Digital economy in the BRICS countries: myth or reality?

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Abstract — The article discusses the current situation of the formation and development of the digital economy in the BRICS countries. The comparative analysis of the BRICS countries based on key requirements such as availability and reliability of the data, the possibility of cross-country comparisons. As comparative techniques analyzed international integrated (composite) codes for up to one scale evaluation plurality of objective and subjective parameters. It has been shown that digitalization has a positive effect on per capita GDP growth only after reaching the distribution and use of ICT at a certain critical point. To obtain a positive response in the economy from digitalization, a certain period is required for organizations and the public to master new technologies and adapt to them. It was found that the ICT index is not yet sufficiently informative to assess the level of welfare since it gives a significant positive impact on the economy with a time lag. An analysis of the components of the telecommunications infrastructure index showed that Russia, Brazil are close to their saturation point, and India, South Africa, and China have very good sources of growth. The e-government development index and the telecommunications infrastructure index showed a high degree of correlation. Used summation method showed that now in Russia a degree of readiness for the formation of the digital economy has reached almost the maximum value, while those of the BRICS countries like China, India and South Africa are still in their infancy, but there are significant advantages to accelerate the digitalization process. For the digital economy to become a reality for all the BRICS countries, serious government measures and large investments are required, both in the development of infrastructure for access to the Internet and in investment in human capital.

Keywords — ecosystem, digitalization, BRICS, information technology, ICT

I. INTRODUCTION

The current stage of global economic development is characterized by the significant influence of digitalization. Digitalization of the economy is an inevitable stage of its evolution, not by chance the topic on the agenda at the «G20» meetings and the World Economic Forum, as it changes the model, cost control system. The development of digitalization leads to increased efficiency of the economy and improving people's quality of life. Conducted by Economist Intelligence Unit structural analysis confirms the view that in the developed countries there is a close correlation between ICT and economic growth, and that ICT provides growth of GDP per capita. The digital economy, in which the essential element in the implementation of economic development goals is to use IT, now pervades all areas of social and economic life of most countries, working on different areas of the world and national economy: the banking system, trade, energy, transport, education, health and etc. The digital transformation of the economies of different countries has high expectations in terms of economic growth, improving the quality of life, etc., as well as concerns related to job cuts, increasing inequality, and growing threats to information security. However, digitalization of the economy has become an objective of the current trend of development of the world community. Gradually formed a system of Internet of Things, in which there is a convergence of different ways of social cooperation as a result of the development of ICT. BRICS countries, being objectively included in the global process of forming a digital economy, should use their digitalization capabilities of national economies to bridge the gap with developed or advanced countries and acquire flagship positions at this stage of the 4th technological revolution. Author of the concept of the fourth industrial revolution, Klaus Schwab, said that the fourth industrial revolution equally creates both huge benefits and huge problems. Of particular concern in the community is intensifying inequalities (K. Schwab, 2018). The most important factor in endogenous economic growth is the digitalization of all aspects of human life, leading due to artificial intelligence to more efficient use of resources, ensuring positive growth rates of GDP per capita. Studies in the US and Europe show that investing in ICT helps to achieve high growth in every sector of the economy (Remache A. & Belarbi A., 2019). The growth of digital technology is changing the existing economic system in all developed countries with traditional processes of production and consumption. Today, digital technology is creating a new reality for governments, people, enterprises, organizations, global markets and providing a new promising growth path for any country (Khalimon et al., 2018). Digitalization accompanies socially relevant research and thereby reduces the risks of climate change, lack of drinking water, food, energy, and etc. (Guryanova et al., 2018). Digital transformation will affect not only the environmental dimension but probably the technical and social (Beier et al., 2017). Information and communication technologies (ICT) play an important role in reducing energy consumption and, consequently, to increase the energy efficiency of the economy, promoting sustainable growth. (Moreno-Munoz et al., 2016). Research shows that ICT contributes to sustainable development through more efficient management systems, to promote changes in behavior and reduced energy consumption (Bull, 2015). Today, almost all countries aim to increase their competitiveness, and the emphasis is on the development of ICT and digitization. Raul Katz highlights 3 waves of digital technology. The first wave is...
associated with the use of information and information management systems, aimed at the automation of data and is used for monitoring and reporting of business; the proliferation of telecommunication technologies, such as broadband Internet access (fixed and mobile). The second wave of digital technology involves the spread of the Internet and digital platforms (search engines, marketplaces). Third Wave Digital, which became the starting point for the formation of the digital economy and involves the translation of routine tasks of enterprises and governments on a digital basis. These technologies are not possible without passing the first two stages (Raul Katz, 2017). Compared to developed countries, in which the process of creating Industry 4.0 was launched earlier and aimed at achieving marketing and social results, BRICS countries face institutional and financial barriers. (Bogoviz et al., 2019). These trends are observed in the Russian Federation, China, India, and other BRICS countries. At the same time, their development is uneven both at the global and domestic levels. (Revinova 2016; Revinova & Lazanyuk, 2018).

