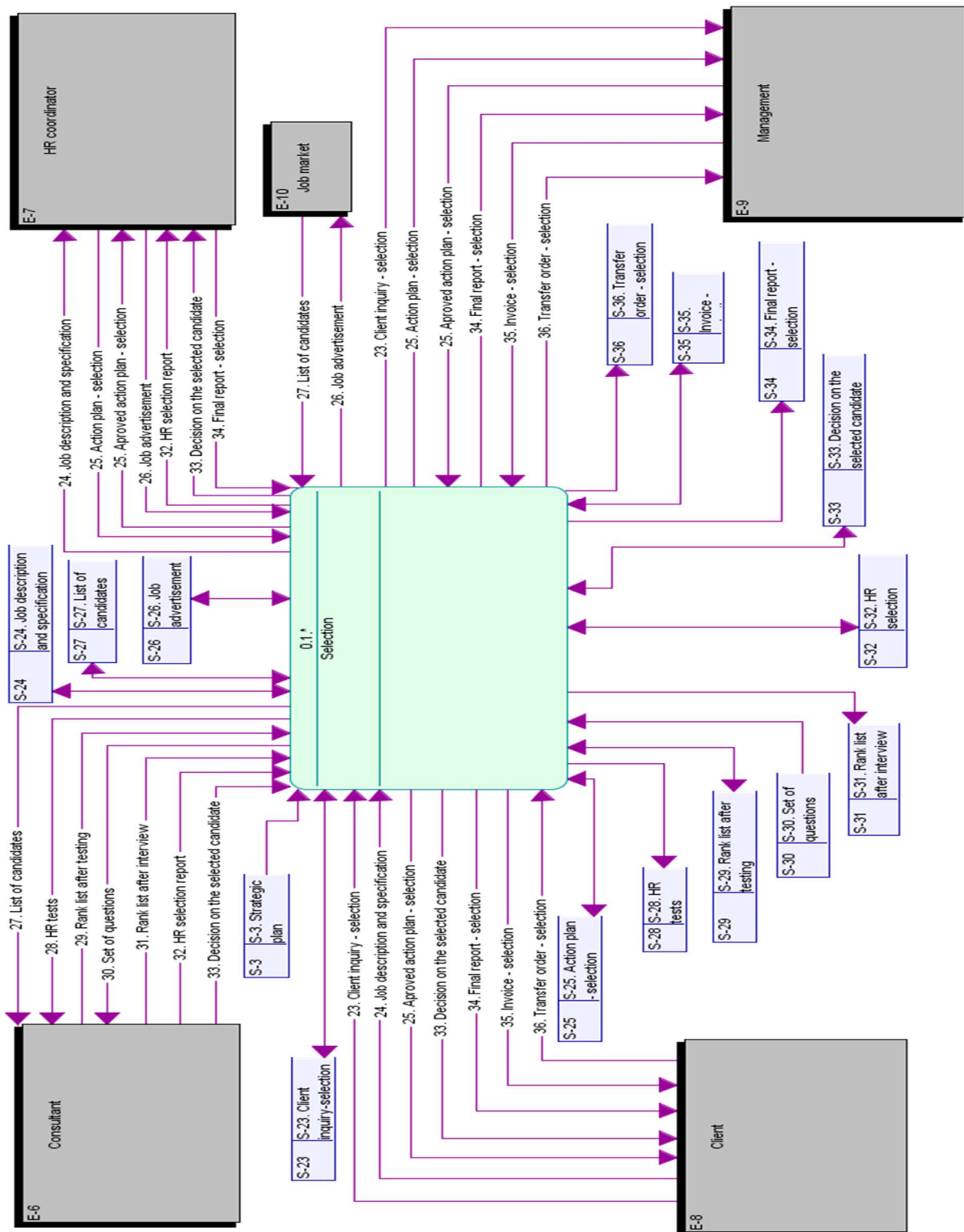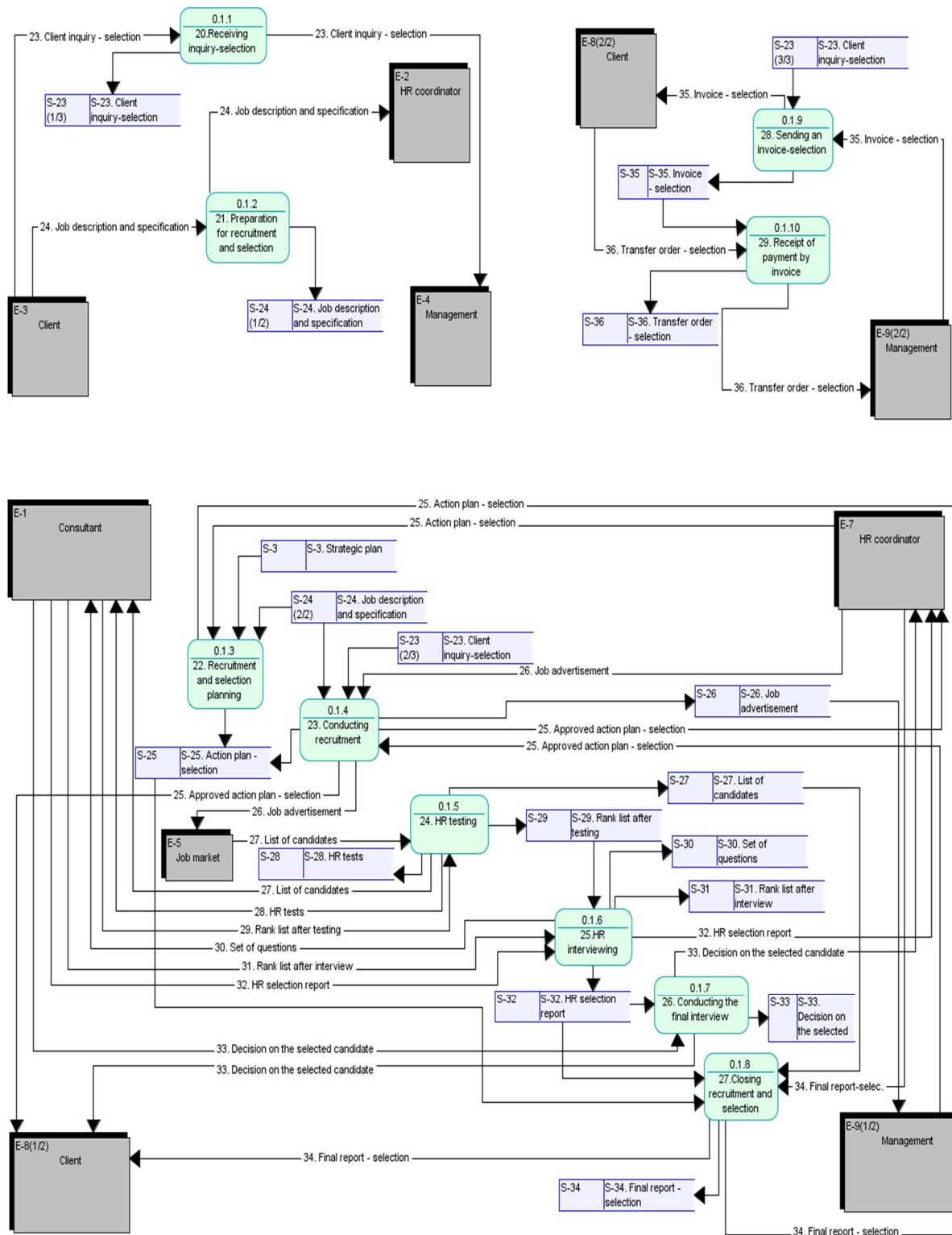
Source: Autors

