ASSESSMENT OF THE MAIN TECHNOLOGICAL AND ECONOMIC CAPABILITIES FOR THE TRANSITION TO A DIGITAL ECONOMY

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Abstract. *Purpose* – the purpose of the article is to a study of factors that allow to test the impact of digitalization on the economy.

Research methodology – the main method of the research is panel analysis of 8 digital economy indicators on GDP per capita for 28 countries for over 17 years. The study asserts that digitalization will ensure the growth of GDP as a key indicator of economic development.

Findings – it was found that that transformation into a digital economy is likely to have a positive impact on countries where there is a growth of the net export of ICT services is achieved while communications and computer service imports are reduced.

Research limitations – the limitations of the research are that the method applied allows to determine the influence of the studied factors on GDP per capita, but the results of the evaluation require further detailed analysis of the studied factors for each country.

Practical implications – the study helps to identify the factors of high importance in the digitalization process and to determine factors what should be focused on achieving the desired results of digitalization.

Originality/Value – the method allows to make an express-evaluation, reducing the complexity of calculations and time costs.

Keywords: digital economy, Industry 4.0, new industrialization, high technology exports, life quality.

JEL Classification: D24, D81, L85, O14.

Conference topic: Digitalization of Business Processes: Trends, Challenges, Solutions.

Introduction

The digital economy is one of the most frequently used terms that refer to the prospects of the socio-economic development of modern society. In the broad sense of the word, the digital economy describes a stage in the development of the technological society and implies the wide application of information technologies in all spheres of human activity. It appears inappropriate, however, to use the term "digital economy" to refer to economic processes as such. It also needs to be further verified whether the digital economy as a technology of activity organization fully reflects all forthcoming changes in society under the influence of new industrialization.

The scientific community uses different terms to refer to the transition to a new technological setup, according to the Kondratieff cycle. Spanish sociologist Manuel Castells, describing changes in commodity production in the conditions of digital globalization, suggests the term "Network Economy", i.e. an economy capable of operating as a single system in real time on a planet-wide scale (Castells, 2010). Some prefer "digital economy" coined by American scholar Nicholas Negroponte, while others use "new industrialization" to describe the new processes etc. (Negroponte, 1995).

Golovenchik and Kovalev define the digital economy as "an industry of digital goods and services, the digitalization of tangible assets. In the broad sense, though, it is more of a sector (or rather a coordinating innovation superstructure) of the real economy that cannot exist in isolation from material production" (Golovenchik & Kovalev, 2018). It is possible to conclude that the existing definitions of the term "digital economy" largely applies to technological processes in manufacturing and services, but does not comprehensively describe the essence of the forthcoming changes in socio-economic relations in society.

It was officially declared in Russia that the digital economy is a certain system of economic, social and cultural relations, implemented through the use of digital ICT (Kapranova, 2018). Much importance is attached to the transition to a digital economy, so a national program has been developed stipulating that the government must perform the digital transformation of Russia's economy and social sector by creating a legal framework and upgrading infrastructure.

We believe that by focusing on the digital economy only it is impossible to fully ensure a breakthrough in the national economy in the course of the new scientific and technological revolution so the current global transformations need to be considered in the context of Industry 4.0. The term "Industry 4.0" gives a broader definition of the processes that are associated with the application of the achievements of the new scientific and technological revolution because it reflects the convergence of nanotechnology, biomedicine, information technology, and cognitive science (NBIC) technologies. In the structure of NBIC, the digital economy is an element of information technologies that are used in all spheres of activity.

We also need to realize that economics as an art and science has clear effectiveness criteria. Conceptually, these criteria have a different value for the owners of the means of production, authorities and the majority of the population that does not own either means of production or power. In order to assess the feasibility of introducing any innovation, we need to factor in the resources that are available to the three types of economic agents mentioned above and assess the efficiency of innovations from the point of view of these agents. Given different interests and capacities, it is necessary to consider the following things in the course of the transition to a digital economy:

– whose interests the transition to a digital economy largely caters to − private businesses, the state or citizens who do not own any means of production or power. This will help determine the main source of financing for the forthcoming processes;
– how accessible the new digital technologies will be to people. That will help assess the return on the technology investment;
– whether it is possible to build an independent national system of "digital economy".

