Digitalization and society's sustainable development – Measures and implications

Jovanović, Milica; Dlačić, Jasmina; Okanović, Milan

Source / Izvornik: **Zbornik radova Ekonomskog fakulteta u Rijeci : časopis za ekonomsku teoriju i praksu, 2018, 36, 905 - 928**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

https://doi.org/10.18045/zbefri.2018.2.905

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:192:802249

Preliminary communication
UDC: 502.131.1:004
https://doi.org/10.18045/zbefri.2018.2.905

Digitalization and society's sustainable development – Measures and implications[*1]

Milica Jovanović[2], *Jasmina Dlačić*[3], *Milan Okanović*[4]

Abstract

This paper examines the relationship between digitalization and sustainable development and presents the composite index used for measuring the digital competitiveness of nations – the Digital Economy and Society Index (DESI). Today's environment is highly dependent on technological capabilities. Tracking contemporary technological development is becoming crucial at both micro and macro level. One of the major revolutions in modern business is switching from traditional to digital business models for achieving higher competitiveness level. Digitalization is one of the primary impetus of today's development. To accept and implement these changes, it is important to highlight the macromarketing role in this process. It is necessary to have concrete measures for identifying the shortcomings, good practices, and track the development. For this purpose, European Commission developed DESI to measure digital performance of European Union countries. This paper examines the DESI methodology and observes how the digital performance of EU affects main sustainable development components: economic, social, and environmental. Thus, the paper explores the correlations of DESI and other composite indices that measure sustainability components. Besides, the research examined the relationships between Hofstede's cultural dimensions and digital

[*] Received: 02-05-2018; accepted: 13-12-2018

[1] This paper has been supported by the University of Rijeka for project ZP UNIRI 9/17 and the Ministry of Education, Science, and Technological Development of the Republic of Serbia project number TR-32013.

[2] *Teaching assistant, MSc, University of Belgrade, Faculty of organizational sciences, Jove Ilica 154, 11000 Belgrade, Serbia. Scientific affiliation: management of technology, innovation and development, operations research. Phone: +381113950879. E-mail: milica.jovanovic@fon.bg.ac.rs.*

[3] *Assistant professor, PhD, University of Rijeka, Faculty of economics and business, Ivana Filipovica 4, 51000 Rijeka, Croatia. Scientific affiliation: marketing. Phone: +38551355111. E-mail: jasmina.dlacic@efri.hr.*

[4] *Assistant professor, PhD, University of Belgrade, Faculty of organizational sciences, Jove Ilica 154, 11000 Belgrade, Serbia. Scientific affiliation: marketing. Phone: +381113950848. E-mail: milan.okanovic@fon.bg.ac.rs.*

performance. The paper highlights the importance of digitalization as another crucial component of society's sustainable development.

Key words: *digitalization, sustainable development, performance indicators, society, macromarketing*

JEL classification: *Q01, E71, M38*

1. Introduction

Throughout history, the main radical changes that occurred through industrial revolutions shaped today's society. Four eras of technology deeply changed everything that surrounds us and affects everyday life (Schwab, 2016). Medicine, education, transport, manufacturing, banking, business, sports, food industry, etc., everything changed under the influence of these significant changes. In this world of fast changes, man forgot about his natural habitat, his environment. Technology is continually developing, but sometimes the costs are great. Thus, it is significant to measure the impact that technological changes have on *sustainable* development, the synergistic development of economy, society, and environment. Recently, there is an emergence of various measures of national performance. Numerous indices are used with the aim to measure different aspects of a nation's economic development: competitiveness, innovativeness, entrepreneurial activity, etc. (Jovanović et al., 2017). However, there are indices oriented towards measuring different national phenomena, such as goodness of a country, which inspects contribution of a nation to the humanity; or overall sustainability that evaluates contribution to sustainable development goals. In these recent trends, another index emerged because of rapid digital development: The Digital Economy and Society Index (DESI).

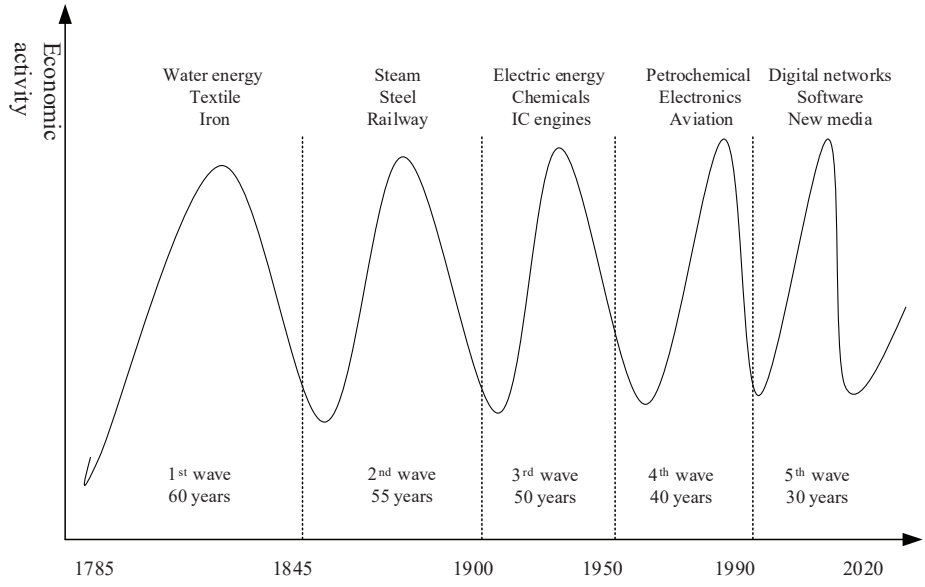
In this paper, we examined the digitalization impact on the main sustainability components: economy, society, and environment. The test hypothesis of the research is that digitalization affects sustainable development. To confirm the hypothesis, we proposed two research questions listed in the second section. We analysed the correlation of DESI with selected methodologies that measure different aspects of sustainability dimensions. We also observed the relationship between cultural characteristics of a nation and country's digitalization level by exploring correlations of Hofstede's cultural dimensions and DESI.

Next section explains main concepts examined in this paper: digitalization, sustainable development, macromarketing, relationship between sustainable development and digitalization, with focus on DESI. Section three presents the methods used for the research. The fourth and fifth sections give empirical data and results of the research, as well as the discussion. Finally, we complete the paper with the conclusions of the research as well as point out limitations and propose further research ideas.

2. Literature review

Today's environment is highly dependent on technological capabilities and keeping track with contemporary development is becoming crucial at both micro and macro level. Today's societal characteristics are highly influenced by the industrial revolutions occurred in the last three centuries. Revolutions have occurred throughout history when new technologies and novel ways of perceiving the world caused a profound change in economic systems and social structures (Schwab, 2016). From the first industrial revolution and steam machine in the 1760s, technology has developed exponentially by constantly upgrading itself and behaving as a sort of recursion where new technologies were created by the old ones. The second revolution in the late 19th and early 20th century was induced by the development of electricity and it enabled mass production. Afterwards, the 60s of the 20th century brought computers that shaped the third industrial revolution or, so-called, digital revolution. This era introduced personal computers and the internet. Finally, based on the previous digital revolution, the current, fourth industrial revolution is led by artificial intelligence, machine learning and Internet of things (Schwab, 2016). Schumpeter explained this phenomenon through his waves of innovation (Figure 1). He claims that each wave of innovation does not last equally, and that their length is shortened due to the rapid development of new technologies (The Economist, 1999; Levi Jakšić et al., 2018a). Currently, we are living in the 5th wave of innovation, where digital solutions are becoming the leading impetus of change.