Currently, developed countries have taken a course towards increasing social responsibility to their citizens. Technological progress has a huge impact on all areas of life, almost all countries have adopted programs or strategies aimed at digitalization and the digital economy. Enhancing the role of the BRICS countries in today's global economy is largely dependent on the degree of advancement of their economic integration in several areas, including in science and technology and the use of innovative products (Gusarova, 2015).

The purpose of this study is to analyze the level of development of the digital economy of the BRICS countries based on GDP per capita and the number of composite indices Digital Development to assess the readiness of the digital environment for rapid creation and development of the digital economy in the BRICS countries.

II. RESEARCH METHODS

The information method is used to study the digital economy as a social phenomenon that has an important social entity. This method is productive for finding the necessary information about the subject of our scientific interest. The descriptive method used to describe the special characteristics of the new, socially-oriented model of the digital economy, taking into account the factor of inclusion.

System method used to determine the various aspects of the digitization of their interdependence with the integrated economic system. Structural methods help to determine the features of the functioning of the digital economy. To analyze digital development, we used data on the BRICS countries from 2010 to 2018. Socio-economic indicators are taken from the World Bank databases. Distribution of countries into groups according to their level of development of different parameters was performed using factor analysis method and amount of places. The method of summing places is to organize any set of values from best to worst. In this case, the best is assigned first place. The resulting places are summed up, and the smaller the result, the better.

III. FINDINGS

All countries of the world pay much attention to economic growth, however, the economic sphere of society regularly faces various crises. Currently one of the major problems is the slowdown in the global economy. According to the World Bank, the average growth rate of world GDP from 2010 to 2018 amounted to 2.5%, and from 1960 to 1970 it was at 5.3%. The average increase in world trade also decreased, for example, for the period 1980 - 2011 amounted to 7%, but in 2016 and 2017 it decreased to 1.8% and 4.7%, respectively. (WTO trade forecasts). The imbalance of economic development of different countries, the unequal distribution of natural resources and excessive levels of differentiation of incomes, it becomes a serious problem in the way of sustainable development and global order. Growing inequality restricts access to education for various groups of the population that harms the labor market, which is annually filled with manpower of low qualification. Having realized most of its growth potential, the world economic system at the present stage of development of society requires the transformation of the structure of economic relations to create new opportunities for economic growth.

As an indicator of the level of socio-economic development of the country's GDP has certain restrictions, since it does not reflect the structure of the distribution of accumulated wealth and cannot be used as a measure of the prosperity of the state. In addition, GDP does not fully take into account environmental and social factors of economic growth. GDP is not able to adequately measure the level of socio-economic development of the modern state since it ignores the impact of non-economic factors on the economic system and society as a whole. These findings are easily supported by statistics. Thus, the United States for several years a leader in the world in terms of GDP, but it took the 23rd place among countries with developed economies, by the index of inclusive development, which is associated with low rates of inclusion. A similar situation is with GDP per capita. So, if we compare the country's position in terms of per capita GDP with its place in the ranking on the inclusive development index presented in the WEF report, then you can see the absence of dependence between these two indicators, which is true not only for developed countries, but also for developing ones, including for BRICS countries (Table 1).