The aim of the analysis is to estimate the impact of digitalization on the economy.

The main hypothesis is that digitalization will affect the GDP growth which is the main indicator of the domestic economy's development. Objectives of the study are:

– to consider the most popular methodological approaches to an evaluation of digitalization;
– to choose a method of integrated express-assessment of the impact of digitalization processes on business results;
– to test the effectiveness of the digitalization of economies for selected countries selected.

In the study, we chose an econometric model method based on panel data containing information on 8 selected regressors for 28 selected countries over 17 years. Investigation of the impact of digitalization processes on economies does not disprove the hypothesis proposed. We consider this method as an express method that allows highlighting significant factors influencing the digitalization process. For a more detailed analysis of each country, it should carry an individual assessment of the influence of significant factors on the dependable variable out.

This method allows:

– to use an internationally recognized, available statistical base, which allows making calculations transparent;
– to reduce the complexity of calculations and time costs.

This technique can be attributed to the rapid methods underlying the subsequent in-depth analysis. The results make it possible to identify the factors that determine the transition to a digital economy, have a high significance for reaching the goals of analysis and to determine insignificant factors, which enables one to determine priority areas of action to focus on.

Previous research

Much interest has been observed among scientists in issues related to the digitization of economic processes in management, production, and society. The methods provide the basis for rankings etc. Some of the best-known studies were conducted by James (2009), Pelissie du Rausas et al. (2011).

The emerging electronic markets cause new approaches to management (Grewal, Chakravarty, & Saini, 2010). Under the influence of new technologies and the Internet, the business environment is transforming (Palamidovska-Sterjadovska & Ciunova-Shuleska, 2017). In commerce, the share of e-commerce is growing (Davidavičienė, Paliulis, Sabaitytė, & Davidavičius, 2016). The increasing importance of Internet marketing for both B2B and B2C sectors is explained by the development of electronic markets, an increase in the number of new generation consumers (Sabaitytė & Davidavičienė, 2018). Success in this area requires new specific knowledge (Raudeliūnienė, Davidavičienė, Tvaronavičienė, & Radeckytė, 2018) The development of e-business is directly related to innovative activity in the commercial sector, financing, development of legislation protecting property rights, consumer rights, etc. (Kunešová & Eger, 2017).

There are new types of activity, in particular, blogging, bearing not only personal but also social and advertising context, turning sometimes into a professional activity (Stepaniuk, 2017). The development of communicative activity

through social networks contributes to an increasing innovation activity and reducing errors made in the development and product sales as it described by Khorakian and Jahangir (2018), S. Saniuk, and A. Saniuk (2018).

However, the development of Internet technologies presents new challenges to society. Berghäll (2016) suggests that interfering with competitive conditions to stimulate innovation is useless. Innovations in small firms are already relatively high in terms of intensity of R & D, while technical changes are having a retarding effect on R & D. Hirsch-Kreinsen (2016) suggests that smart production systems may have limited perspectives, and it should be emphasized that implementation options have not yet been finally determined as it meets technical, economic and social barriers hard to overcome.

Pfeiffer (2017) argues that there is no single Industrie 4.0. It's hard to say which innovations will be adapted, which companies will benefit from that innovations since it depends on the specific factors including but not limited to the degree of automation, product complexity, value chains, and production technology.

Some segments of the population are not ready to use new technologies. To overcome psychological and social barriers arising from the problems of using modern technologies, it is important to organize training sessions that enhance the adaptation of aged people in modern society Klímová, Poulová, Šimonová, Pražák, and Cierniak-Emerych (2018). In this regard, it is necessary to estimate the effectiveness of digitalization processes and determine the potential for transforming a country to the conditions of a digital economy.

A sufficiently large number of methods for testing the digitalization level of economies have. Most of them are based on the definition of an integral indicator characterizing the development of digital technologies and their impact on the economy. The integral indicator is presented in the form of an index that allows building a ranking scale. The most common are the methods of calculating are the Digital Evolution Index (DEI), Information and Communication Technology Development Index (IDI − ICT Development Index), Digital Economy Country Assessment (DECA).