Figure 4. Root diagram for Selection

Source: Autors

Figure 5. Diagrams of primitive functions for the Selection

Source: Autors

DESIGN OF INTEGRATED LOGICAL DATA MODEL

The following step in the development of management information system is the creation of data model. As key entities in modeling the real system of the agency, the following entities have been identified: business system, client, services, inquiry, invoice, job advertisement, etc.
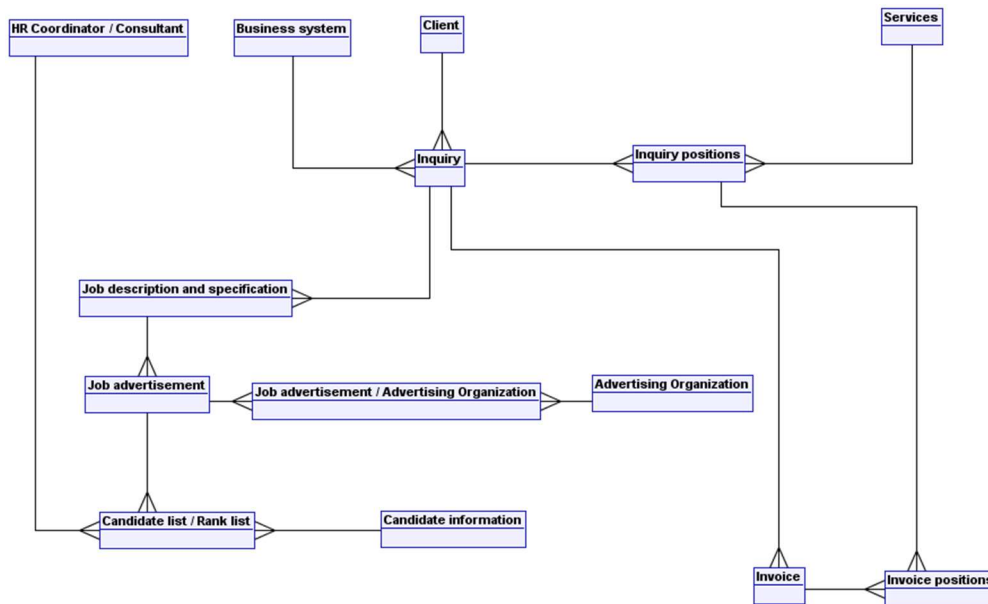
Figure 6. Data model

Source: Authors

DESIGN OF MODULAR APPLICATION IN THE FUNCTION OF BUSINESS PROCESSES INTEGRATION

Graphical user interface refers to the set of menus, commands, icons, graphical and other displays that the software implies, and that enable user to communicate and use the software.
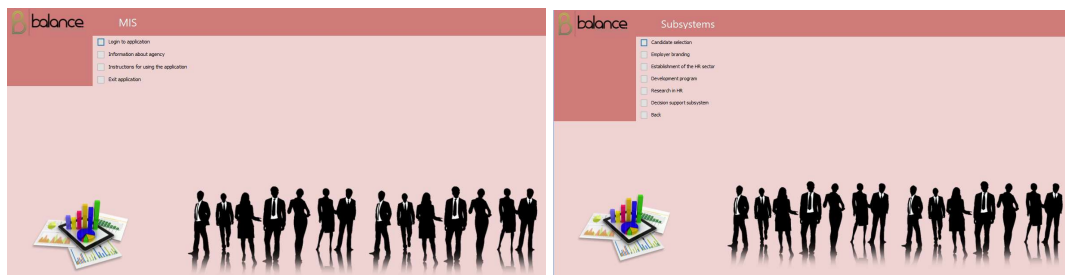
Figure 7. Home screen of application software for users

Source: Authors

DESIGN OF INPUT – SCREEN FOR ENTRY, UPDATING AND DATA REVIEW

Design and production of input prototype in MIS includes:

- Methods and requests for encompassing data and inputs in MIS (encompassing, input and entry of data),
- The control of graphical user interface for input design (it is realized with the help of: text tabs, circles for options choice, tabs for check-up, tabs for data listing, drop-down lists) and
- The manner of prototype production and designing of input in MIS (identifying attributes that will be registered, defining messages and information for the help of users, choice and designing corresponding types of graphical user interface and development of input screen prototype) (Arsovski, 2008).

