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FACULTY OF ECONOMICS

SMART AND SUSTAINABLE ECONOMY: TRENDS AND PERSPECTIVES

Editors:

Tadija Đukić

Dragana Radenković Jocić

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Tadija Đukić, PhD

Dragana Radenković Jocić, PhD

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P R E F A C E

International scientific conference entitled "SMART AND SUSTAINABLE ECONOMY: TRENDS AND PERSPECTIVES" has been held in organized by the Faculty of Economics the fifty-fourth time. The aim of the Conference is exactly to initiate a fruitful debate on various possibilities. The conference was opened with welcome speeches of Professor Tadija Đukić, Dean of the Faculty of Economics. It was our great pleasure and privilege to have Mrs. Draginja Radonjić Petrović, Vice-president of the Serbian Association of Economists. She opened the academic programme of the conference by giving a keynote lecture trying to answer the main theme of Conference from different aspects.

This conference brought together academics from four different countries. The academic programme contained 44 presentations with a much greater number of participants. In this conference proceeding, 41 papers are published. Considering importance of national economy development issues the international conference, held at the Faculty of Economics, University of Niš, on October 13th, 2023 is divided into four sessions. The first session includes 10 presentations (9 papers). Following session covers several similar themes (with 10 papers), the third session involves 13 papers, and finally the fourth part is covered by 11 presentations (9 papers).

Topics and participants' views were divergent, which exactly contributed to achieving the objective of the conference – smart and sustainable economy. Main focus of the special issue is how to foster a smart and resilient development and adaptation of urban areas dealing with changes, transformations, or shifts in the social, economic, cultural, and environmental structures and organization. Papers can cover one or more of the following topics: technological transition, infrastructure transition, environmental transition, economic transition, demographic, and cultural transition.

The direct outcomes of this conference are these proceedings and a special volume of edited book series. The content of the proceedings fully portrays diversity of research interests of contributors. Such variety of thematic areas contributed to flourishing debate, interesting for a wider audience. Here, we would like to express our gratitude to all authors and guests. We truly value the authors' support for this conference. Thank you all for the interest you have shown, for coming here from near and far to take part in our discussions. We also like to acknowledge financial support of the Republic of Serbia, Ministry of Education, Science and Technological Development.

Editors

Tadija Đukić, PhD, Dean

Dragana Radenković Jocić, PhD, Vice-Dean for Science

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SMART AND SUSTAINABLE ECONOMY: TRENDS AND PERSPECTIVES

DIGITAL COMPETITIVENESS AND ICT ADOPTION IN FUNCTION OF SUSTAINABLE ECONOMIC GROWTH

Jelena Živković[*]

Stefan Zdravković, PhD [•]

Abstract: *Digital competitiveness and ICT adoption are the key elements of modern economy. It is indispensable part of competitiveness, innovation and development. The research coveres 20 SEE countries in 2022. The NRI (Network Readiness Index) is used. NRI is composite index which represent digital competitiveness and ICT adoption. GDP per capita is used as economic growth indicator. In this study correlation analysis is applied. Research results shows that there is strong correlation connection between Handset prices and Mobile tariffs on the one side, and GDP per capita, on the other side with Pearson coefficients of 0.757 and 0.671. Results indicate that economic growth is in connestion with cost and prices of ICT adoption rather than ICT infrastructure and ICT innovation.*

Keywords*: digital competitiveness, ICT adoption, economic growth, correlation*

1. Introduction

With modern information and communication technologies (ICT) implementation, the digital economy is changing almost all business aspects and the daily execution of various activities, both in developed and developing countries. The concept of the digital economy developed due to the multiple and dynamic nature and transformation of digital technologies in recent years.

In this way, the use of modern technology improves digital competitiveness. Furthermore, digital competitiveness through various channels becomes a factor in economic growth. Every country searches for strategies to produce gradual and sustainable

[*] PhD student, Institute for Information Technologies Kragujevac, University of Kragujevac, Serbia, ✉ jelenazivkovic@uni.kg.ac.rs

[•] Faculty of Business and Law in Belgrade, University MB, Serbia,
✉ szdravkovic034@yahoo.com

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growth. Technology development has a significant impact on gross domestic product (GDP) per capita acceleration. More technologically advanced nations are frequently more competitive and have higher economic indicators.