The ITU (International Telecommunication Union) has developed and introduced the ICT Development Index (IDI), a composite index that measures the accessibility of the internet and communication technology (Kravchenko, Bobylev, Valieva, & Fedorov, 2013). Measured annually, the index shows that nearly 50% of the world's population has internet access, but not all of them are active internet users. In developed countries, lack of or inadequate ICT skills are a major impediment for people to access the Internet. In developing countries, lack of adequate telecommunications infrastructure and a high cost of ICT services prevent wider use of the internet (Biggs, 2017).

The ICT Development Index (IDI) is calculated as a combination of 11 indicators that reflect access to ICT infrastructure, availability of internet devices and internet literacy skills. The index has proved useful as an instrument of comparative analysis at a global, regional and national level (Dobrota, Jeremic, & Markovic, 2012).

The issues of wider ICT use are being addressed at the government level in Russia. The government of the Russian Federation developed the 2017–2030 Strategy for the Development of an Information Society in the Russian Federation. In July 2017, the Russian government approved a program called "The Digital Economy in Russia through to 2025" (Sneps-Sneppe, Sukhomlin, & Namiot, 2018). The program prioritizes the following nine areas:

– creation of infrastructure to support the digital economy;
– creation of a legal framework for the digital economy;
– development of educational programs and technologies for personal and user training in ICT skills;
– creation of a digital security system;
– incentives for R&D;
– digital transition in healthcare;
– smart City project;
– creation of a digital public administration system;
– adoption of digital technologies for the provision of e-government services.

A large number of methods have been developed internationally to evaluate the development level of digital technologies and their impact on the economy. The Digital Evolution Index (DEI) was presented for evaluating the digital development of economies. The index is a composite indicator measuring four drivers that govern a country's digitization (Chakravorti, Tunnard, & Chaturvedi, 2017):

– supply conditions, such as access infrastructure, electronic payment methods etc.;
– demand conditions that are in most cases determined by consumer behavior;
– innovation (including the entrepreneurial, technological and funding ecosystems, presence and extent of disruptive forces and the presence of start-up culture and mindset);
– digital economy institutions and their effectiveness (for example, governance efficiency and government role in business regulation; the legal environment and facilitatory institutions).

In March 2017, the World Bank suggested designing a Digital Economy Country Assessment Methodology (DECA) and trialing it in Russia (World Bank, 2017). DECA Russia is a joint project of the World Bank, the Institute of Information Society, the MSU National Center for Digital Economy, the Plekhanov Russian University of Economics, the RAS Central Economic-Mathematical Institute, Kazan Federal University, the Federal Bureau of Medical and Social Expertise, the Financial University of the Russian Government etc. The Methodology is a multidimensional model for assessing a country's preparedness for digital transformation. The declared dividends from the project include economic growth, employment, quality of services and social well-being. The main components of the model are:

– economic and social interactions;
– digital transformation: government, business, citizens;
– digital sector of the economy;
– digital foundations of economic development;
– non-digital foundations (factors) of economic development (World Bank, 2018).

The existing methodologies contain plenty of secondary and indirect indicators, which makes it more difficult to calculate indices the process of collecting and processing information is time-consuming. Sometimes methodologies become outdated too soon and require a revision. Even the IDI method had to be updated in 2018 (Koroivuki, 2018). All too often, methodologies of testing the effectiveness of digital economies lack an objectiveness. Their authors need to offer a more clear explanation as what their methodology will be used for and whose interests it will serve.

The DEI, IDI, DECA indices have proven to be useful tools for comparative analysis of the development of digital technologies and the market for information and communication services at the global, regional and national levels. However, they reflect the processes of the society digitalization and do not characterize the category of the "digital economy". Therefore, the understanding of the digital economy is shifting to an explanation of the digitalization of the real-life processes of an individual person and society.