Figure 1: Schumpeter's long waves of innovation



Source: Levi Jakšić et al. (2018a)

One of the major revolutions in modern business is switching from traditional to digital business models for achieving higher competitiveness level. In this, fifth wave of innovation, we can distinguish three eras of digital transformation (I-scoop, 2016):

1. Digitization: where the analog items are converted into digital versions (i.e. electronic version of paper documents);

2. Digitalization: where digital technologies are used to change business models, create revenue, improve business and value-producing opportunities; and

3. Digital transformation: where digital technologies are used to change all business aspects.

Currently, we live in the third era of digital transformation, and new challenges are put in front of governments, companies, entrepreneurs, and customers/consumers (Schwab, 2016). Schmarzo (2017) stresses out that this era of digital transformation represents "application of digital capabilities to processes, products, and assets" with the aim to "improve efficiency, enhance customer value, manage risk, and uncover new monetization opportunities." Similarly, Bertini (2016) points out that digital transformation affects not just lives, but also individual's experiences.

Dang and Pheng (2015: 13) explored new theories of economic development and well noted, "on the way to achieve rapid economic growth, countries around the world have been exploiting their natural resource reserves at alarming rates". Both science and society have noticed this occurrence, and consequently, sustainable development has been increasingly highlighted as a priority for nations and enterprises (Levi Jakšić et al., 2018b). Brundtland Commission (1987: 41) states that: "*Sustainable development (SD) is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*. This concept suggests that the well-being of humanity can be achieved only by the synergistic effect of three basic pillars: economic growth, social equity, and environmental protection. Additionally, due to the complexity of today's society, culture has been identified as the fourth dimension of sustainable development (Commonwealth Secretariat, 2007; Hawkes, 2001). Organization Culture 21 states that "culture ultimately shapes what we mean by development and determines how people act in the world" (Culture 21, 2014). This component of SD is important because it determines how the changes will be accepted in the society. Thus, it could be a crucial factor in the adoption of the digital transformation.

Some authors criticize the SD definition given by the Brundtland Commission and even consider five determinants of sustainable development (Seghezzo, 2009): *Place*: with three dimensions of space; *Permanence*: the dimension of time; and *Persons*: human dimension. However, this concept is too abstract to be applied, and not sufficiently explored and scientifically confirmed. Recent researches

also examine the influence of culture on accepting digitalization. Benner (2017) analysed the impact of the cultural acceptance of digitalization on the GDP in East and West Germany. The research was based on measuring the data from Google Trend, where the term "Facebook" occurred as a search term. The results showed that positive cultural acceptance of digitalization increases GDP. However, this research did not include the remaining SD dimensions. On the other hand, Hegyes et al. (2017) examined the problem of digitalization and sustainable development by comparing Hungary with other EU countries. The research was based on the European Commission reports and empirical research in secondary education. Again, the results did not give the whole picture of the digitalization impact on sustainable development components, but they put the focus on Hungarian performance in comparison to EU.

Relationship of the national cultural dimensions and technology innovativeness has already drawn the attention of the researches. Zhao (2011) has empirically examined whether national culture has an impact on e-government development in 84 countries around the world. He has found that only individualism, power distance and long-term orientation are significantly correlated with e-government development. Khalil (2011) also explored the relationship between values of national culture and practice to e-Government readiness. He has found that, except for the performance orientation and assertiveness, values of national culture and practices correlated negatively and positively with e-Government readiness. Al-Hujran et al. (2011) have developed an integrated model by extending the technology acceptance model (TAM) with Hofstede's national culture dimensions, which is used to evaluate the impact of national culture on eGovernment adoption. Favourable cultural factors across nations like religion, ethnicity, political freedom do help nation to support technological progress (Coccia, 2014). Some researchers provided synthesis of previous research related to information technology and national culture (Gallivan and Srite, 2005) but not pointing out national cultural dimensions. Srite and Karahanna (2006) in their research compared technology acceptance and cultural values. Their research indicated that espoused cultural values have different influence on behavioural intention to use technology depending on cultural values like *Masculinity*, *Power distance* and *Uncertainty avoidance*. Rinne et al. (2012) explored the link between Hofstede's measures of cultural values and innovation measured by the Global Innovation Index (GII). Their analyses show a strong negative relationship between Hofstede's dimensions of *Power distance* and GII innovation scores as well as a strong positive relationship between *Individualism* and GII innovation scores. Considering other studies that investigate a relationship between culture and environmental sustainability, Cox et al. (2011) found that economic development is also related to cultural values. They found that *Power distance* was negatively related to weighted gross domestic product per capita (GDPC), whereas *Individualism* was positively related to weighted GDPC. GDPC in their study was balanced with environmental sustainability.

In these kinds of societal changes, managers should take care of companies' impact on society. Taking a systems perspective of marketing it is evident that everything is networked: people, companies, society, and as such they must respond to customer demand (Layton and Grossbart 2006). If we observe macromarketing from a perspective of activities within society than marketing is helping to optimize overall social benefits form entire marketing process (Bartels and Jenkins, 1977), and marketing processes are functioning as a result and determinant of economic and social environment. Consequently, marketing from a macromarketing perspective is a facilitating agent that helps to organize activities in society to improve conditions for individuals in a specific society (Layton, 2009). Macromarketing is more oriented on social aspects of marketing and institutions (Bartels and Jenkins, 1977). This concept tries to explain the functioning of complex marketing mechanisms of economic and social environments. As such, it is an important determinant of sustainable development. Kilbourne et al. (1997) claim that only macromarketing can effectively examine the relationship between sustainable consumption and quality of life. They recognize four dimensions: technology, economics, ethics, and politics as crucial for determining sustainable consumption. By fostering macromarketing activities and mechanisms (information, individual actions, participation of business, measuring indicators, political support of government) it is possible to transform society from the state of hyperconsumption to the desired state of sustainable consumption (Kilbourne et al., 1997). Macromarketing activities encourage a behavioral change of society by raising awarenes and they are also responsible for accepting the radical technological changes (i.e. digital transformation) (Shultz, 2007; Nills and Shultz, 1997). Also, Mittelstaedt et al. (2014) argue that macromarketing approach is researching, among others, globalization, the environment and quality of life, and due to that is the most suitable for analysing and advancing sustainability.

Shultz and Peterson (2017) noticed the socioeconomic transition in Vietnam to a market-oriented economy, and thus examined the macromarketing aspect of their performance. They examined the Sustainable Society Index values with macromarketing activities and concluded that it is crucial to foster macromarketing activities in order to achieve a sustainable society. Further, one of the possibilities for exploring this impact of macromarketing on society is to analyse global indices (Simkins and Peterson, 2015). For example, the Sustainable Society Index can offer important issues related to marketing and sustainable business practices. Moreover, secondary data that also include various indexes are a lucrative pool for approaching and researching sustainability issues through macromarketing. In the process of adopting changes, macromarketing can be used as an approach that takes into consideration different cultural aspects of the society where the change is being implemented. Layton (2007) points out that culture and its elements are an integral part of macromarketing approach to marketing systems. Therefore, cultural context is important in defining and exploring marketing environment. It interacts with other elements in the environment like economic development, level

of technology and the physical environment to ensure sustainable development of a society. In the era of digital transformation of society, the technological change and the growth of knowledge are a driver of economic growth and wealth (Layton, 2009). Consequently, in this process of the digital transformation of the society, it is important to consider different cultural dimensions. Different dimensions of culture and cultural change operate together through marketing systems to change society (Layton, 2009) and to influence sustainable development of the society. Therefore, there is interconnectedness between society, culture and macromarketing approach.