However, the impact of the digital economy on the national economy has not been consistently determined by the empirical studies. Some academics believe that the digital economy growth might increase the efficient use of elements like labour and capital, leading to economic growth. Others have suggested that the lack of infrastructure, particularly in less developed nations, makes ICT development and use expensive.

The paper aims to analyze the level of ICT readiness, like the digital competitiveness indicator, in the SEE countries and how it is connected with GDP growth. The paper consists of several sections. In the first part, a literature review will be presented. The second part will refer to data sources and applied methodology, while the third part is reserved for results and discussion to draw certain conclusions.

2. Literature review

Consistent technical advancement and an ongoing speeding of the technological development are now commonplace in all countries. The idea of the digital economy was initially brought by Tapscott (1996), who claimed that in the age of networked intelligence, networking of humans through technology is just as important as networking of technology. The term "digital economy" denotes the growth of a technology society and alludes to the pervasive usage of ICTs in all areas of human endeavour. The Organization for Economic Co-operation and Development (OECD) defines the digital economy as “the digital transformation of economic and social development” and regarded the digital economy as encompassing all traditional industries that were digitalizing and networking (OECD, 2014). The G20 Digital Economy Development and Cooperation Initiative defined the digital economy as “a broad range of economic activities that include using digitized information and knowledge as the key factor of production, modern information networks as an important activity space, and the effective use of ICT as an important driver of productivity growth and economic structural optimization” (G20, 2016). Additionally, digital economy is a sophisticated organisational and technical concept generated from numerous components (industrial, infrastructure, organisational, programme, regulatory, legislative, etc.) that interact and apply to one another across a wide range of economic representatives to share knowledge under conditions of ongoing development. The interchange of knowledge, the technologies that make it possible, and a culture that can govern this trade are crucial to defining a digital notion (Turban et al., 2008).

Given how the technology application is present in all spheres of the economy today, a frequently researched question is what is the connection between the development of the digital economy and economic growth. The ICT application plays a key role in building digital competitiveness. Thompson Jr and Garbacz (2011) argue that there are two ways that ICT affects economic growth. Direct impact denotes productivity gains as a result of the use of ICTs, while indirect impact is the actualization of externalities generated by the implementation of ICT. Tsakaev and Khadzhiev (2019) claim that there are three main components of digital economy: (1) E-infrastructure for business (hardware, software, telecommunications, networks, human capital, etc.); (2) E-business (how a business is run,

any process that an organization conducted via computer-mediated networks); and (3) E-commerce (transfer of goods online).

Fernández-Portillo et al. (2020) studied the relationship between ICT and economic growth in the countries of the European Union. Based on empirical results, they conclude that progress in the application and use of ICT drives the economic growth of developed European countries. Stanley et al. (2018) investigated whether there is a relationship between ICT and national economic growth and came to the conclusion that ICT is positive contributed to economic growth. Miethlich et al. (2020) in their research deal with national competitiveness as well as the digital economy from technological, industrial and social perspectives The advantages of the digital economy are the inclusion of innovation; emergence of new markets; growth labor productivity; reduction of production and sales costs; production of better quality goods and services. The combined action of these factors must have an impact on economic growth.