For the entry, updating and review of data the forms that for user represent electronic form and facilitate the use of application have been used. In figures 8 the forms for entry, updating and review of data have been displayed.

Figure 8 Data entry, view and update screen

Source: Authors

DESIGN OF OUTPUT – THE REPORT FOR THE SUPPORT OF MANAGEMENT DECISION MAKING ON VARIOUS LEVELS

After the design of input, the following step is the design of output. The outputs imply the transformation of input data into the corresponding desired information on the process condition, business operation and the system.

When producing output, the queries have been created first and on the basis of them the corresponding reports as well. The queries enable users to filtrate the data and come to the information that would not otherwise be easily available. The reports represent the manner for information to be formed and displayed in the desired form.

List of candidates applying for a particular job advertisement

Name	Surname	Phone	Professional qualifications	Name of workplace
Irena	Anđelković	0635895245	VSS	Marketing manager
Nenad	Ilić	0604565776	VSS	Marketing manager
Andrija	Mandžukić	0675647113	VSS	Marketing manager
Milica	Nešić	0618723471	VSS	Marketing manager

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Figure 9 Report: List of candidates applying for a particular job advertisement

Source: Authors

List of candidates for a particular job advertisement who have passed the test

Name	Surname	Phone	Professional qualifications	Name of workplace
Irena	Anđelković	0635895245	VSS	Marketing manager
Nenad	Ilić	0604565776	VSS	Marketing manager
Andrija	Mandžukić	0675647113	VSS	Marketing manager

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Figure 10 Report: List of candidates who have passed the test

Source: Author

List of candidates who passed the interview

Name	Surname	Phone	Name of workplace	Number of years of experience	Passed interview
Irena	Anđelković	0635895245	Marketing manager	4	☑
Andrija	Mandžukić	0675647113	Marketing manager	3	☑

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Figure 11 Report: List of candidates who have passed the interview

Source: Author

Review a inquiries for an arbitrarily entered period

Client code	Inquiry code	Date	Service code	Price of service	Quantity
K3	UP19	6/16/2019	U4	80,000 RSD	1
K9	UP18	2/21/2019	U1	70,000 RSD	1

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Figure 12 Report: Review a inquiries for an arbitrarily entered period

Source: Author

Review a inquiries for an arbitrarily entered client

Client name	Inquiry code	Date	Name of service	Price of service
NIS				
	UP01	5/9/2012	Selection	70,000 RSD
	UP11	10/26/2016	Selection	70,000 RSD
	UP20	11/24/2019	Research in HR	40,000 RSD

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Figure 13 Report: Review a inquiries for an arbitrarily entered client

Source: Author

Review a inquiries for a specific service during a specific period

Client code	Inquiry code	Date	Name of service	Cena usluge
K8	UP10	2/18/2016	Selection	70,000 RSD
K1	UP11	10/26/2016	Selection	70,000 RSD
K9	UP18	2/21/2019	Selection	70,000 RSD

Tuesday, November 3, 2020 — Page 1 of 1

Figure 14 Report: Review a inquiries for a specific service during a specific period

Source: Author

Review of all invoices realized during an arbitrarily entered period

Client code	Invoice code	Date of payment	Service code	Value
K1	F11	12/5/2016	U1	70,000 RSD
K10	F14	8/9/2017	U5	40,000 RSD
K6	F15	12/12/2017	U5	40,000 RSD
K8	F10	3/29/2016	U1	70,000 RSD
K9	F12	3/29/2017	U5	40,000 RSD

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Figure 15 Report: Review of all invoices realized during an arbitrarily entered period

Source: Author

EVALUATION OF DEVELOPED PROTOTYPE OF MANAGEMENT INFORMATION SYSTEM AND THE ANALYSIS OF COLLECTED DATA

After the development of management information system, the presentation of developed software solution, its possibilities and the manner of use followed, and the interview was carried out, in order to perform the evaluation of performances of developed software by potential users.

Small number of potential users of MIS in the observed agency caused the application of interview, as the method for data collection. The data were collected from primary resources. In-depth interview included individual interviewing of each respondent (one on one), as well as group interviewing, that included simultaneous discussion of all respondents.

For the needs of interview the questionnaire with open questions was composed. The questionnaire at the beginning contained the questions related to the personal data for each observation unit in target group, while other questions were structured in three groups according to the research questions, which is represented in figure 16.

The collection of data that were used in the analysis enabled the obtaining of responses to defined research questions in this paper. Future research courses can be directed to the realization of new interview on the same target group of respondents upon the implementation of MIS, in order to observe real performances of the system and define the suggestions for the improvement of the said.

Since the analysis was based on the responses of the respondents, the qualitative analysis of responses was carried out.

On the basis of the opinion of all respondents on questions that are contained in the questionnaire per groups of research questions, the following conclusions undoubtedly emerged:

- That the implementation of MIS will enable complete integration of business processes;
- That by the implementation of MIS the integration of data will be realized and thus the processes of managing and decision making will be improved;
- That the implementation of MIS will improve the quality and efficiency of communication with the key stakeholders.