1. Methodological approaches to assessing technological and economic capabilities for the transition to a digital economy

Speaking of capabilities for the transition to a digital economy, it has to be noted that the question is first and foremost about forming a new model of economic practices. At the same time, the objectives of economics as the science studying the use of resources remain unchanged: to maintain or improve the quality of life under the condition of scarce resources. Consequently, the digital economy as a new economic model ought to provide digital space for all spheres of a country's life in order to improve the quality of life of its population. The capabilities for this can be both internal (in-country) and external (Kunzman, 2016). The risk of the national economy's losing its independence from external factors depends on which capabilities prevail - internal or external ones. Figure 1 visually represents this idea. Part of Figure 1 shows the situation of a mutually beneficial market of information and communication services. External and internal factors that ensure the development of the national digital economy are balanced. This is the most comfortable environment for the formation of a national digital economy. Part b is a scheme characterizing the predominance of external factors on the domestic market, ensuring the digitalization process. This situation is unfavorable for the domestic economy since it makes it dependent on the external market information and communication services market. Part c shows the situation that provides the most favorable conditions for the domestic economy. The country exports ICT services to the external market and thereby increases GDP, which creates additional conditions for the further socio-economic development of this country.
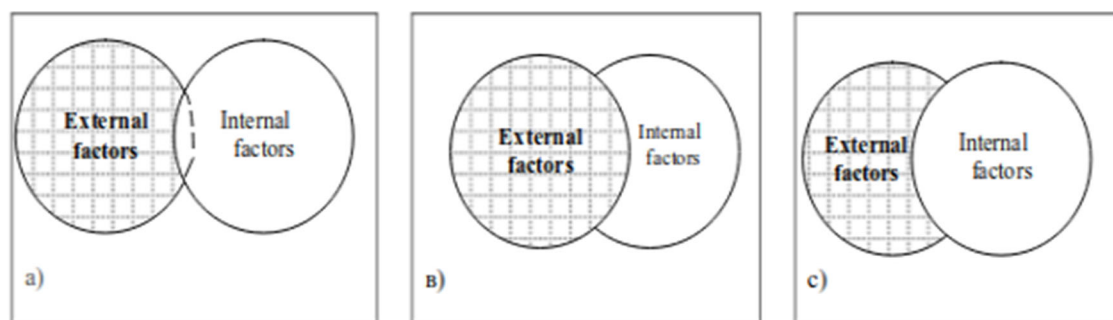

Figure 1. An interplay of external and internal factors conditioning the transition to a digital economy
(source: compiled by the authors)

The ratio of external and internal factors influences the emergence of an internal national environment for the development of a digital economy. The most optimal ones are the ratios depicted in Figure 1a when external and internal factors are in such an equilibrium that they allow for creating an interaction field in which neither side takes over the other one. Otherwise, markets are taken over, which could lead to a monopoly being created.

Components of the description of capabilities for the transition to a digital economy must include the following:
– availability of digital technologies and their competitive advantages in the sectoral market;
– availability of technical means supporting digital technologies;
– trends in the digital services market;
– forms of state regulation of the industry.
All the above factors except state regulation could be both external and internal.

To produce a general integral estimation of the digital economy the method of panel data models was used. GDP per capita was selected as a predictable outcome. It makes it possible to measure both the development level of a national economy and living standards.

A country's self-sufficiency in terms of digital technologies and digital equipment is determined by the level of digital export and import, hence the net export of these products may influence on GDP per capita. As an integral indicator characterizing the level of development of the national economy, we choose gross domestic product per capita. It serves as an illustration of the per capita value of goods and services produced in the country as well as one of the three indicators that determine the standard of living.

The availability of modern communication tools can be evaluated by their presence in the domestic market, the possibility of their daily use and maintenance, the ability of economic entities to purchase and use these means of communication. We propose to assess the purchasing power of economic agents through the possibility of using mobile and broadband communications and the services of the ICT sector. The amount of per capita GDP can determine the impact of information and communication products on the level of development of the national economy in relation to the following indicators:

– Mobile cellular subscriptions (per 100 people);
– Communications, computer, etc. (% of service exports, BoP);
– Communications, computer, etc. (% of service imports, BoP);
– Computer, communications and other services (% of commercial service exports);
– Computer, communications and other services (% of commercial service imports);
– Fixed broadband subscriptions (per 100 people);
– ICT service exports (BoP, current US$);
– ICT goods exports (% of total goods exports);
– ICT goods imports (% total goods imports);
– ICT service exports (% of service exports, BoP).

The above indicators were obtained from data for the period 1999−2017 in 28 countries (World Bank, 2019):

Since the purpose of the study is to evaluate the impact of digitalization on economies, the criteria for selecting countries are, by priority: population and level of economic development. In Table 1 we present three groups of countries selected for the analysis.