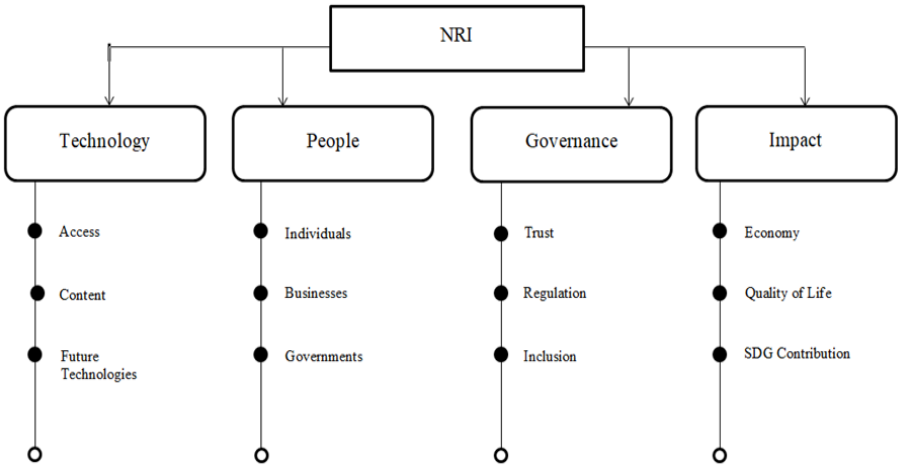
Niebel (2014) found the positive impact of ICT application on economic growth by panel regression analysis based on sample of 59 countries from 1995 to 2010. Appiah-Otoo and Song (2021) found out that ICT adoption increase economic growth in 123 coutries from 2002 to 2017. They concluded that low – income countries have more benefits from ICT than high – income countries. While ICT adoption in developing countries can serve as a tool for human and economic development, policies and actions in developed countries should focus on other factors that can lead to higher levels of human development. Developing countries could more easily integrate into a more advanced economic environment if they made the most of the opportunities offered by new technologies (Domazet & Marjanović, 2023). Nair et al. (2020) claims that R&D and ICT development have positive impact on economic growth in long - run in OECD countries from 1961 to 2018. Majeed and Ayub (2018) in their study covered 149 countries from 1980 to 2015 and based on Ordinary Least Squares (OLS), Pooled OLS, Two Stage Least Squares (2SLS) and Generalized Method of Moments (GMM) techniques they concluded that ICT contribute to economic growth. Jin and Cho (2015) find positive impact of Internet use, mobile profit and adoption and technology investment on economic growth.

2. Data and Methodology

The research covered following SEE coutries: Serbia, Bosnia and Herzegovina, Montenegro, North Macedonia, Albania, Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Greece, Italy, Hungary, Israel, Malta, Moldova, Romania, Slovakia, Slovenia and Turkey in 2022. Data about digital competitiveness are retrivered from The Network Readiness Index reports. GDP data are retrivered from World Bank database.

The Network Readiness Index is the composite index and it is used like digital competitiveness indicator. It is constructed with three levels. The core elements of network readiness are comprised of four pillars that make up the primary level. The second level is made up of more sub-pillars that are divided into each of the fundamental pillars (Figure 1). The primary and secondary levels' many sub-pillars and pillars are dispersed across the third level's specific indicators.

Figure 1. NRI 2022 model



Source: Portulans Institute, The Network Readiness Index 2022, p. 28. https://networkreadinessindex.org/#:~:text=The%202022%20NRI%20is%20the,their%20performance%20across%2058%20variables.

In order for a country to participate in the global economy, having a certain level of technology is a requirement, according to the Technology pillar. This pillar includes: ICT accessibility for the general public, including concerns with cost and communications infrastructure; research on the topic that was gleaned via books, software purchases, GitHub commits, and the development of mobile apps; and employing Artificial Intelligence (AI), the Internet of Things (IoT) and the levels of spending in emerging technologies. Second pillar People represent the knowledge, resources, and capacity of individuals and groups within a nation to make effective use of its technological resources. It refers on how individuals participate in the network economy by utilizing technology and leveraging their skills; how companies use ICT and engage in the network economy, particularly how much they spend on R&D; and how ICT is used, invested in, and implemented by governments for the benefit of the general populace. The Governance pillar focuses on the development and availability of systems that encourage activity across three levels of the network economy. This pillar includes: the safety of people and businesses in the network economy represented in a climate that encourages trust and the populace's trusting behavior; how much a government encourages involvement in the network economy by rules, policies, and planning; the gender, disability, and social differences in countries with governing structures that can address them, and the digital divides inside those same nations. The Impact pillar aims to evaluate the human, societal, and economic effects of involvement in the network economy. The Impact reflects the economic impact of participating in the network economy - including the size of the local market; the social effects of network economy participation; the effects of taking part in the network economy in relation to the SDGs. ICT is given special attention because of its crucial role in the network economy and because it integrates measures for gender equality, health, education, and the environment.

In order to show how digital competitiveness is related to economic growth and its sustainability, GDP pc data will be used. Correlation analysis will be used to determine the relationship between these phenomena.

3. Results and Discussion

The results of the NRI depend a lot on the country's economic development. USA is dominant within high – income countries. In the same time, USA is the most sucessful economy in the world about networking or digital competitiveness. In the upper middle – income group, the best result has China with the global ranking of 23. Ukraine ranked on 50th place on world list, but first in lower middle – income group. Between low – income countries, Rwanda has the most successful result. Then follow Zambia and Uganda. The top three countires in each income group are shown in Table 1.