Research questions	Will MIS implementation enable complete integration of business processes?	What problems do you most often face with when performing business activities?
		For which activities would you need MIS?
		Do you think that MIS would enable you to more easily observe business processes?
		Do you often experience that you spend too much time implementing business activities? Which activities are these?
		Do you think that MIS would provide you better and more efficient performance of business processes?
		Which difficulties you most often face with when providing services?
		To which extent would the implementation of MIS contribute to faster and easier elimination of candidates that do not meet necessary conditions, as well as to more efficient implementation of the process of candidate selection itself?
	Will data integration be realized by MIS implementation and thus management and decision making processes be improved?	What are the deficiencies in the flow of data and information within agency?
		How fast you come to the necessary data and information?
		Is it complicated to you to come to desired information?
		Do you think that by implementing MIS easier management and observation of larger amount of data would be realized?
		To which extent would MIS enable the integration of data related to all the services that you provide?
		Which difficulties you are facing with when recording and searching clients' invoices? Do you think that MIS would enable easier and more simplified insight into them?
		What problems you are most often dealing with when making important decisions?
		What obstacles you encounter when composing necessary reports?
		Do you have any troubles when finding necessary reports?
		How much would MIS help you in overcoming problems of composing and searching the reports you had so far?
	Will MIS implementation improve the quality and efficiency of communication with key stakeholders?	Which were the deficiencies of your communications and cooperation with clients?
		Do you think that MIS would enable you better insight into the demands of clients?
		How much your clients help you in obtaining information?
		Do you perform the evaluation of satisfaction of your clients with your services?
		Do you have feedback on your clients' satisfaction?

Figure 16 The relation between research questions and query elements

Source: Autors

CONCLUSION

The research results in the paper reflect on:

- Identified demands and needs of management and employees for MIS;
- Implemented detailed analysis of performing business processes in the observed agency, performed choice of key business processes, identified interactions between processes, responsibilities for the processes and managing processes;
- Modeling business processes for the objective and thorough analysis of business system, and for the purpose of observation of starting postulates and possibilities for their improvement;
- Creating contextual, root and diagram of primitive functions with the help of corresponding software tools;
- Created two-dimensional associative matrix of process/class data;
- Developed logical process model;
- Developed logical data model, through the analysis of data flow and data storage;
- Created prototype of MIS for the support of business processes integration.

The implementation of suggested MIS prototype in the observed agency would lead to: the automation of routine businesses that last long, digitalization of business processes, complete integration of data, by which the quality of communication with key stakeholders would be enhanced and the process of managing and decision-making would be improved, since the agency does not possess management information system.

It is expected that this research contributes to the integration of business processes in the observed agency. The analysis and design of management information system, as well as the implementation of developed prototype of management information system should provide complete integration of business processes, data integration, the improvement of quality and efficiency of communication with key stakeholders, which would reflect on the improvement of managing and decision making processes, since the observed agency does not possess management information system.

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CRYPTO-DEMOCRACY: IMPLICATIONS OF THE BLOCKCHAIN TECHNOLOGY ON THE DEMOCRATIC CHOICE

Andrija Popović[*]
The Innovation Center, University of Niš, andrija.m.popovic@gmail.com

Ana Milijić
The Innovation Center, University of Niš, ana.randjelovic@yahoo.com

Abstract: *Deciding by the majority is the simplest way of voting on the issues of public interest. Over time, the legitimacy of this system has been widely accepted and became the dominant form of government and public decision-making. However, global democracies are in decline due to the pressure of the multiple global challenges, and Blockchain technology is the possible solution. This paper aims to systematize and identify the potential implications of the Blockchain on the decentralization and the economy of collective decision-making. Methodological individualism and the Institutional Possibility Frontier (IPF) framework, applied to the model of the constitutional democracy, provide a logical foundation for the comprehensive analysis of the possibilities and limitations of blockchain implementation in democratic voting systems. The results show that blockchain technology provides significant benefits and cost reduction in any form of institutional decision making. Furthermore, crypto-democracy provides a decentralized, transparent, and reliable decision-making system which transforms traditional geographical constituencies into an unbundled agency system, which ensures that the individual opinion is reflected in the public choice. The study indicates that the research on the institutional application of blockchain technology is in the early stages. Therefore, recommends the careful but optimistic introduction of the presented system into the existing voting mechanisms.*

Keywords: *Crypto-democracy, Blockchain, Public Choice, Transaction Costs*

JEL Classification: *D02, D7, O17, O30*

INTRODUCTION

Deciding by majority represents the simplest form of decision making concerning the public choice. In the historical and philosophical context, majority decision evolved as a means through which a social group makes collective choices among alternatives when the consensus among the individuals comprising the group cannot be attained (Buchanan, 1954, p. 118). Since the 16th century, this exact form of decision making is known as a democracy (Merriam-Webster, 2020).

Democracy is a dominant governmental system in the world. However, the beginning of the 21st century brought forth the understanding of democratic states as fragile and vulnerable systems. The ability to cope with increasingly pronounced problems and challenges of these systems, such as growing inequality, migration, and pronounced globalization, is in question (IDEA, 2017). At present, the construction of an adequate and functional democratic system is hampered by the presence of the aforementioned external phenomena and complex problems present in all countries of the world, such as manipulating the electoral process and restricting human rights. This dynamic environment has resulted in some countries advancing in the democratic process, while others are declining due to the negative impact on the independent media, judiciary, and education (Bermeo, 2016).

The solution for the mentioned decline is sought in the fourth industrial revolution's modern technological advancements. Blockchain technology was introduced to the world in 2009 as a technological platform for Bitcoin. However, according to its creator, Nakamoto (2008), Blockchain is meant to be the platform for comprehensive socio-economic liberalization and decentralization. Due to the benefits promised by Blockchain, such as safety, security, efficiency, and speed, many governments worldwide embraced this technology through various projects regarding the public sector (Killmeyer et al. 2017).