Table 1. Grouping of countries selected for the study, by the population of 2017 (source: World Bank, 2019)

Group 1			Group 2			Group 3		
Country	Population, thousand people	GDP per capita, $	Country	Population, thousand people	GDP per capita, $	Country	Population, thousand people	GDP per capita, $
China	1386395	8826	Germany	82695	44469	Netherlands	17132	48223
India	1339180	1942	Turkey	80745	10546	Czech Republic	10591	20368
USA	325719	59531	France	67118	38476	Sweden	10067	53442
Pakistan	197015	1547	UK	66022	39720	Switzerland	8466	80189
Brazil	209288	9821	Argentina	44271	14398	Norway	5282	75504
Nigeria	190886	1968	Ukraine	44831	2639	Singapore	5612	57714
Bangladesh	164669	1516	Poland	37975	13863	Finland	5511	45703
Russia	144495	10743	Australia	24598	53799	Lithuania	2827	16680
Mexico	129163	8910				Latvia	1940	15594
Japan	126785	38428				Estonia	1315	19704

The first group consists of countries with the largest population. The second group comprised countries with a population of 20 to 100 million people. The third group includes economically developed countries with a small population. At stage one, a fixed effects (FE) regression model was estimated to find a relationship between digital technology factors and economic wealth (GDP per capita).

2. Results of analysis and assessment of the main technological and economic capabilities for the transition to a digital economy

The testing revealed that the fixed effects model is more preferable for the purposes of crude analysis. The model enables one to choose the resulting (dependent) indicator and to determine the factors that have a sustained influence on it and to identify the factors that will be insignificant in relation to the indicator.

By performing the analysis we sought to verify the hypothesis that the digitalization will ensure the GDP growth. That was the reason for choosing GDP per-capita as the resulting indicator. Other factors were tested in relation to it. The most significant results were shown by the panel with fixed effects. The analysis was performed for the 28 selected countries (number of observations 457). The obtained results are summarized in Table 2.

Table 2. Results of a panel analysis of ICT indicators for GDP per capita
(source: authors calculations based on World Bank (2019) data)

	Coefficient	Std. Error	t-ratio	p-value	
const	0.288832	0.604304	0.4780	0.6329	
l_Mobilecellularsubscriptions	0.122280	0.0292467	4.181	<0.0001	***
l_CommunicationsimportsBoP	−0.762728	0.181147	−4.211	<0.0001	***
l_Computercommeserviceimp	0.467030	0.162137	2.880	0.0042	***
l_Computercommeserviceimp_1	−0.141434	0.0408029	−3.466	0.0006	***
l_Fixedbroadbandsubscriptio_1	0.0447603	0.00827193	5.411	<0.0001	***
l_ICTserviceexportsBoP	0.504954	0.0336627	15.00	<0.0001	***
l_ICTgoodsimports_1	0.0758390	0.0332164	2.283	0.0229	**
l_ICTserviceexports	−0.398559	0.0399109	−9.986	<0.0001	***
Mean dependent var	9.698750	S.D. dependent var			1.248637
Sum squared resid	7.065211	S.E. of regression			0.129854
LSDV R-squared	0.990062	Within R-squared			0.857779
LSDV F(37, 419)	1128.201	P-value(F)			0.000000
Log-likelihood	304.2760	Akaike criterion			−532.5519
Schwarz criterion	−375.8139	Hannan-Quinn			−470.8150
rho	0.747130	Durbin-Watson			0.424620

The analysis shows that transformation into a digital economy is likely to be done by those countries where there is a steady effect of the export of ICT services on the growth of gross domestic product per capita (GDP per capita).

The best results on the possibilities of transformation into the digital economy were shown by India since it is the leader in the export of ICT services in the balance of payments (in terms of value) and in the share of ICT services in the total volume of services exported. Figure 2 shows that the value of exports of ICT services in India in 2017 amounted to almost $ 8 billion, which is significantly higher than all other countries.