Table 1. Top three countries by income group in 2022

Country	R	NRI	Country	R	NRI	Country	R	NRI	Country	R	NRI
High – income			**Upper middle - income**			**Lower middle – income**			**Low - income**		
USA	1	80.30	China	23	68.83	Ukraine	50	55.71	Rwanda	101	39.48
Singapore	2	79.35	Malaysia	36	60.58	Indonesia	59	51.51	Zambia	113	34.02
Sweden	3	78.91	Russian Federation	40	59.54	India	61	51.19	Uganda	116	33.33

Source: Portulans Institute, The Network Readiness Index 2022, p. 26. https://networkreadinessindex.org/#:~:text=The%202022%20NRI%20is%20the,their%20performance%20across%2058%20variables.

The frequency of income categories and regional performance within each region are clearly correlated. Namely, 76% of the countries in Europe have high income economies, and the continent continues to hold a leadership position in the NRI 2022. European countries has the best results in NRI. There are Sweden, Netherlands and Switzerland.

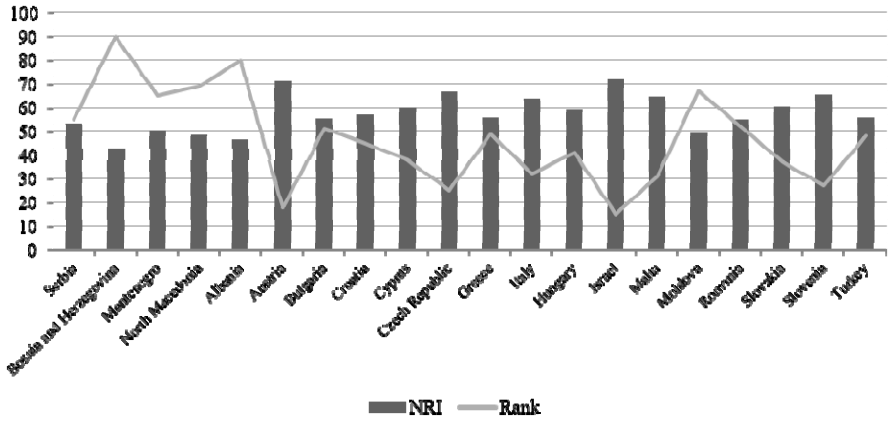
Table 2. Top three economies by region

Country	Rank	NRI	Country	Rank	NRI	Country	Rank	NRI
Africa			**Arab States**			**Asia & Pacific**		
South Africa	68	48.90	United Arab Emirates	28	65.64	Singapore	2	79.35
Mauritius	72	47.87	Saudi Arabia	35	61.09	Korea, Rep.	9	75.95
Kenya	77	46.90	Qatar	42	57.87	Japan	13	73.09
CIS			**Europe**			**The Americas**		
Russian Federation	40	59.54	Sweden	3	78.91	USA	1	80.30
Kazakhstan	58	52.46	Netherlands	4	78.82	Canada	11	74.22
Armenia	64	50.40	Switzerland	5	78.45	Chile	43	57.19

Source: Portulans Institute, The Network Readiness Index 2022, p. 26. https://networkreadinessindex.org/#:~:text=The%202022%20NRI%20is%20the,their%20performance%20across%2058%20variables.

When it comes to global NRIs, the best results are achieved by Israel and Austria with an index value of 72.20 and 71.31, respectively. They are in the 15th and 18th places on the global list. A high level of NRIs is achieved by the Czech Republic with an index of 54.89 and Slovenia with an index of 65.67. Most countries have NRI values greater than 50. Bosnia and Herzegovina have the lowest NRI value of 42.67 and are ranked 90th in the world list. Considering that the NRI value ranges from 0 to 100, the scores of most countries are far from the potential of these countries. It is clear how significant is the gap behind the best countries in Europe: Sweden, the Netherlands, and Switzerland (Figure 2).

Figure 2 NRI and rank of selected countries in 2022



Source: Authors' illustration based on data Portulans Institute, The Network Readiness Index 2022, https://networkreadinessindex.org/#:~:text=The%202022%20NRI%20is%20the, their%20performance%20across%2058%20variables.