Over the last decade, many authors tried to understand Blockchain's effects on the different aspects of public interest and collective choice. Swan (2015) gave a comprehensive analysis of this technology's potential impact, including its potential for the state administration and election process. In light of rising interest in Blockchain's importance for social development and its decentralized nature, Atzori (2015) discussed the need for a centralized government in modern states. Davidson et al. (2016) emphasized a twofold approach to the Blockchain analysis, the innovation-centered, on the one hand, and the government-centered aspect, while the latter enables the creation and realization of the new organizational forms based on the new institutional economics and public choice.

The main body of work regarding Blockchain's use in the election process in democratic systems and the possibility for its improvement was established in the last five years. Allen et al. (2017) have systematically addressed the economic aspects of crypto-democracy, emphasizing negotiation costs, informing, and maintaining contracts. Other authors discussed the decentralized system based on Blockchain (Srivastava et al. 2017; Liu & Wang, 2017) and the effects that this could have on trust and transparency (Berg et al. 2018).

This paper aims to introduce a unique, encompassing view on Blockchain technology's impact on the decentralization of collective decision making and optimization of related costs in democratic systems by analyzing the current theoretical and empirical work in the field.

DEMOCRACY – THE CONCEPT AND RELATED COSTS

Democracy can be conceptually defined as the rule of the people, i.e., the majority's rule. In addition to this general definition, democracy can be defined as "a government in which the supreme power is vested in the people and exercised directly or indirectly by the people through a system of representatives that

usually includes periodic free elections" (Merriam-Webster, 2020). However, despite the single starting point, approaches to democracy significantly differ.

Charles Tilly (2007) concluded that, regardless of all the differences, there are four general approaches in defining democratic systems: constitutional, procedural, substantive, and process-oriented. *The constitutional approach* has a constitution as the main distinction between democracy and other systems, and among the four, it provides the most clarity in differentiation. *The procedural approach* points out that political freedom has the highest importance in building genuinely democratic systems. The modern democratic procedures are built on equal rights for every individual to participate in social decisions through fair elections (Saffon, 2013). *The substantive approach* is based on evaluating the living conditions and governmental policy to determine whether the system has genuinely democratic qualities. Finally, *the process-oriented approach* requires both the existence of processes and the minimum functionality to claim the existence of democracy (Tilly, 2007). Dahl (1978) gave five criteria for the evaluation of real democracy:

- Effective participation – means that all citizens have the right to disclose their opinion on the social matters before the decision is reached;
- Equality in voting – means that all citizens have the same opportunities and possibilities for voting under the same conditions;
- Gaining an enlightened understanding – means that all citizens need to have the same opportunities to assess different policies under reasonable limitations;
- Exercising final control over the agenda – means that all citizens can decide what will be placed on the agenda;
- Inclusion of adults – means that all residents should have the same rights implied in the first four criteria

Having in mind previous approaches and criteria, we can see numerous modalities of modern democratic systems. However, most of them share certain common characteristics. Based on individual rights and being the highest state act that limits governmental power, the Constitution defines 21st-century democracies (Berggren & Karlson, 2003). The second defining feature of modern democracies is that most of them are representative democracies. Therefore, the decision-making process concerning the people is indirect. Prokopijević (2000) claimed that these two elements, combined with fair rules and respect of the principles of liberalism, can form good constitutional democracy, which will be used as a model in the following discussion.

Understanding constitutional democracy means understanding the concepts of separation of power, decision-making costs, rationality, and public well-*being*. Initially introduced by Montesquieu (1989), who proposed the differentiation between legislative, executive, and judiciary power, the separation of power was further discussed and improved over time, resulting in the fully formed concept of the separated power system in democratic states. This system is based on the independent judiciary system, guaranteed individual rights, generality principle, independently elected representatives, and the undeniable possibility of a referendum.

The concept of costs in collective decision making is significant because it is assumed that if an individual does not want to let his fate to uncertain, he is exposed to additional costs, which he does not bear when making private decisions (Prokopijević, 2000). Even though multiple different categories of costs are discussed in the literature, this paper focuses on transaction costs determined by established institutions and available technology (Berggren & Karlson, 2003). Citizens lack the skills, capacity, time, and inclination to implement government policies to delegate decision-making and implementation to public figures (Berg, 2017). Constitutional democracy is characterized by the transfer of responsibilities

between different government levels, which by its nature, incurs costs for maintaining the system functioning. These costs that occur when making social decisions are called transaction costs.

Rationality has been a starting point in many economic theories and must be found to analyze the assumptions and preconditions of constitutional democracy. There are different views on how constitutional rules can induce rationality. However, the instrumental approach under rationality implies actions oriented towards the fulfillment of a specific goal. Therefore, rationality can be linked to the ability to react and the transaction costs, which have a divergent direction in a mathematical context.

Finally, the public interest is another concept that is at the core of a democratic state system. Riker (1988) pointed out that the differentiation of private and public interest is often a topic of discussion; however, the definition of these terms rarely appears in the literature. The public interest in the framework of this paper will mean a situation in which the long-term preferences of the majority of citizens are met within the defined legal framework (Berggren & Karlson, 2003), and we will not analyze the opposing views that inevitably appear in the literature (Riker, 1988).

Considering the literature tackling the connection between modern technologies, public interest, and democracy (Swan, 2015; Tapscott & Tapscott, 2016; Berg, 2017; Allen et al. 2017; Berg et al. 2018) in addition to the positive changes and challenges, this paper will mainly focus on the transaction costs. Starting from previous considerations that indicate that these costs tend to fall with improved information and available technologies. We will show that blockchain technology has a significant impact and multiple benefits for democracy successfully implemented.