Meanwhile, the global digitalization, technological changes are radically changing society, the production system, management processes, and necessitate the implementation of a new model of development of the state, based on the priority defining the leading role of the modern human capital. BRICS Leaders regard the formation of a national digital economy as an opportunity that will allow countries to go to high-quality economic growth to solve the technological, infrastructural and social problems in the national economy. That is why national governments initiated the “digitalization” of their economies as a strategic task, formulating their national programs: “Digital India” as part of the “Make in India” strategy in India, “Digital China” as part of the “Made in China, 2025” strategy in China, the Digital Economy of the Russian Federation, approved in Russia in 2017. In Brazil, in 2017, a working group was established to formulate the national digital development strategy “The Brazilian Digital Strategy”. In South Africa in
To assess the level of digital development of countries, a number of indexes are used, which are calculated by various international organizations, for example, the Country Readiness Index for a Network Society (World Economic Forum) and the Knowledge Economy Index (World Bank), ICT Development Index - Information and Communication Technology Development Index (ITU) and etc. All indexes are combined measures that take into account several sub-indexes. For a more realistic picture of the indices should be considered not in isolation, but in combination to reflect the real situation of readiness of the BRICS countries to the implementation and use of e-government services. It is calculated by the UN Department of Economic and Social Development (UN DESA, the United Nations Department of Economic and Social Affairs) every two years. EGDId 2018 was prepared based on nine statistical indicators for 2016 and data from the web monitoring of government portals. Russia is steadily leading in the ranking by the value of the e-Government Development Index among the BRICS countries. Other member countries occupy the following positions: Brazil - 44 th place, China - 65th, South Africa - 68th, India - 96th (Table 1). It should be noted that compared with the previous index in 2016 all BRICS countries improved their positions, except China, which lowered its rating by 2 positions. Assessing the state of e-government development the level of BRICS countries soon, it should be noted that Russia is unlikely to remain a significant breakthrough in the ranking of the value of the e-Government Development Index. And there are many reasons. The spread of mobile communications in our country has reached a certain limit value, and the number of landline telephones will gradually decrease due to the natural evolution of communications. The number of Internet users is also gradually approaching the limit value, an especially fast and efficient in China is the “digitalization” of a multimillion-dollar population that actively uses Internet retail, online ecosystem capabilities, and digital banking. The Telecommunications Infrastructure Index (TII) is a comprehensive index that is calculated on the basis of several indicators: the number of PCs per 1000 inhabitants; the number of telephone lines per 1000 inhabitants and other indicators reflecting the conditions for effective interaction between citizens and the state, as well as providing the necessary level of promotion of electronic services. As for other members of the BRICS, it can be stated that in China and India the limit indicators: the spread of mobile communications, the number of Internet users, the spread of mobile broadband Internet access, as well as the adult literacy rate, and coverage of the population at primary and other levels, have not yet been reached and it can be regarded as a driver of growth of the digital economy of these countries. Especially fast and efficient in China is the “digitalization” of a multimillion-dollar population that actively uses Internet retail, online ecosystem capabilities, and digital banking. The Telecommunications Infrastructure Index (TII) is a comprehensive index that is calculated on the basis of several indicators: the number of PCs per 1000 inhabitants; the number of Internet users per 1000 inhabitants; the number of telephone lines per 1000 inhabitants and other indicators reflecting the country's technical equipment and population access to them. According to the data (Table 1), Russia ranks first in the ranking of the union countries. An analysis of the sub-indices showed that Russia and Brazil have a very good source of growth (Fig. 1).

![Fig. 1. BRICS Telecommunications Infrastructure Index Indicators (2018)](image)

The human capital index shows how many people can use the services of electronic information. In fact, this is an education index, which is determined by the number of literate students, the level of adult literacy and the number of Internet users.

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people among residents over 15 years old and the number of students in the country. The low position of this index in India and China is explained by the huge population that is not involved in the digital space.

ICT Development Index best describes the state of the industry in the country, taking into accounts all its sectors. ICT Development Index (ICT Development Index, IDI) has been published annually since 2007 and is a combined indicator of the achievements in terms of ICT development of the countries of the world. The index includes 11 indicators, which are compiled into a single criterion, and allows comparing achievements of countries in ICT development and can be used as a tool for comparative analysis at the global, regional and national levels. The index is calculated on a global level and reflects the changes occurring in countries at different levels of ICT development, so it is based on a limited set of data that can be obtained in all countries at all levels of development with sufficient accuracy. It can be noted that the level of ICT development today is considered one of the most important indicators of the economic and social well-being of the state. On average, the index grows, and there is a tendency of convergence of ICT development index value between the two countries and it is expressed most clearly in the developed national ICT systems. However, an analysis of the data in Table 1 shows that, to date, the ICT index does not fully reflect the level of development of the country’s welfare. It has a positive effect on the growth of GDP per capita is only after reaching a certain minimum threshold of ICT development. In other words, the distribution and use of ICT must reach a certain critical mass before they begin to have a significant positive impact on the economy. This is consistent with the view that there is a significant delay between investment and profit-ICT, i.e. the amount of time that organizations need to master and adapt to new technologies.