At the same time, in the process of this research, it was not possible to determine the role of transnational companies in the transformation of national economies of different countries into a digital economy as data that would allow tracking this situation are absent.
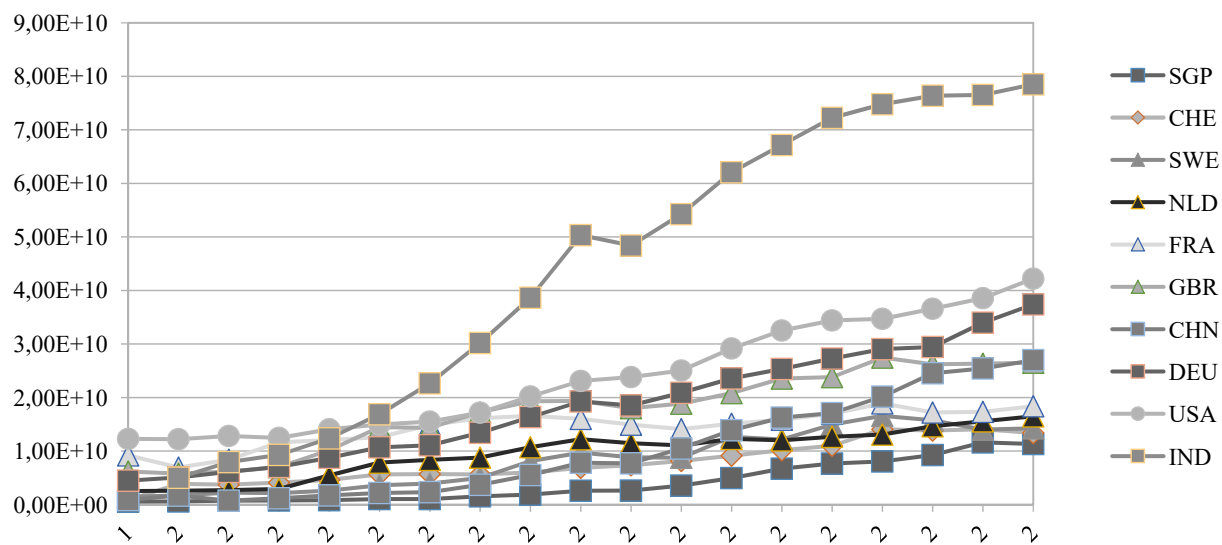

Figure 2. Evaluation of exports of ICT services by balance, in US dollars at current prices
(source: authors' compilation based on World Bank (2019) data)

In the study, we took into account that impact makes the influence of the logarithms of the variables studied on the logarithm of GDP per capita in current US dollars. Based on the results of the fixed effects analysis panel, the connection of the regressors and the variable explained is clearly visible. Almost all regressors are significant at one percent level. The value of 5% is only the indicator of ICT imports of goods with a lag of 1 (l_ICTgoodsimports_1). The signs in front of the coefficients of variable accounts of users of mobile Internet networks (l_Mobilecellularsubscriptions), imports of computerized services (as a percentage of commercial services - l_Computercommeserviceimp), accounts of broadband Internet users with lag 1 (l_Fixedbroadbandsubscriptio_1), exports of IC services calculated on the balance of payments, (l_ICTserviceexportsBoP), ICT of goods, are positive. In general, for all the countries studied, the maximum effect on GDP growth is provided by the ICT service exports and imports of computer, communications and other services (% of commercial service) and the mobile scriptions. The negative impact is shown by the communication and computerized service imports, calculated on the balance of payments, as well as the of ICT service exports, calculated in percent of total services exports. The authors assume that the share of exports of ICT services in the cost of exported services grows slightly, and therefore does not have a positive effect on the GDP per capita growth.
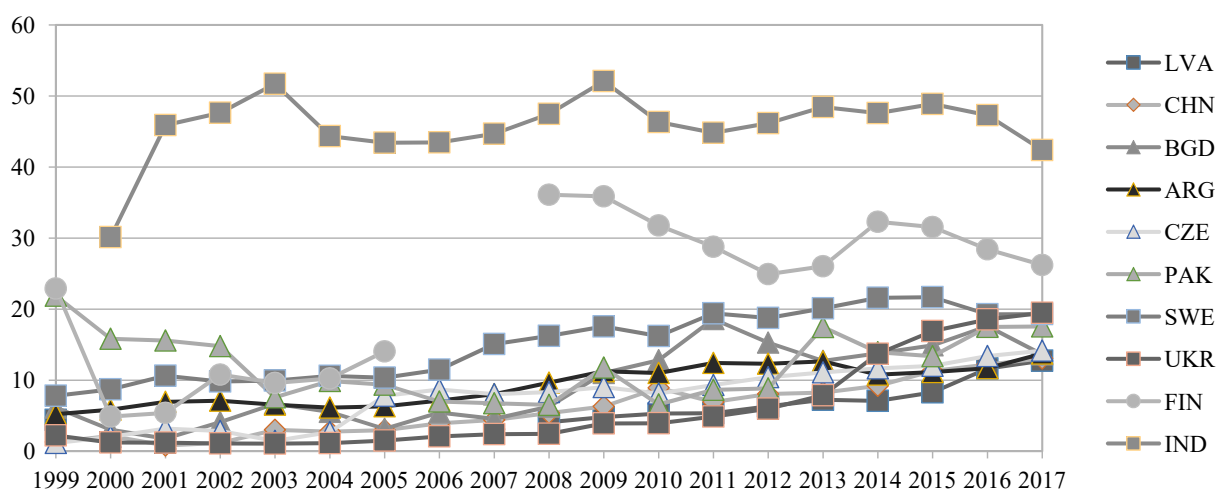