Having in mind the emergence of the digital transformation process, importance of sustainable development issue, and the intermediary role of macromarekting, to answer the main hypothesis of the research we proposed two research questions:

Whether and to what extent digital transformation affects sustainable development and its components?

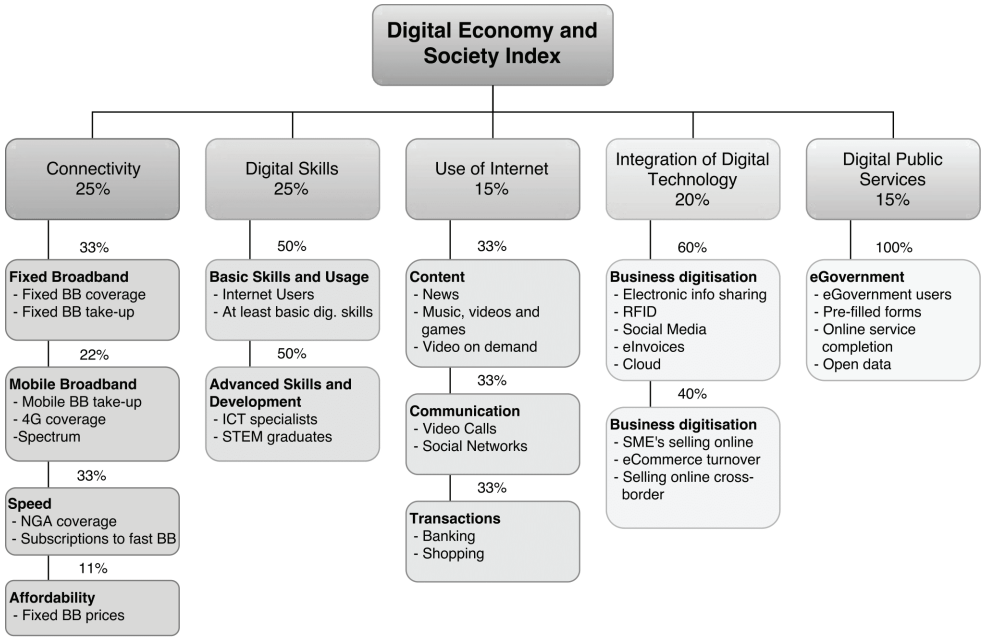
Whether digital transformation level is affected by the cultural characteristics of a society?

Thus, in this paper, we compare the measures of digitalization performance with measures of sustainable development (as a concept, as well as its components). In the research, we observed cultural dimensions as an important component of both sustainable development and macromarketing. We based our conclusions on a set of 28 EU countries. For the measure of digitalization, we observed the Digital Economy and Society Index and compared the results with other measures related to the sustainable development components.

To measure the level of achieved digitalization in a country, European Commission developed The Digital Economy and Society Index (DESI), a composite measure that summarises indicators related to the digital performance and digital competitiveness of the EU member states. The index is compounded of a set of indicators related to the digital policy mix and has a three-layer structure (European Commission, 2017). At the first level, there are five principal dimensions: Connectivity, Digital skills, Use of Internet, Integration of Digital Technology, and Digital Public Services. Second level has 12 sub-dimensions, and the third level has 31 individual indicators. Complete structure of DESI with the weighting system is presented in Figure 2. The five principal dimensions are defined by the five principal policies for digital economy and society. European Commission (2017) claims that the digital development of the economy and society can only be achieved by interconnected development of these areas (European Commission, 2017). As technological changes occur, this index is also changing the methodology, so in 2016, they included some new indicators in the calculation (i.e. 4G coverage). Regarding weighting system used for the computation of final DESI score, not all the dimensions have the same share: Connectivity and Human Capital are having the largest impact with 25% each, then Integration of Digital Technology with 20%,

while Use of Internet and Digital Public Services have the lowest impact of 15%. Within dimensions, the sub-dimensions also have different weighting system shown in Figure 2 (European Commission, 2017).

Figure 2: Digital Economy and Society Index structure



Source: Authors, based on European Commission (2017)

Analysing the structure and methodology used for computation of the DESI, we can conclude that the indicators are carefully examined, selected and appropriate for the phenomenon they measure. Also, as one of the biggest shortcomings of numerous global index methodologies is equal weighting system (Jovanović et al., 2017; Šegota et al., 2017), we can say that this is not the case with DESI, since the different significance of certain digitalization aspects has been considered. Finally, all indicators at the lowest level of the hierarchy are quantitative, so they provide objective measures of performance regarding the achieved level of digitalization.

To objectively examine the relationship between the digitalization process and sustainable development, we measured the correlation between the DESI and selected set of indicators that measure certain (or all) aspects of sustainable development. We compared the DESI results with the following global indices:

- Global Competitiveness Index
- Global Innovation Index

- Gross Domestic Products
- Global Entrepreneurship Index
- The Good Country Index
- Sustainable Development Goal Index
- Sustainable Society Index

There is still no widely accepted index that measures overall sustainability, but some of them deal with one or more SD dimensions (Savić et al., 2016). In this research, we use indices explicitly defined for this purpose, but since their methodologies are still developing (Sustainable Development Goal Index started being measured in 2015), or not measured each year (as Sustainable Society Index), we used measures that relate to some SD dimensions and are widely accepted.

To examine macromarketing role in the process of digitalization, we included measures of Hofstede's cultural dimensions in the research. Also, culture is identified as the fourth dimension of SD, but not included in any official methodology for measuring sustainability level. Thus, this was another reason to include a cultural aspect in the research.

Having in mind that not all examined indices measure each SD aspect, we classified them based on the set of indicators they are compounded of (Table 1). After the explanation of each methodology, we noted the dimension they are related to.

3. Methodology

Further, we will briefly explain the subject matter of each index. *Global Competitiveness Index (GCI)* is measured by the World Economic Forum and assesses the global competitiveness of 137 countries. It also gives an insight into the catalysts of the economy that are crucial for the further development and prosperity (WEF, 2017). The indicators of this methodology are oriented on economy (i.e. quality of roads, pay and productivity, company spending on R&D, etc.) and society development (i.e. Secondary education enrolment rate, Internet users, quality of education, etc.).

Global Innovation Index (GII) measures innovation performance of 127 world economies. Cornell University, INSEAD Business School, and World Intellectual Property Office annually publish The Global Innovation Report and provide data related to the innovative activity of countries through the set of 81 indicators (Cornell University et al., 2017). As in GCI, the components of this index are related to economy and society. The only single indicator used in the research for the comparison with the digitalization level is *Gross Domestic Product (GDP),*

as one of the main indicators of a country's economic performance (Syrquin, 2011). We also examined the scores of *the Global Entrepreneurship Index (GEI)* published by the Global Entrepreneurship and Development Institute. This index measures the health of 137 entrepreneurial ecosystems by measuring entrepreneurial attitudes, abilities, and aspirations (GEDI, 2017). Although entrepreneurial activities are not an explicit part of the sustainable development, they relate to the social activities within the economic system, so it is also connected to the economy and society dimensions of SD (Levi Jakšić et al., 2015).