Table 3 shows indicators for 1st sub-pillar of NRI Technology Access. It includes Mobile tariffs, Handset prices, FTTH/building Internet subscriptions, Population covered by at least a 3G mobile network, International Internet bandwidth and Internet access in schools. This pillar actually refers to the availability of ICT to the majority of the population. For most countries no data is available on indicator Internet access in schools. The best result is for Population covered by at least a 3G mobile network which values are very high, and even maximum for some countries like Bulgaria, Croatia, Italy, and Slovenia. There are high values for International Internet bandwidth where the best results is for Turkey (85.78). FTTH/building Internet subscriptions has the lowest values among these sub-indexes and its values do not exceed 30. It is noticeable that EU member states achieve better results in all parameters than non EU countries.

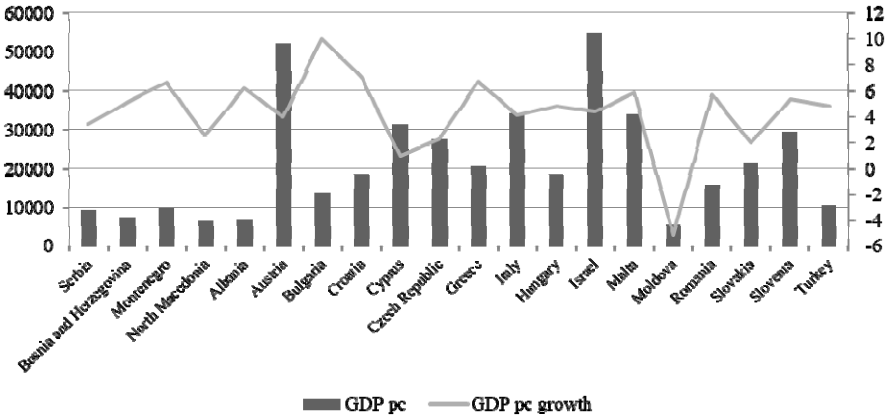
Table 3. 1st sub-pillar: Access of selected countries in 2022

	Mobile tariffs	Handset prices	FTTH/building Internet subscriptions	Population covered by at least a 3G mobile network	International Internet bandwidth
Serbia	70.1	56.16	25.42	99.82	74.45
Bosnia and Herzegovina	44.8	52.65	13.44	99.01	63.85
Montenegro	48.89	47	15.33	99.35	67.42
North Macedonia	40.32	42.09	17.76	99.95	57.37
Albania	48.1	47.01	27.96	99.74	63.05
Austria	89.31	74.44	11	99.35	69.17
Bulgaria	70.13	71.05	38.93	100	78.56
Croatia	87.54	50.2	15.91	100	72.47
Cyprus	50.71	67.72	5.38	99.98	74.88
Czech Republic	71.13	74.44	28.69	99.94	70.35
Greece	54.95	68.49	2.45	99.9	76.7
Italy	88.36	83.14	37.33	100	75.14
Hungary	72.18	68.6	33.69	99.74	69.56
Israel	89.4	72.89	19.13	99.68	68.89
Malta	55.56	68.5	5.81	100	62.71
Moldova	67.26	53.28	36.44	99.97	72.84
Romania	70.87	51.69	47.6	99.99	71.27
Slovakia	73.06	66.61	28.97	99.68	68.31
Slovenia	78.54	60.84	20.72	100	71.03
Turkey	85.06	40.74	47.9	99.61	85.78

Source: Portulans Institute, The Network Readiness Index 2022, https://networkreadinessindex.org/#:~:text=The%202022%20NRI%20is%20the,their%20performance%20across%2058%20variables.

When it comes to economic growth, in sample we have seven countries from upper middle – income group (Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia and Turkey) while the other countries are from the high - income group. Figure 2 shows GDP per capita and GDP per capita growth in selected countries. The highest GDP per capita have Israel and Austria. Cyprus, Italy, Malta and Slovenia has GDP per capita about 30.000. The lowest GDP per capita has North Macedonia, Albania and Moldova. In addition to the GDP value, it is useful to monitor the annual GDP growth rate in order to identify the potential for future growth. The highest annual GDP per capita growth rate has Bulgaria in spite of relative low GDP per capita value and belonging to a upper middle – income group. Also, Montenegro and Bulgaria from this group has GDP growth rate of 6.62% and 6.67%, respectively.