Having analyzed the data of table 1 using the method of the sum of places, we obtain the following results (see table 2).

Thus, we can say that the best infrastructure and human capital belong to Russia in the 2nd place of Brazil, followed by China, South Africa and India closes the rating. Despite positive reserve in the BRICS countries, some factors are hindering the introduction of digital technologies. In addition to cross-country differences in the aggregate, within countries, there are also significant gaps based on income levels, education, gender, and geographic location. For example, there is still a significant gap between urban and rural areas.

| Country  | Amount places | Rating |
|----------|---------------|--------|
| Russia   | 7             | 1      |
| China    | 20            | 3      |
| Brazil   | 16            | 2      |
| India    | 34            | 5      |
| South Africa | 28   | 4      |

Also among the problems hindering the diffusion of ICT include the gender gap (ITU, 2017). In two-thirds of all countries, the proportion of women using the Internet is lower than that of men. The gender gap in Internet use, defined as the difference between the user penetration rate among men and women, accounting for nearly 11.6 percent for the whole world.

To unite the capabilities of the BRICS economies in the creation and implementation of digital technologies, it is proposed to create a technological platform for the industrial ecosystems of the Digital Economy of the BRICS countries. Based on this platform could be carried out to form national information infrastructure to provide high-speed connectivity and cloud platform for a variety of government departments, from the government to the level of rural settlements. The harmonization of national laws governing the use of the Internet of things technologies, distributed information storage (blockchain) and “big data”, as well as the deployment of fifth-generation networks will contribute to the development of cooperation among the BRICS countries in the implementation of digital technologies.

The role and importance of the joint activity of the BRICS countries on the formation of the digital environment, as well as on the formation of supranational regulation of e-commerce tools will be since the countries of BRICS, no doubt will be able to benefit from the synergies of cooperation. BRICS countries can create such rules of a supranational regulation, which will enable them to be active participants in the digitalization of the world economy, determining the trends and prospects of the global economy. Low valuation, which is given by international organizations to the level of development of the digital economy in the BRICS countries, boost the development of the digital economy shortly.

IV. CONCLUSION

Thus, we can conclude that we need aggregate, which includes both quantitative and qualitative components to assess the level of preparedness of the BRICS countries to the digital economy. These indicators there are enough, but none of the analyzed indexes is unable to date to assess the real situation. In reality, it is necessary to consider the indexes are not individually and collectively to show the real situation of the BRICS countries’ preparedness for the digital economy. Assessment of the level of formation of the state and development of the digital economy in the BRICS countries showed significant differences among countries.

An analysis of the BRICS e-government development index showed that Russia soon is unlikely to expect a significant breakthrough in the ranking in terms of the e-government development index since many sub-indices included in this indicator come close to the maximum possible values.

The analysis of the indicators included in the telecommunication infrastructure index showed that Russia, Brazil either peaked or is on the approach to it, and India, South Africa, and China have very good sources of growth. The e-government development index and the telecommunications infrastructure index showed a high degree of correlation.

The ICT index is not yet sufficiently informative to assess the level of welfare since it gives a significant positive impact on the economy with a time delay. But it can be used for a significant breakthrough, which is important for developing countries. ICT infrastructure offers benefits for businesses and
consumers, as it can help the first to become more productive and improve their access to markets.

We can say that the digital economy is being successfully formed and is becoming a reality today in Russia, although, according to experts, the level of its formation is average. For the digital economy to become a reality for all BRICS countries, serious government measures must be taken. Investments are needed both in the development of infrastructure for access to the Internet, as well as investments in human capital. Access to IT is necessary, but at the same time insufficient for the formation of a digital economy. Population, business, and the state should have the qualifications and skills for working with digital technologies. It is necessary to take measures to combat illiteracy (especially in India), a decrease in the gender gap and increase access to education. Nevertheless, despite the existing problems, the BRICS governments recognize the need to transition to digital rails, and all the BRICS countries have good prospects in the formation and development of the digital economy, mainly due to the rapid spread of information technology, especially mobile, and the younger generation, which is actively involved in digital processes.

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