Another global index examined in the research offers a slightly different perspective – *the Good Country Index (GoCI)*. Unlike other measures that are oriented mostly towards economic and social performance, this index measures the contribution of a country to "the common good of humanity" (Good Country, 2016). The Good Country organization collects the data from the official institutions and evaluates the "goodness" of a country through its contribution to seven dimensions: Science and Technology, Culture, International Peace and Security, World Order, Planet and Climate, Prosperity and Equality, and Health and Wellbeing. Unlike previous indices, this relates to all three sustainability aspects: economy, environment and society. The listed indices are not primarily oriented towards measuring sustainability but are focused on one or more dimensions. Thus, we included methodologies developed solely to measure the sustainable development: Sustainable Development Goals Index and Sustainable Society Index. *Sustainable Development Goals Index (SDGI*) is the result of a worldwide study that evaluates how much each country contributes to achieving the Sustainable Development Goals. The Sustainable Development Solutions Network and the Bertelsmann Stiftung annually publish these reports with guidelines to leaders how can identify priorities and track progress in achieving the goals (Bertelsmann Stiftung and SDSN, 2017). *Sustainable Society Index (SSI)* is another measure of sustainability level that the Sustainable Society Foundation publishes every two years. The SSI calculates the performance at three levels: 21 indicators, 7 categories, and 3 basic SD dimensions (Economic, Environmental, and Human Wellbeing) (SSF, 2016a). However, this index does not provide the aggregate measure of sustainability, but three different scores for each dimension. Thus, we compared the DESI result with each of the three SSI components.

None of the listed indices includes the cultural perspective of a nation, although it is identified as an important component of adopting technological changes or component that moderates technology adoption, usage, and infusion (Srite, 1999). Kovačić (2005) in his work asserts that cultural values relate to technology readiness. Others explored relationship between different national cultural dimensions on technology acceptance or technology readiness (Sun, Lee and

Law, 2018; Khalil, 2011; Yoon, 2009; Parasuraman, Edvardsson and Gustafsson, 2004). Thus, we included Hofstede's cultural dimensions scores for the selected set of countries. Hofstede's cultural dimensions approach is one of the most widely used tools that measure cultural characteristics of a nation (Hofstede, 1984; Masleand and Hoorn, 2009). We explored correlations with each of the six defined dimensions. Each country achieves a certain score on a scale from 0 to 100.

Power Distance dimension describes the level of orientation towards hierarchy. Countries that have high scores on this dimension accept unequal distribution of power since low scores mean that power is equally distributed among society. *Individualism vs. Collectivism* describes the strength of the community in the society. A high score on this dimension means that people are not willing to take other people's responsibility, unlike those with low scores that are loyal to the group they belong to and stand for their interest.

Masculinity vs. Femininity describes the roles of men and women in society. Highly masculine societies defer the roles depending on the gender, and money and achievement are important determinants of success, while the feminine societies more orients towards the quality of life, and it is considered that men and women roles are overlapping. *Uncertainty Avoidance* measures the level to which people are willing to deal with the anxiety and are capable of accepting the risk. A high score on this dimension defines that society prefers the situation that they can control and situations that can predict, while the lower score signifies the relaxed and open communities.

Long-term orientation describes the degree to which people are oriented on past and tradition. Nations with low scores are more religious, nationalists, and are not easy to accept societal changes and thus are marked as short-term oriented, while high scores describe the nations that are more persistent, pragmatic, thrifty and respect education. *Indulgence vs. Restraint* measures a society's characteristics regarding enjoying life. Nations with low scores are restraint, pessimistic and are regulated by strict social norms, while high score describes societies that are more optimistic and focused on personal happiness (Hofstede, 2011).

4. Empirical data and analysis

To compare the results and derive conclusions, we collected data from 2014 to 2017 (since the European Commission started measuring DESI in 2014) for EU countries (the scope of DESI). The SDGI values are available only for 2016 and 2017, while the SSI is measured every two years and thus the results are provided only for 2014 and 2016.

Table 1: SD dimensions and data source for the selected indices

Measure	SD component		Data source
GCI	Economy, Society		WEF (2014) WEF (2015) WEF (2016) WEF (2017)
GII	Economy, Society		Cornell University et al.(2014) Cornell University et al. (2015) Cornell University et al. (2016) Cornell University et al. (2017)
GDP	Economy		Eurostat (2018)
GEI	Economy, Society		GEDI (2014) GEDI (2015) GEDI (2016) GEDI (2017)
GoCI	Economy, Society, Environment		Good Country (2017)
SciTech		Economy	
Culture		Society	
Intern.Peace & Security		Society	
World Order		Society	
Planet & Climate		Environment	
Prosperity and Equality		Economy, Society	
Health and Wellbeing		Economy, Society	
SDGI	Economy, Society, Environment		Kroll (2015) Sachs et al. (2016) Sachs et al. (2017)
SSI	Economy, Society, Environment		SSF (2016b)
HCD	Culture		Hofstede Insights (2018)

Source: Authors

All data were collected from the official reports, websites, and databases, and the sources are given in Table 1. Also, the table lists the dimensions of sustainable development that is addressed by the selected indices. To calculate the correlation, we used StatSoft's software *Statistica* (StatSoft, 2018). We measured the Spearman's correlation coefficient for comparing the Good Country Index and DESI since the data from the GoCI methodology is ordinal (ranks). For the rest of the data, we calculated Pearson's correlation coefficient. Although correlation coefficients do not imply causal relationship, they show the linkage between the observed variables and the strength of the link. The results are discussed in the next section.

Correlations from Table 2 show that most of the measures significantly correlate with the DESI values (numbers flagged). GCI, GII, and GEI have a strong positive correlation with DESI for each year (from 0.7667 to 0.8856) which means that highly digitalized countries are more likely to be more competitive, innovative, and entrepreneurially oriented on the global market. The similar situation is with the GDP level, which shows high positive correlation from 0.6125 to 0.6623 with DESI index. This can be labelled as expected because higher digitalization level can be related to the higher standard level of the countries. However, it is not as high as the previous measures, which proves that the economic standard is not the only aspect that is related to the more digitalized societies.