Figure 3. GDP per capita and annual GDP per capita growth rate of selected countries in 2022



Source: Authors' illustration based on data https://databank.worldbank.org/

Table 4 shows descriptive statistics for selected variables. For the purposes of this analysis, the following variables will be used: Mobile tariffs (X_1), Handset prices (X_2), FTTH/building Internet subscriptions (X_3), Population covered by at least a 3G mobile network (X_4), International Internet bandwidth (X_5) and GDP per capita (X_7).

Table 4. Descriptive statistics

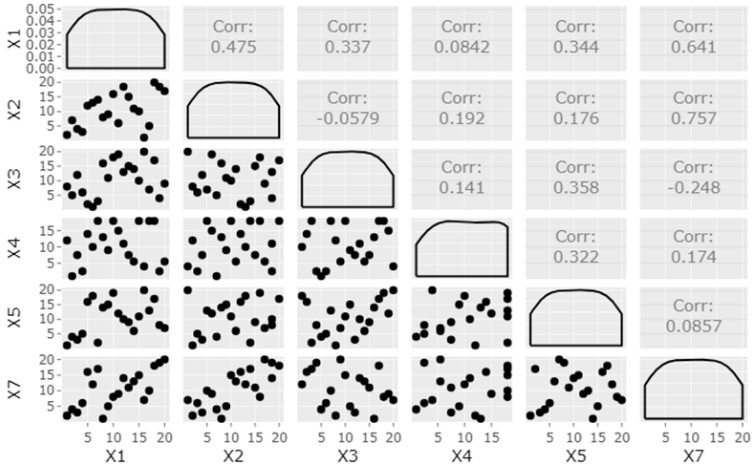
	X_1	X_2	X_3	X_4	X_5	X_7
Mean	67.8135	60.8770	23.9930	99.7855	70.690	21,412.305
Std	16.0100	12.2606	13.5303	0.2760	6.304	14,410.531
Median	70.5000	63.7250	23.0700	99.9200	70.690	18,438.222
Min	40.3200	40.7400	2.4500	99.0100	57.370	5,562.614
Max	89.4000	83.1400	47.9000	100.0000	85.780	54,659.754

Source: Authors' calculation

In order to determine the connection between digital competitiveness and economic growth, a correlation analysis was performed. This analysis was conducted after the data standardization because there is a different range of values among the variables. For this reason, it was necessary to do the scaling.

We can see that there is positive correlation coefficient between GDP per capita and other variables, except in case of FTTH/building Internet subscriptions. There is weak correlation relationship between GDP per capita and Population covered by at least a 3G mobile network, and GDP per capita and International Internet bandwidth. There is strong correlation connection between GDP per capita and Handset prices where the Pearson coefficient is 0.757. Also, there is strong correlation between GDP per capita and Mobile tariffs with the correlation coefficient of 0.641 (Figure 4). In this case, it can be noticed that the economic growth is connected with the technology prices and cost. In fact, access to modern technology is driven by costs more than architecture and innovation.

Figure 4. Technology Access indicators and GDP per capita for selected countries in 2022



Source: Authors

3. Conclusion

The digital economy is the most dominant driver of global innovation, competitiveness, and economic growth. The ICT application is the most significant factor and basis for the digital economy development and its application in the global environment is constantly increasing. A contemporary and forward-thinking economy and society are built on superior digital infrastructure. Digital competitiveness, a component of the competitiveness concept overall, is a multidimensional structure that includes a number of aspects of the process of digital transformation through the capacity for learning and applying new technologies. Also, it incorporates technical features that support digital transformation and digital readiness aspects that evaluate how well-prepared an economy and its citizens are for digital transformation.

Research covered SEE countries. Although there are countries from different income group, they have similarities. The results of correlation analysis showed that there is strong correlation connection between Handset prices and GDP per capita. Also, there is strong connection between Mobile tariffs and GDP per capita. Other variables of Technology Access does not have connection between economic growth. This results indicate that the dominant factor of ICT adoption in factor of economic growth is in line with its cost and expenditure.