BLOCKCHAIN – FUNDAMENTAL CONCEPTS

Blockchain is a set of decentralized technologies that combine asymmetric cryptography, networking (peer-to-peer), a consensus-based voting mechanism, and a data processing apparatus that combined creates an immutable decentralized public ledger for storing and transferring property rights (Berg, 2018). Created to realize Bitcoin cryptocurrency, it attracts significant attention and is the initiator of many projects in various industries. Since the conception of the idea in 2008, interest in this technology has steadily grown. The potential benefits of adopting blockchain technology in the private sector have been analyzed by both the scientific community and large companies. However, the analysis of this technology's implications in the public sector is in the early stages. Blockchain technology can be used for any form of the register of tangible and intangible assets, stocks, and exchanges in different areas, making it suitable for transforming a wide range of social activities (Swan, 2015).
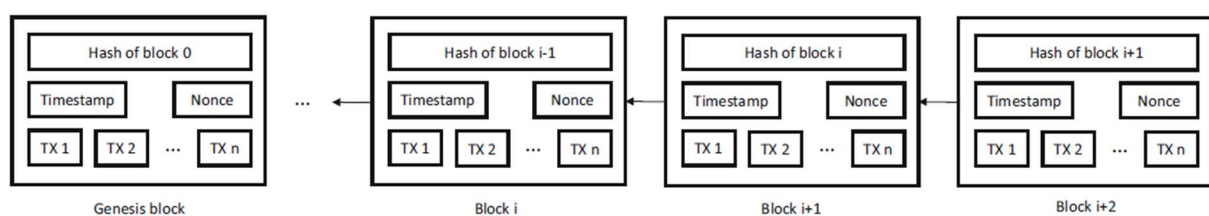

Figure 1 Typical example of Blockchain

Source: Zheng Z, Xie S, Dai HN, Wang H (2016) *Blockchain Challenges and Opportunities: A Survey.*Work Pap

Blockchain consists of the digital ledger in which, based on the predetermined set of mathematical rules, are all transactions recorded — this way, all illegal corrections, and changes are prevented. This technology operates through peer-to-peer networks based on the thousands of nods all over the world. Nods can freely join or leave the network (Nakamoto, 2008). New nods are created through the mining

process, and all of them operate anonymously, working together on the solutions of mathematical problems, through which they add new blocks.

A Blockchain consists of data sets whose structure consists of a chain of data packets (blocks), and each block contains a large number of transactions (TX1-n). This Blockchain is extended by adding each new block and representing a complete record of the transaction history. Block validation is performed by cryptography.

The Blockchain allows the disintermediation and decentralization of all transactions of any type between all parties on a global basis (Swan, 2015, p. x). This technology is an opponent of centralized and hierarchical organizations, such as companies and governments, which functionally implies that blockchain technology is a fundamental technology for creating new decentralized institutions (Davidson et al. 2016) and encourages groups of institutions to collaborate to create new growth opportunities resulting in better performance (Arun et al. 2016). Walport (2016) points out that governments can benefit significantly from multiple potential applications of distributed ledger technology, while Berg et al. (2018) believe that governments can be critical in adopting and developing this through regulation, legislation, and public investment technological innovation.

Given the popularity of Blockchain, it is essential to understand the three main pillars that brought it on. These three main pillars are (Rosic, 2020):

- Decentralization,
- Transparency, and
- Immutability.

Before the advent of blockchain technology, most systems in the world were based on a centralized architecture. Blockchain technology has challenged the functionality of centralized systems such as banks, government, large companies, and forced them to incorporate this technology into their day-to-day operations. In a decentralized system, information is not stored in one place, but each network member has information. In such systems, if one user wants to communicate with another user, he does not have to use an intermediary, and this principle is embodied in Bitcoin, which means that sending money between users is possible without the bank's mediation.
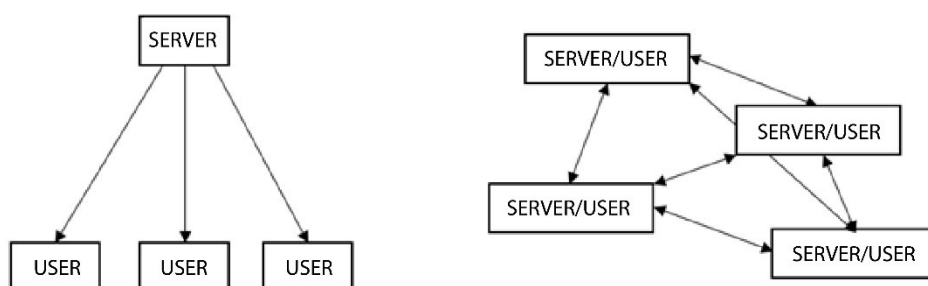

Figure 2 Comparison of organization systems

Source: Rosic, A., Blockgeeks. (2020). What is Blockchain Technology? A Step-by-Step Guide For Beginners. Accessed May 5th, .2020. at: https://blockgeeks.com/guides/what-is-blockchain-technology/

Transparency means that traditionally public distributed ledgers, based on blockchain technology, are visible to all network members (Walch, 2016). There is often confusion regarding transparency because the privacy provided by this technology is often emphasized. Transparency means that all data is visible to all network members, but their identity is cryptographically protected, yet this transparency level has never existed before.

Immutability means that a distributed Blockchain-based ledger is unchangeable. In theory, this means that once a change is posted, it cannot be changed or removed, and this fact is especially important for participants in the financial sector because they can rely on the correctness of the data in the ledger and can expect that there will be no corrections and changes in the future (Walch, 2016). This feature is also vital for the public sector because it ensures data consistency and the entire system's resilience.

These features are three pillars upon which the exceptional reliability of Blockchain technology is built. A reliable and transparent system of records, resistant to the risks inherent in the modern age, favors developing a system that will adequately replace or improve the existing election mechanisms in democratic societies.