Figure 3. The share of exports of ICT services in total exports of services, in%
(source: authors' compilation based on World Bank (2019) data)

Figures 2 and 3 show the ranking of countries for which the of ICT service exports in terms of value and as a percentage of total services exports has the best effect on the growth of GDP per capita. The top ten countries for which the export of ICT services in total exports of services amounted to (by the balance pf Paments in current $ US): India, which, since 2005, by this indicator significantly exceeds all other countries.

Experts explain this as follows: "In many ways, this growth is due to a large number of government procurements in this area. Scientific and technical programs and projects serve as a guideline for India's state policy. In recent years, a well-organized policy has been carried out to stimulate the activity of the private sector with the attraction of foreign capital to the innovation sphere. Public and private organizations engaged in the patenting and commercialization of innovations continue to be actively supported" (Biryukova & Matyukhina, 2016). Other countries that are in the top ten with a positive dynamics of the impact of ICT services exports in terms of value on GDP per capita were distributed in the rating by the decrease in the indicator in the following order: USA, Germany, China, United Kingdom, France, Netherlands, Sweden, Singapore.

In terms of the share of ICT services in total exports, India is in the first place. However, the share of exports of ICT services in total exports of India had a maximum value of more than 50%, most recently in 2009. Then the value of this indicator moved oscillatory but did not cross the mark above 50%. At the same time, judging by the indicators, there are no competitors for India in terms of the volume of ICT services exports.

Other countries with high rates of ICT service exports are distributed downwards in the following order: Finland, Sweden, Ukraine, Pakistan, Bangladesh, Czech Republic, China, Argentina, Latvia.

The above-mentioned countries, unlike others, demonstrate a relatively high readiness for the digitalization of economic processes. At the same time, not in every country, the population has the financial capabilities, the skills to use equipment and programs, the desire to acquire innovative products of the digital economy. In order to understand this situation in detail, it is necessary not only to analyze statistical data but also to conduct research using sociological methods.

3. Discussion

Humanity is entering a new stage of scientific and technological development. It consists in the transition to new technologies based on the widespread use of information technologies in all spheres of human activity. The ongoing and upcoming changes cause many organizational, economic, technical issues. There is still no consensus on how to characterize and name the upcoming changes: new industrialization, industry 4.0, network economy or digital economy. There is no unity since it is still difficult to find an integrating definition characterizing the essence of the upcoming changes in the socio-economic sphere under the influence of new achievements in science and technology.

The internationally adopted methodologies for assessing the transition to digital technologies are based on determining such integral indicators as the DEI, IDI or DECA. These methods are an important tool for comparative analysis of the development of information and communication services market and digital technologies growth. They may help to characterize the technical and technological capabilities of each country to transition to digital technologies. All the above-mentioned indices do not characterize the opportunities of the transition to the digital economy, and they do not integrate the influence of digitalization processes, economic opportunities with the results of economic activity. The existing methods contain numerous indirect and secondary indicators, therefore they are laborious and not transparent in calculations.