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References

Appiah-Otoo, I. & Song, N. (2021). The impact of ICT on economic growth-Comparing rich and poor countries. *Telecommunications Policy, 45*(2). https://doi.org/10.1016/j.telpol.2020.102082

Domazet, I & Marjanović, D. (2023). Information and Communication Technologies – A key Factor of the Competitive Digital Economy. *28th International Scientific Conferenca Strategic Management and Decision Support Systems in Strategic Management SM2023*, Subotica, 18 – 19 May, 2023, DOI: 10.46541/978-86-7233-416-6_42

Fernández-Portillo, A., Almodóvar-González, M., & Hernández-Mogollón, R. (2020). Impact of ICT development on economic growth. A study of OECD European Union countries. *Technology in Society*, 63.

G20. (2016). *G20 Digital Economy Development and Cooperation Initiative*. Available online at: http://www.g20chn.org/English/Documents/Current/201609/P020160908736971932404.pdf

Jin, S., & Cho, C. M. (2015). Is ICT a New Essential for National Economic Growth in an Information Society? *Government Information Quarterly, 32*(3), 253-260.

Majeed, M. T. & Ayub, T. (2018). Information and Communication Technology (ICT) and Economic Growth Nexus: A Comparative Global Analysis. *Pakistan Journal of Commerce and Social Sciences, 12*(2). 443-476.

Miethlich, B., Belotserkovich, D., Abasova, S., Zatsarinnaya, E., & Veselitsky, O. (2020). Digital economy and its influence on competitiveness of countries and regions. *Revista espacios, 41*(12).

Nair, M., Pradhan, R. P. & Arvin, M. B. (2020). Endogenous dynamics between R&D, ICT and economic growth: Empirical evidence from the OECD countries. *Technology in Society, 62*(2020), https://doi.org/10.1016/j.techsoc.2020.101315

Niebel, T. (2014). *ICT and Economic Growth - Comparing Developing, Emerging and Developed Countries*. Discussion Paper No. 14-117. Centre for European Economic Research. Available online at: https://madoc.bib.uni-mannheim.de/37488/1/dp14117.pdf

OECD. (2014). *Measuring the Digital Economy: A New Perspective*. Paris: OECD Publishing. doi: 10.1787/9789264221796-en

Stanley, T. D., Doucouliagos, H., & Steel, P. (2018). Does ICT generate economic growth? A meta-regression analysis. *Journal of economic surveys, 32* (3), 705-726.

Tapscott, D. & McQueen, R. (1996). *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*. New York, NY: McGraw Hill

Thompson Jr, H. G., & Garbacz, C. (2011). Economic impacts of mobile versus fixed broadband. *Telecommunications Policy, 35* (11), 999–1009. https://doi.org/10.1016/j.telpol.2011.07.004

Tsakaev, A. & Khadzhiev, M. (2019). Taxation and tax transformations to the digital economy conditions. *Industry 4.0, 4*(2019), 134-137.

Turban, E., Leidner, D., McLean, E. & Wetherbe, J. (2008). *Information Technology for Management: Transforming Organizations in the Digital Economy*. Wiley, 5th Edition, ISBN 978-0471705222

https://databank.worldbank.org/

https://networkreadinessindex.org/

DIGITALNA KONKURENTNOST I PRIMENA IKT U FUNKCIJI ODRŽIVOG EKONOMSKOG RASTA

***Rezime**: Digitalna konkurentnost i primena IKT su ključni elementi moderne privrede. Predstavlljaju neizostavni deo konkurentnosti, inovacija i razvoja. Istraživanje obuhvata 20 SEE zemlje u 2022. godini. Korišćen je NRI (Network Readiness Index). NRI je kompozitni indeks koji ocenjuje digitalnu konkurentnost i primenu IKT. BDP per capita je primenjen kao indikator ekonomskog rasta. U studiji je primenjena korelaciona analliza. Rezultati istraživanja pokazuju da postoji jaka korelaciona veza između cene mobilne opreme i tarifa, na jednoj strani, i BDP per capita, na drugoj strani sa Pirsonovim koeficijentom korelacije od 0,757 i 0,671. Rezultati ukazuju na to da je ekonomski rast u vezi sa troškovima i cenom primene IKT više nego sa IKT infrastrukturom i inovacijama.*

***Ključne reči:** digitalna konkurentnost, primena IKT, ekonomski rast, korelacija*

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