CRYPTO-DEMOCRACY: DEMOCRACY GOING DIGITAL

To the extent that efficient institutions' development explains modern economic growth, Blockchain can prove to be a universal general-purpose institutional technology that affects many sectors and industries (Allen et al. 2017). Although its original purpose was to democratize the financial system, blockchain technology plays a significant role in further decentralization and improved transparency of a democratic system. Despite the focus on online voting, due to concerns that the platforms are subject to fraud, corruption, and sabotage, it has not been adopted worldwide (Daniel, 2020). Originally applied forms of internet voting in Estonia and Norway have faced serious omissions and shortcomings, but a growing number of political organizations and technology startups are experimenting with secure digital voting systems based on blockchain technology. This application of blockchain technology is called crypto-democracy (Davidson et al. 2016). The world is facing a new trend of declining democracy, especially in fair and democratic elections. Under the ruling regimes' influence, the electoral process seemingly allows for competition, while fraud, coercion, and circumvention become increasingly pronounced. It is a crypto-democracy that can solve some of the most pronounced problems facing democracies worldwide.

The crypto-democracy analyzed in the following segment is based on blockchain technology and the previously presented system of constitutional democracy. Although there are notions in the literature of the possibility to use Blockchain technology in completely changed systems such as direct democracy or even the newly introduced "liquid" democracy (Swan, 2015; Tapscott & Tapscott, 2016; Berg, 2017a), it is much more likely and acceptable to gradually transform the existing democratic system by implementing specific technological solutions. Tapscott & Tapscott (2016) point out that public discourse and the greater involvement and interest of citizens in the decision-making process should be distinguished from direct democracy. Citizens are not interested and do not have the expertise and time to be informed and decide on each issue, so a legal framework is needed to enable discussion, specification, and problem-solving.

Multiple authors have presented blockchain technology as a potentially effective selection mechanism (Daniel, 2015; Barnes et al. 2016). However, to determine the potential effects of implementing this system, existing electoral system institutions must be compared with the solutions after introducing the Blockchain. Djankov (2003) provided a suitable instrument for analyzing the spectrum of institutional possibilities. Using the Institutional Possibility Frontier (IPF), we can monitor how different institutional possibilities affect the presented disorder costs and dictatorship costs.

Given that modern constitutional democracies are most often representative democracies, representatives' elections are among the most critical issues. High decision-making costs are an argument for representative democracy because time, interest, and information make decision-making

on every issue very expensive for an individual. Crypto-democracy provides a new delegation mechanism. Instead of treating representation as a grouping problem, crypto-democracy allows it to be treated as a matching problem.
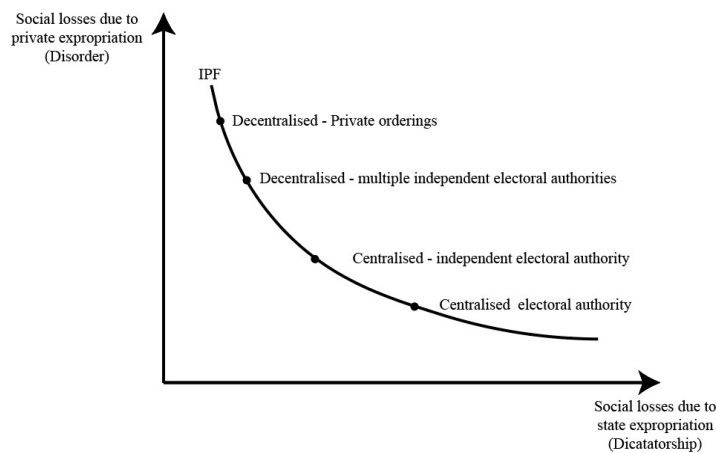

Figure 3 Institutional Possibility Frontier

Source: Djankov, S., Glaeser, E., La Porta, R., Lopez-de-Silanes, F., Shleifer, A. (2003) *The new comparative economics. Journal of comparative economics.* 31 (4), 595-619

The traditional electoral system geographically groups voters into electorates. The choice of representatives for each electorate depends on the consistency of opinion within the electorate. Crypto-democracy opens up other possibilities in the form of proposals to group voters according to opinion consistency rather than geographical location. The proposed system is shown in Figure 4 on the example of Parliamentary elections.
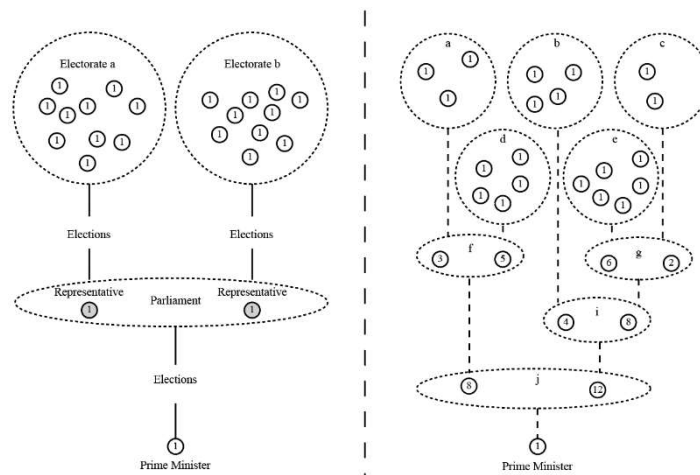
Figure 4 Election systems Traditional vs. Crypto-democracy

Source: Berg, C. (2017) *Delegation and Unbundling in a Crypto-Democracy*. Available at: http://dx.doi.org/10.2139/ssrn.3001585

Elections in a constitutional democracy usually require the opinion harmonization of many individual voters, leading to increased transaction costs and the time required for making a final decision. In crypto-democracy, this kind of harmonization is not required. Voters can rely on system transparency and find like-minded people, and delegate agents who, based on the number of votes cast, will negotiate with other agents until the decision is made. Although the system is transparent and harmonization of

opinions is more straightforward and faster, Blockchain technology does not eliminate transaction costs. When delegating an agent to each subsequent level, certain compromises must be made, which distances individual voters from their optimal decision.