Table 2: The correlation results

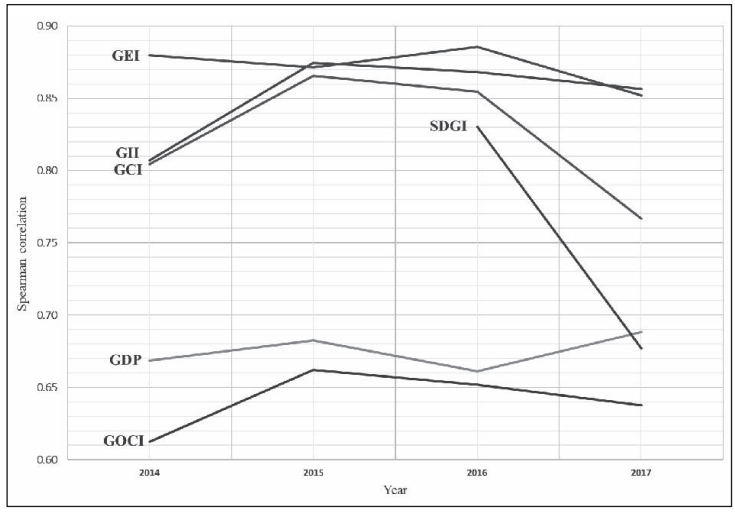
Measure		SD component	DESI			
			2014	2015	2016	2017
GCI		Economy, Society	0.8047*	0.8655*	0.8546*	0.7667*
GII		Economy, Society	0.8071*	0.8745*	0.8682*	0.8564*
GDP		Economy	0.6687*	0.6827*	0.6614*	0.6883*
GEI		Economy, Society	0.8797*	0.8712*	0.8856*	0.8521*
The GoCI		Economy, Society, Environment	0.6125*	0.6623*	0.6519*	0.6377*
SciTech		Economy	0.3175	0.3290	0.3372	0.2874
Culture		Society	0.7767*	0.8095*	0.8161*	0.8084*
Intern. Peace & Security		Society	0.2759	0.3131	0.3098	0.2868
World Order		Society	0.5249*	0.5397*	0.5008*	0.5101*
Planet & Climate		Environment	0.1527	0.1587	0.1637	0.1544
Prosperity and Equality		Economy, Society	0.5435*	0.5955*	0.6015*	0.5709*
Health and Wellbeing		Economy, Society	0.7225*	0.7564*	0.7493*	0.7504*
SDGI		Economy, Society, Environment	N/A	N/A	0.8302*	0.6771*
SSI		Economy, Society, Environment	N/A	N/A	N/A	N/A
Human Wellbeing		Society	0.5488*	N/A	0.6132*	N/A
Environmental Wellbeing		Environment	-0.5642*	N/A	-0.5890*	N/A
Economic Wellbeing		Economy	0.3156	N/A	0.3199	N/A
Hofstede's dimensions	Power distance	Culture	-0.7201*	-0.7079*	-0.6992*	-0.5613*
	Individualism	Culture	0.5593*	0.5607*	0.5528*	0.5980*
	Masculinity	Culture	-0.3814	-0.3610	-0.3870	-0.3465
	Uncertainty Avoidance	Culture	-0.6427*	-0.6598*	-0.6470*	-0.5791*
	Long term orientation	Culture	-0.0681	-0.0772	-0.0920	0.0295
	Indulgence	Culture	0.6932*	0.7092*	0.7246*	0.6844*

*significant at $p < 0.05$; N/A – the data was not available for the observed years

Source: Authors

The Good Country Index also has a strong positive correlation with DESI (from 0.6125 to 0.6623). These results indicate that countries with higher level of digitalization tend to contribute more to humanity. This tendency can also be considered as a certain aspect of sustainability if we assume that these kinds of contribution and responsible behaviour are leading towards higher sustainability. To have results on correlations between the observed indices and DESI more visually comparable we created Figure 3.

Figure 3: Statistically significant correlations of the observed indexes and DESI

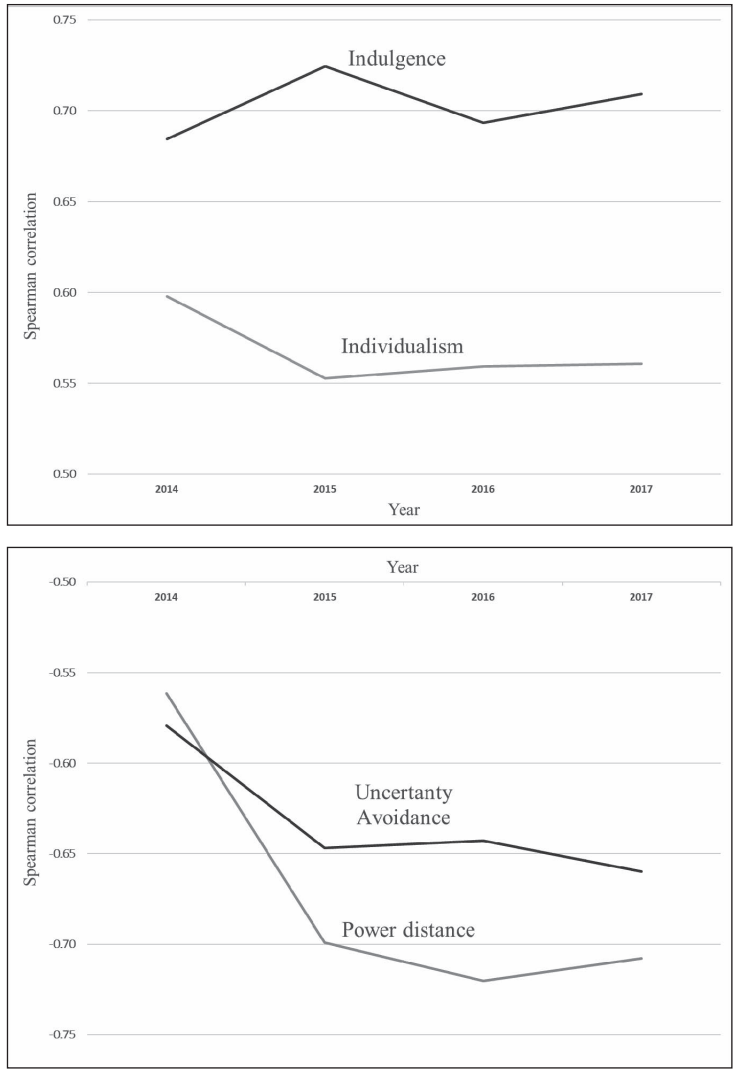


Source: Authors

If we focus on the sustainability indices, SDGI also strongly correlates with the DESI with correlations of 0.8302 and 0.6771.

From a cultural perspective (Figure 4), the results show that *Power distance* dimension has a high negative correlation with DESI. Also, it has been identified that more risk-oriented countries (have lower *Uncertainty Avoidance* scores) have medium to a strong negative correlation score (-0.5791 to -0.6470).

Figure 4: Statistically significant correlations of Hofstede's components and DESI



Source: Authors

Furthermore, *Individualism* has a medium positive correlation with digitalization (0.5528 to 0.5980). *Long term orientation* does not detect any relationship with the digitalization level. In the end, *Indulgence* has strong positive correlation with the level of digitalization (0.6844 to 0.7246).

5. Results and discussion

If we examine the components of GoCI and the results given in Table 2, *Science and Technology* development have low positive relationship with DESI, which at first do not seem logic, but this value in the GoCI methodology is computed based on the number of international students, journal exports, international publications, Nobel prizes, and patents, and is not closely linked to the ICT development. Cultural component, however, has a strong positive relationship with digitalization level, as well as *Health and Wellbeing*. *World order*, and *Prosperity and Equality* have a medium positive correlation with the level of digitalization. These results again emphasize that social components of the countries are influenced positively with the process of digitalization. On the other hand, for *International Peace and Security* does not identify the statistically significant relationship, although it is positive. Also, for *Planet & Climate* component, the only component related to environmental dimension, there is a weak positive correlation, which means that does not have a statistically significant relationship with digitalization level.

Table 2 and Figure 3 point out that sustainability index SDGI strongly correlates with DESI. This implicates that, according to this measure, more digitalized societies tend to perform better in achieving sustainability goals. To have another perspective, we can investigate the SSI correlation results, since this index diversifies three components related to the sustainability dimensions and do not provide a single (composite) measure of sustainability. *Human Wellbeing* component (related to the social dimension) has a positive relationship with the digitalization, meaning that digitalized societies have more satisfied basic needs and better education. In comparison to *Environmental Wellbeing*, DESI has a negative relationship. This is an important implication since it signifies that societies with higher digitalization level are scoring low regarding climate, energy use, renewable energy, consumption etc.