To carry out an express-assessment of the impact of the main technological and economic opportunities on the formation of the digital economy, we applied the econometric model technique based on panel data. We chose the GDP per capita as an indicator integrating the achievements of the national economy, economic opportunities for further development and the quality of life of the population. In our applied method, this indicator acts as a predicted result. Also, as indicators characterising the economic opportunities for the development of digital technologies, the following were chosen: ICT services exports (PB, in US dollars): ICT goods exports (% of total exports of goods); Import of ICT goods (% of total imports of goods) and Export of ICT services (% of service exports, PB). We selected indicators of exports and imports of digital services, the prevalence of mobile and broadband accounts as variables that have an impact on the resulting indicator.

For the study, 28 countries were selected, grouped by population (from the largest to the smallest) and by the level of development of national economies, characterized by the GDP per capita. In the course of the study, we had found that such indicators as ICT service exports (calculated by Balance of payments), computer, communications and other services (% of commercial service imports), and the spread of mobile subscriptions had the greatest impact on the resulting indicator. A negative impact on the development of the national digital economy is caused by the import of communication services and computer equipment, calculated by the balance of payments, and the ICT services exports, calculated as a percentage of the total exports of services. India showed the best results in terms of opportunities for transformation into a digital economy. It is the leader in the export of ICT services in the balance of payments (by value) and in the share of ICT services in the total volume of services exported. Of the 28 countries studied, there are ten countries, which show relatively high readiness for the digitalization of economies.

The studies conducted did not disprove the hypothesis that the digitalization of economic processes will ensure the growth of gross domestic product as a key indicator of economic opportunities and the development of the national economy. This method can be used for the rapid estimation of the country's readiness for the formation of the digital economy. However, the development of national programs and strategies for the transition to a digital economy requires a more detailed factor analysis for each country.

Limitations

The method of analysis allows us to determine the impact of factors studied on GDP per capita as the dependent indicator, but the results of the assessment require further detailed analysis of factors studied for each country. The limitations also related to the lack of statistics for a number of countries over a long time span. The development of an international statistical database using unified data processing techniques will solve this problem.

Conclusions

The digitalization of economic processes is an inevitable process in all countries. The rate of transformation of the economy into a digital model will determine the future course of economic development of national economies. Therefore, it is important to identify the factors influencing the transformation process into a digital economy.

During the study the authors came to the following theoretical and empirical conclusions:
 – the most well-known and applied internationally are the method of calculating the Digital Evolution Index (DEI); the method of calculating the Information and Communication Technologies Development Index (IDI − ICT Development Index) and the Digital Economy Country Assessment (DECA) method of calculation;
 – internationally used methodologies are important tools for benchmarking. They test the distribution of information and communication technologies in various areas of activity. These methods mainly characterize the development of digital technologies and the market of information and communication services;

– the listed indices make it possible to assess the technological possibilities of the transition to a digital economy. However, these techniques are not transparent. They contain numerous secondary and indirect indicators, which complicates the calculation of indices. The process of collecting and processing information is laborious and time-consuming. The calculated indices do not evaluate the economic opportunities of different countries to transform into a digital economy;

– the method proposed by the authors for rapid assessment of economic opportunities for the transition to a digital economy at a cross-country level, based on an econometric model, did not disprove the hypothesis under investigation: the digitalization of economic processes will ensure the growth of gross domestic product as a key indicator of economic opportunities and the economic development;

– the study identified economic factors that determine the transition to a digital economy, which are of high importance and minor factors that determine the priority areas of activity on which attention of economic regulators should be focused. Significant factors include the export of ICT services, imports of computers, communications and other services (% of commercial service imports) and mobile cellular subscriptions. Imports of communication services and computer equipment, calculated on the basis of the balance of payments, and imports of ICT services, calculated as a percentage of total services, have a negative impact;

– the analysis shows that transformation into a digital economy is likely to be done by those countries where there is a steady positive net balance of the export of ICT services and low computer, communications and other services imports;

– of the 28 countries studied, India has the best potential for digitalization, as this country is the leader in the of ICT service exports by the balance of payments.

The authors suppose his method can be used to identify economic factors that have significant and not significant significance for the transition to a digital economy. This method is an express-assessment, based on which it is possible to conduct a more detailed factor analysis for each country.

Disclosure statement

The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

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