The choice of agents in a crypto-democracy is one of the essential issues. Delegation to agents is also done under the influence of transaction costs. Citizens who think that the costs of decision-making are too high for them will delegate their vote to one of the agents, and depending on their risk appetite and ability to bear the growth of costs, they will have the opportunity to participate in the election process until the very end.

The analysis of the effects of transforming the system of representative democracy into crypto-democracy can be observed through the presented model of the Institutional Possibilities Frontier (IPF). As there is not only one institution for managing the electoral process, it is possible to observe several institutional forms in the spectrum of institutional possibilities (Figure 3). Djankov et al. (2003) expressed that in institutional choice, society faces a compromise between the costs of disorder and dictatorship costs, while the IPF represents different forms of electoral institutions minimizing these costs.

Centralized institutions minimize the cost of riots by unified voter register management and full power to conduct elections, reducing duplication costs but increasing the costs of dictatorship. There is a risk that civil servants who favor a particular political option will manipulate the whole process. On the other hand, decentralized institutions limit the costs of dictatorship by providing competition and choosing between competencies, but at the same time increase the potential costs of disorder because individuals gain greater powers and decisions rely on private collective decision-making (Djankov et al. 2003).

Through this model, Allen et al. (2017) presented Blockchain's impact on the institutional environment in which elections occur. This technology theoretically reduces the costs of consensus, information coordination, and contract enforcement and maintenance, and in the context of the IPF model, Blockchain reduces the costs of dictatorship and disorder while providing compactness, anonymity, and transparency. Although its potential for decentralization is primarily emphasized, Blockchain can also be applied in centralized systems, and its implementation in the electoral system can be represented by moving the IPF inward (Figure 5).
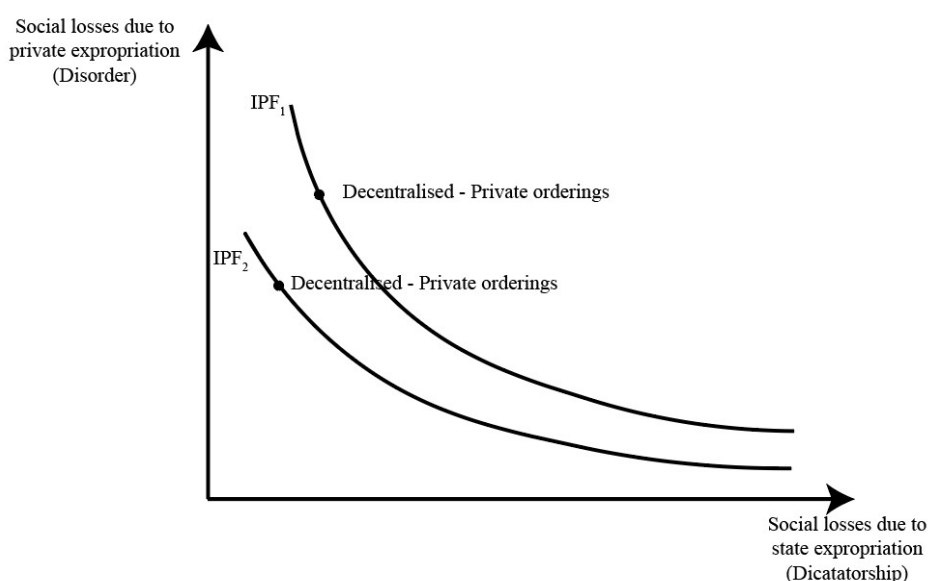

Figure 5 Implementation of Blockchain in Democracy

Source: Allen, DW., Berg, C., Lane, A.M., Potts, J. (2017) The Economics of Crypto-Democracy. Available at: http://dx.doi.org/10.2139/ssrn.2973050

Shifting the IPF inward shows increased efficiency due to Blockchain's application in the electoral process and leaves room for entrepreneurial activity within the institutional limit of opportunity and creating solutions to broader democracy problems (Allen & Berg, 2016).

Blockchain technology, as presented, can have wide institutional applications. Crypto-democracy as a form of "democracy on steroids" cannot be classified into any particular form of democratic organization. However, based on the previously presented IPF, it is feasible to see the positive effects of blockchain technology in any form of the electoral process.

CONCLUSIONS AND RECOMMENDATIONS

This paper presents an introductory consideration of Blockchain technology's potential use to facilitate the electoral process and realize a new democratic organization. It contributes to the systematization of Blockchain's effects in the socio-economic systems, i.e., crypto-democracy, but it does not introduce novelties in the system's design itself.

This paper points out that Blockchain technology represents a significant potential for both the private and public sectors. Its characteristics are incredibly conducive to developing democracy and decentralized government forms, which will enjoy citizens' greater trust and reflect their wishes and thoughts more accurately. Crypto-democracy, as a presented form of the decentralized governmental system, can reduce transaction costs, improve efficiency, and create a more open environment for entrepreneurial activity in collective decision-making systems and mechanisms.

Considering that theoretical and empirical research in this field is in its infancy, and practical implementation is in the early phases, it is impossible to claim certain benefits from the Blockchain use in democratic systems. Additionally, the scale of potential socio-economic changes and social experiments' history makes it even more challenging to project these systems' future development. Thus the research provides only notions of perceived benefits, based on the logical analysis of inherent characteristics of critical elements of crypto-democracy.

This research reflects current advancements in the very narrow overlapping field of information technology, economics, and democracy. However, this paper considers only possible improvements without considering concerns and limitations regarding rapid technological advancements in the field due to time and volume constraints. Therefore, future research in the field and the generation of empirical evidence of Blockchain's potential benefits in a democracy should provide a practical framework for its implementation and assess the negative aspects and security concerns inherent in digital systems.

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