The research also examined cultural component according to Hofstede's dimensions of culture (Figure 4 and Table 2) and shows several trends. Namely, *Power distance* dimension has a high negative correlation with DESI. Also, it has been identified that more risk-oriented countries (have lower *Uncertainty Avoidance* scores) tend to be more digitalized. In addition, results show that collectivistic societies have a lower level of digitalization than the individualistic (*Individualism* component). Surprisingly, *Long term orientation* does not detect any relationship with the digitalization level. This signifies that there are no differences found in accepting the digitalization between the traditional and future-oriented societies. In the end, *Indulgence* has a strong positive correlation with the level of digitalization. This result indicates that the level of digitalization is higher in the societies that tend to enjoy life and have fun in comparison to the restraint countries that resist the fulfilment of desires. Hofstede's cultural dimensions are used in this research, but, it

would be interesting, related to macromarketing efforts, to explore different cultural tools that Fons Trompenaars and Shalom Schwartz developed (Trompenaars and Hampden Turner, 2000; Schwartz, 2006).

Although we have derived important implications, this research has certain limitations. Firstly, the set of countries is narrowed to 28 EU countries because of the scope of DESI. This is important because cultural differences may be even stronger, and conclusions may significantly differ when the rest of the world countries are included (especially Asian and African). However, this cannot be changed if some new official measures occur or the European Commission methodology changes the scope of DESI. Regarding methodologies for measuring sustainable development, SDGI is still young methodology, and SSI is not measured annually and does not provide a unique score on sustainability. Furthermore, observing countries based on the current level of development would help researchers to distinguish between knowledge and information society. This approach would be interesting to be applied in further research. In this research, we used Hofstede's model of cultural dimensions to explore values and relationship that society has on DESI. However, other methodologies can be applied to explore relationship with macromarketing efforts, especially related to digitalization and sustainability. As current research focuses only on exploring wheatear and how digital transformation affects sustainable development, it would be interesting to explore to what extent these elements influence sustainable development. We suppose that there will be differences among different cultures and especially in cultural dimensions as current research indicated. Also, there is a possibility to structure the model of implications for policymakers with specific macromarketing tools that should be applied for easier implementation of technological changes into a society based on the cultural dimensions.

6. Conclusions

Technological changes are rapid. They significantly shape our society. Since the length of the waves is shortening, it demands quick and agile reaction on the market. Currently, we are living in the era of digital transformation. Digital technologies are changing all business aspects, and new challenges are occurring. In adopting these changes, macromarketing has a special role with its specific approach. Nonetheless, man must not forget his natural environment in chasing the economic development. Thus, developing sustainably has been set as a priority action, and the hypothesis was proposed that that digitalization affects sustainable development. Consequently, two questions emerge: Whether and to what extent digital transformation affects sustainable development and its components? and Whether digital transformation level is affected by the cultural characteristics of a society? For answering the posted questions, we conducted a research where

the digitalization measure of EU countries is compared with other established methodologies that measure one or more sustainability components. The results show that digitalization significantly correlates with the sustainable development components, indicating that we can confirm our posited hypothesis. Higher digitalization level is in a relationship with economic development through higher competitiveness, innovativeness, and entrepreneurial activities. Also, GDP is higher in more digitalized countries. Nevertheless, not just economic development, but the social aspect is also positively influenced by the digitalization. However, environment is neglected with a medium negative impact of the digitalization. Based on correlations results between different Hofstede's cultural dimensions and digitalization it is noted that cultural differences have a large impact on the process of digitalization. More hierarchy, individualism, risk orientation, and readiness to enjoy life are leading to higher digitalization. On the other side, traditional societies have similar digitalization level as the future-oriented ones. This also leads to the conclusion that macromarketing has an important role in accepting digitalization if the tools are used and shaped by a nation's cultural characteristics.

It has been noted during the research that methodologies used for measuring the level of sustainability are not developed enough and that more focus is put on the economic and social development. Also, we based our conclusions on DESI, measured only for the EU countries. We examined the methodology and concluded that it had been carefully developed, with the appropriate structure and weighting system. Since the digitalization is an important aspect of today's development, DESI should have a wider scope than 28 countries. This would enable future research with a more representative set of countries for deriving implications, especially regarding cultural characteristics that are important for shaping the set of actions for implementation.

References

Al-Hujran, O., Al-Dalahmeh, M., Aloudat, A. (2011) "The role of national culture on citizen adoption of eGovernment services: An empirical study", *Electronic Journal of E-government*, Vol. 9, No. 2, pp. 93–106. Available at: <http://www.ejeg.com/issue/download.html?idArticle=230>.

Bartels, R., Jenkins, R. L. (1977) "Macromarketing", *The Journal of Marketing*, Vol. 41, No 4, pp. 17–20, doi: 10.2307/1250229.

Benner, E. (2017) "Cultural Acceptance of Digitalization and Growth of an Economy: A Comparison of East and West Germany", *Economics Student Theses and Capstone Projects. 53*.

Bertelsmann Stiftung and SDSN (2017) "Sustainable Development Goals Index: Overview". Available at: <http://www.sdgindex.org/overview/>.

Bertini, P. (2016) "Focus on technology hinders true digital transformation". Available at: <http://www.brandknewmag.com/focus-on-technology-hinders-true-digital-transformation/>.

Brundtland Commission (1987) *Our common future: Report of the World Commission on Environment and Development,* United Nations.

Coccia, M. (2014) "Driving Forces of Technological Change: The Relation Between Population Growth and Technological Innovation: Analysis of the Optimal Interaction Across Countries", *Technological* Forecasting and Social Change, Vol. 82, pp. 52–65, doi: 10.1016/j.techfore.2013.06.001.

Commonwealth Secretariat (2007) "Culture as the Fourth Pillar of Sustainable Development", In *Small States: Economic Review and Basic Statistics, Volume 11*. London: Commonwealth Secretariat, pp. 28–40, doi: 10.14217/smalst-2007-3-en.

Cornell University, INSEAD, WIPO (2014) "The Global Innovation Index 2014: The Human Factor in Innovation". Available at: <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2014-v5.pdf >.

Cornell University, INSEAD, WIPO (2015) "The Global Innovation Index 2015: Effective Innovation Policies for Development". Available at: <https://www.globalinnovationindexorg/userfiles/file/reportpdf/gii-full-report-2015-v6.pdf>.

Cornell University, INSEAD, WIPO (2016) "The Global Innovation Index 2016: Winning the Global Innovation". Available at: <https://www.global innovationindex.org/userfiles/file/reportpdf/gii-full-report-2016-v1.pdf>.

Cornell University, INSEAD, WIPO (2017) "The Global Innovation Index 2017". Available at: <https://www.globalinnovationindex.org/gii-2017-report>.

Cox, P. L., Friedman, B. A., Tribunella, T. (2011) "Relationships among cultural dimensions, national gross domestic product, and environmental sustainability", *Journal of applied Business and Economics*, Vol. 12, No. 6, pp. 46–56. Available at: <http://www.na-businesspress.com/jabe/coxweb12-6.pdf>.

Culture 21 (2014) "Culture: Fourth Pillar of Sustainable Development". Available at: <www.agenda21culture.net/sites/default/files/files/documents/en/zz_culture4pillarsd_eng.pdf>.

Dang, G., Pheng, L. S. (2015) "Theories of Economic Development". In *Infrastructure Investments in Developing Economies,* Singapore: Springer, pp. 11–26, doi: 10.1007/978-981-287-248-7_2.

European Commission (2017) "Digital Economy and Society Index Metodological Note". Available at: <http://ec.europa.eu/newsroom/document.cfm?doc_id=43048>.

Eurostat (2018) "GDP per capita", Available at: <http://ec.europa.eu/eurostat/web/products-datasets/-/tec00001> [Accessed: 27 January 2018].

Gallivan, M., Srite, M. (2005) "Information Technology and Culture: Identifying Fragmentary and Holistic Perspectives of Culture", *Information and organization*, Vol. 15, No. 4, pp. 295–338, doi: 10.1016/j.infoandorg.2005.02.005.

GEDI (2014) "The Global Entrepreneurship Index 2015". Available at: <http://thegedi.org/product/2014-global-entrepreneurship-index/> [Accessed: 28 January 2018].

GEDI (2015) "The Global Entrepreneurship Index 2016". Available at: <http://thegedi.org/product/2016-global-entrepreneurship-index/> [Accessed: 28 January 2018].

GEDI, (2016) "The Global Entrepreneurship Index 2017". Available at: <https://thegedi.org/product/2017-global-entrepreneurship-index-data/> [Accessed: 28 January 2018].

GEDI (2017) "The Global Entrepreneurship Index 2018". Available at: <https://thegedi.org/2018-global-entrepreneurship-index/> [Accessed: 28 January 2018].

Good Country (2016) "About the Good Country Index" Available at: <https://goodcountry.org/index/about-the-index> [Accessed: 29 January 2018].

Good Country (2017) "The Good Country Index Results". Available at: <https://goodcountry.org/index/results> [Accessed: 29 January 2018].

Hawkes, J. (2001) *The Fourth Pillar of Sustainability: Culture's essential role in public planning,* Melbourne, Australia: Cultural Development Network.

Hegyes, É. G., Csapó, I., Farkas, M. F. (2017) "Some aspects of digitalization and sustainability in the European Union", *Journal of Management*, Vol. 36, No. 2, pp. 37–46. Available at: < https://www.ltvk.lt/file/zurnalai/05.pdf >

Hofstede Insights (2018) "Hofstede Cultural Dimensions – Compare Countries". Available at: <https://www.hofstede-insights.com/product/compare-countries/> [Accessed: 29 January 2018].

Hofstede, G. (1984) "Cultural dimensions in management and planning" *Asia Pacific Journal of Management*, Vol. 1, No. 2, pp. 81–99, doi: 10.1007/bf01733682.

Hofstede, G. (2011) "Dimensionalizing cultures: The Hofstede model in context", *Online readings in psychology and culture*, Vol. 2, No. 1, doi: 10.9707/2307-0919.1014.

I-scoop (2016) "Digitization, digitalization and digital transformation: the differences". Available at: <https://www.i-scoop.eu/digitization-digitalization-digital-transformation-disruption/> [Accessed: 10 March 2018].

Jovanović, M. et al. (2017) "Composite indices in technology management: A critical approach". In Jeremić, V., Radojičić, Z., Dobrota, M. ed. *Emerging Trends in the Development and Application of Composite Indicators,* Hershey, PA: IGI Global, pp. 38–71, doi: 10.4018/978-1-5225-0714-7.ch003.

Kilbourne, W., McDonagh, P., Prothero, A. (1997) "Sustainable Consumption and the Quality of Life: A Macromarketing Challenge to the Dominant Social Paradigm", *Journal of Macromarketing*, Vol. 17, No. 1, pp. 4–24, doi: 10.1177/027614679701700103.

Khalil, O. E. (2011) "e-Government readiness: Does national culture matter?", *Government Information Quarterly*, Vol. 28, No. 3, pp. 388–399, doi: 10.1016/j.giq.2010.06.011.

Kovačić, Z.J. (2005) "The Impact of National Culture on Worldwide eGovernment Readiness", *Informing Science: The International Journal of an Emerging Transdiscipline*, Vol. 8, pp. 143–158, doi: 10.28945/2927.

Kroll, C. (2015) *Sustainable Development Goals – Are the rich countries ready?,* Gutersloh: Bertelsmann Stiftung.

Layton, R. A. (2007) "Marketing systems – A core macromarketing concept", *Journal of Macromarketing*, Vol. 27, No. 3, pp. 227–242, doi: 10.1177/0276146707302836.

Layton, R. A. (2009) "On Economic Growth, Marketing Systems, and the Quality of Life", *Journal of Macromarketing*, Vol. 29, No. 4, pp. 349-362, doi: 10.1177/0276146709345108.

Layton, R. A., Grossbart, S. (2006) "Macromarketing: Past, present, and possible future", *Journal of Macromarketing*, Vol. 26, No. 2, pp. 193–213, doi: 10.1177/0276146706294026.

Levi Jakšić, M. et al. (2018a) *Tehnološko preduzetništvo.* Beograd: Fakultet organizacionih nauka.

Levi Jaksić, M., Jovanović, M., Petković, J. (2015) "Technology Entrepreneurship in the Changing Business Environment – A Triple Helix Performance Model", *Amfiteatru Economic*, Vol. 17, No. 38, pp. 422–440.

Levi Jakšić, M., Rakićević, J., Jovanović, M. (2018b) "Sustainable Technology and Business Innovation Framework – A Comprehensive Approach", *Amfiteatru Economic*, Vol. 20, No. 48, pp. 418–436, doi: 10.24818/ea/2018/48/418.

Maseland, R.K.J., van Hoorn, A.A.J. (2009) "Measuring values for cross-cultural research. NiCE Working Paper 09-107". Available at: <http://repository.ubn.ru.nl/bitstream/handle/2066/74895/74895.pdf> [Accessed: 30 March 2018].

Mittelstaedt, J.D., Shultz, C.J., Kilbourne, W.E., Peterson, M., (2014) "Sustainability as megatrend: Two schools of macromarketing thought", *Journal of Macromarketing*, Vol. 34, No. 3, pp. 253–264, doi: 10.1177/0276146713520551

Nills, A. L., Shultz, C. J. (1997) "Marketing Ethics Across Cultures: Decision-Making Guidelines and the Emergence of Dialogic Idealism", *Journal of Macromarketing*, Vol. 17, No. 2, pp. 4–19, doi: 10.1177/027614679701700202.

Parasuraman, A., Edvardsson, B., Gustafsson, A. (2004) "The impact of national culture on technology readiness, adoption and use". In *9th International Research Symposium on Service Excellence in Management*. Karsland, Sweden, June 15–18.

Rinne, T., Steel, G. D., Fairweather, J. (2012) "Hofstede and Shane revisited: The role of power distance and individualism in national-level innovation success", *Cross-cultural research*, Vol. 46, No. 2, pp. 91–108, doi: 10.1177/1069397111423898.

Sachs, J. et al. (2016) "An SDG Index and Dashboards – Global Report", New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN). Available at: < https://issuu.com/unsdsn/docs/sdg_index_dashboard_full>.

Sachs, J. et al. (2017) "SDG Index and Dashboards Report 2017", New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN). Available at: < http://sdgindex.org/assets/files/2017/2017-SDG-Index-and-Dashboards-Report--full.pdf>.

Savić, D. et al. (2016) "A Multivariate Approach in Measurement of the Sustainable Development of European Countries", *Management: Journal Of Sustainable Business And Management Solutions In Emerging Economies*, 21(78), pp. 73–86, doi: 10.7595/management.fon.2016.0007.

Schmarzo, B. (2017) "What is Digital Transformation?". Available at: <https://www.cio.com/article/3199030/analytics/what-is-digital-transformation.html> [Accessed: 8 March 2018].

Schwab, K. (2016) *The Fourth Industrial Revolution,* Geneva: World Economic Forum.

Schwartz, S. H. (2006) "A theory of cultural value orientations: Explication and applications", *Comparative Sociology*, Vol. 5, No. 2, pp. 137–182, doi: 10.1163/ej.9789004158207.i-193.19.

Seghezzo, L. (2009) "The five dimensions of sustainability", *Environmental Politics*, Vol. 18, No. 4, pp. 539–556, doi: 10.1080/09644010903063669.

Shultz, C. J. (2007) "Macromarketing". In Gundlach, G., Block, L., Wilkie, W. ed., *Explorations of Marketing in Society,* Cincinnati: ITP/South-Western Publishers, pp. 766–784.

Shultz, C. J., Peterson, M. (2017) "A Macromarketing View of Sustainable Development in Vietnam", *Environmental Management*, pp. 1–13, doi: 10.1007/s00267-017-0971-8.

Simkins, T.J., Peterson, M. (2016) "Assessing the value of a societal-level sustainability index for macromarketing research", *Journal of Macromarketing*, Vol. 36, No. 1, pp. 78–95, doi: 10.1177/0276146715586834.

Srite, M. (1999) "The Influence of National Culture on the Acceptance and Use of Information Technologies: An Empirical Study". In *AMCIS 1999 Proceedings*. 355, pp. 1019–1021. Available at: <http://aisel.aisnet.org/amcis1999/355>.

Srite, M., Karahanna, E. (2006) "The Role of Espoused National Cultural Values in Technology Acceptance", *MIS quarterly*, Vol 30, No. 3, pp. 679–704, doi: 10.2307/25148745.

SSF (2016a) "Sustainability and SSI*"*. Available at: <http://www.ssfindex.com/ssi/ssi-2016/> [Accessed: 29 January 2018].

SSF (2016b) "SSI data". Available at: <<http://www.ssfindex.com/ssi2016/wp-content/uploads/2016/11/Data_countries_2006-2016.xlsx> [Accessed: 29 January 2018].

StatSoft (2018) "Statistica Features". Available at: <http://www.statsoft.com/Products/STATISTICA-Features> [Accessed: 3 February 2018].

Sunny, S., Patrick, L., Rob, L. (2018) "Impact of Cultural Values on Technology Acceptance and Technology Readiness", *International Journal of Hospitality Management*, In Press, doi: 10.1016/j.ijhm.2018.06.017.

Syrquin, M. (2011) "GDP as a Measure of Economic Welfare", *SSRN Electronic Journal,* Vol. 3, No. 2011, doi: 10.2139/ssrn.1808685.

Šegota, A., Tomljanović, M., Huđek, I. (2017) "Contemporary approaches to measuring competitiveness – the case of EU member states", *Zbornik radova Ekonomskog fakulteta u Rijeci: časopis za ekonomsku teoriju i praksu / Proceedings of Rijeka Faculty of Economics: Journal of Economics and Business,* Vol. 35, No. 1, pp. 123–150, doi: 10.18045/zbefri.2017.1.123.

The Economist (1999) "Catch the wave: The long cycles of industrial innovation are becoming shorter". Available at: <https://www.economist.com/node/186628> [Accessed: 8 March 2018].

Trompenaars, F., Hampden Turner, C. (2000) *Riding the Waves of Culture: Understanding Cultural Diversity in Business,* London: Nicholas Brealey Publishing.

WEF – World Economic Forum (2014) "The Global Competitiveness Report 2014-15". Available at: <http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf> [Accessed: 28 January 2018].

WEF – World Economic Forum, (2015) "The Global Competitiveness Report 2015-16". Available at: <http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf> [Accessed: 28 January 2018].

WEF – World Economic Forum, (2016) "The Global Competitiveness Report 2016-17". Available at: <http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf> [Accessed: 28 January 2018].

WEF – World Economic Forum, (2017). "The Global Competitiveness Report 2017-18". Available at: <http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017–2018.pdf> [Accessed: 28 January 2018].

Yoon, C. (2009) "The Effects of National Culture Values on Consumer Acceptance of e-Commerce: Online Shoppers In China", *Information & Management*, Vol. 46, No. 5, pp. 294–301, doi: 10.1016/j.im.2009.06.001.

Zhao, F. (2011) "Impact of national culture on e-government development: a global study", *Internet Research*, Vol. 21, No. 3, pp. 362–38, doi: 10.1108/10662241111139354.

Digitalizacija i održivi razvoj društva – Mjere i implikacije[1]

Milica Jovanović[2], Jasmina Dlačić[3], Milan Okanović[4]

Sažetak

Rad istražuje vezu između digitalizacije i održivog razvoja društva te analizira kompozitni indeks koji se primjenjuje za mjerenje digitalne konkurentnosti nacije – Indeks digitalne ekonomije i društva (Digital Economy and Society Index – DESI). Današnje okruženje je visoko zavisno o tehnološkim sposobnostima. Praćenje suvremenog tehnološkog razvoja postaje izrazito važno kako na mikro tako i na makro nivou. Jedna od glavnih promjena u modernom poslovanju je prelazak od tradicionalnog načina poslovanja prema digitalnom poslovanju kako bi se dosegnula viša razina konkurentnosti. Digitalizacija je jedan od glavnih pokretačkih sila suvremenog razvoja. Kako bi se prihvatile i implementirale promjene koje se dešavaju u društvu potrebno je naglasiti ulogu makro-marketinškog sagledavanja cijelog procesa promjena. Važno je imati konkretne mjere za identificiranje nedostataka, dobrih praksi i praćenja razvoja. S tim ciljem, Europska komisija razvila je DESI indeks kako bi mjerila i pratila digitalne performanse država članica Europske unije. Rad istražuje DESI metodologiju i promatra kako su digitalne performanse EU država povezane s glavnim komponentama održivog razvoja: ekonomskim, društvenim i okolišnim. Dakle, rad istražuje korelacije između DESI indeksa i ostalih kompozitnih indeksa koji mjere komponente održivog razvoja društva. Pored navedenoga, istraživanje obuhvaća i povezanost Hofsteadovih dimenzija kulture i digitalnih performansi. Rad naglašava važnost digitalizacije kao ključnog elementa održivog razvoja društva.

Ključne riječi: *digitalizacija, održivi razvoj, indikatori performansi, društvo, makro-marketing*

JEL klasifikacija: *Q01, E71, M38*

[1] Rad je nastao uz potporu Sveučilišta u Rijeci, projekt ZP UNIRI 9/17 i Ministarstva obrazovanja, znanosti i tehnološkog razvoja Republike Srbije, projekt TR-32013.

[2] *Asistentica, mr.sc., Sveučilište u Beogradu, Fakultet organizacijskih znanosti, Jove Ilića 154, 11000 Beograd, Srbija. Znanstveno područje: menadžment tehnologije, inovacija i razvoja, operacijska istraživanja. Tel.: +381113950879. E-mail: milica.jovanovic@fon.bg.ac.rs.*

[3] *Docentica, dr.sc., Sveučilište u Rijeci, Ekonomski fakultet, Ivana Filipovića 4, 51000 Rijeka, Hrvatska. Znanstveno područje: marketing. Tel.: +38551355111. E-mail: jasmina.dlacic@efri.hr.*

[4] *Docent, dr.sc., Sveučilište u Beogradu, Fakultet organizacijskih znanosti, Jove Ilića 154, 11000 Beograd, Srbija. Znanstveno područje: marketing. Tel.: +381113950848. E-mail: milan.okanovic@fon.bg.ac.rs.*