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DIGITALIZATION OF THE ECONOMY: DETERMINANTS AND DEVELOPMENT PROSPECTS

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Abstract

The article reveals the key areas of using digital technologies in the Russian economic system. According to some indicators, comparative characteristics are given with the countries of the world. On the basis of a comparative analysis, it is confirmed that the stage of development of the sector of digital communication technology, Russia's positions lag behind other innovatively active states. So it is generalized that Russia has the opportunity to occupy its own niche in key technologies, connected with the development of Internet of things, additive production, cyber-physical systems (CPS) and open-source technologies in the dynamically developing market of digital economy. The main research method is a correlation analysis, which allowed to establish the correlation between the network economy index of the stage and the level of development of institutions. The existing technological reserves and the opening technological windows of opportunities are able to provide an impetus for causing an increase in efficiency and effectiveness of the structure-forming sectors of the Russian economy.

Keywords: Digital economy, network readiness index, quality indicators of state institutions, information and communication technologies, correlation analysis, digital technologies

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1. Introduction

In the innovative economy, the field of digital technologies is gaining importance for the socio-economic system, providing an increase in the formed gross value added and causing an increase in the multiplier positive synergetic effects in other sectors. This provision is enshrined in the program of digital transformation of the Russian economy (Digital Economy Development Program in the Russian Federation until 2035, 2020). Transition to the new sixth technological mode and the opening of technological windows of opportunity are currently gaining particular relevance (Glazyev, 2017; Kogan et al., 2017; Pinkovskiy, 2017).

Capacity building issues of an economic system in the context of its digitalizationare reflected in the works of authors (Klimenko et al., 2018; Kudryavtseva & Shinkevich, 2015; Kudryavtseva, 2017; Shinkevich et al., 2016; Shinkevich et al., 2017; Shinkevich et al., 2018). The problem of using digital technologies to improve the organization of petrochemical production is reflected in the works of the authors: (Bals et al., 2016; Emelogu et al., 2016; Fleck et al., 2017; Frenken, 2017; Frenken & Schor, 2017; Lindgren et al., 2016; Ozbolat et al., 2017) and etc.

Moreover, we believe that the issues to identifying key factors affecting the digital transformation of the economic system are poorly, which predetermined the relevance and choice of research topics.

2. Methods

The field of information and communication technologies is one of the steadily growing. In the formation of gross value added of ICT sector of the economy, 40.2% were telecommunication technologies, 31.1% - ICT service activity, 21.6% - activities related to the production of ICT equipment and 7.1% - wholesale trade in ICT goods. In the distribution of investment investments, the ICT sector also had the largest share, which accounted for 72.8% of total investments in the ICT sector (Abdrahmanova et al., 2018).

ICT organizations shipped goods and services in the amount of 475765 billion rubles, where ICT services also dominated - 54%, ICT tangible assets - 14%.

One of the main lines of business in the ICT sector is electronic business. At the end of 2016, 85.7% of organizations in the business sector used the Internet, 80.5% - broadband Internet, 56.7% - servers, 43.4% - websites, 20.5% - “cloud” services , 9% - broadband Internet with an access speed of 100 Mbit / s and higher. International comparisons have shown that Russia's performance is inferior to other developed countries. For example, in Russia 43% of organizations had a website, while in Finland - 95%, Sweden and Japan - 90%, the Republic of Korea - 60% (Abdrakhmanova et al., 2017).

In 2016, 16.7% of organizations in the business sector used the Internet for procurement, among which the largest share was characteristic of communications organizations - 27.3%, electric power industry - 24.5%, hotels and restaurants - 22.3%. About 13% of organizations in the business sector used the Internet for sale, including 10.2% using special forms posted on a website or extranet and 6.6% using EDI systems.

The leading organizations in the use of RFID technologies were communication companies - 8.9% of the total number of organizations, manufacturing industries - 8.7%, wholesale and retail trade - 7.8%. On the whole, in the business sector, the value of this indicator was 5.7% (Fig. 6). CRM systems were used

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by 12.4% of organizations in the business sector, ERP systems - 17.3%, SCM systems - 6.6%. Among the types of economic activity, the leading positions in applying the latest digital communications for integration in the supply chain belonged to communication organizations, trading activity.

According to the results of 2016, the export of ICT goods and services amounted to $ 5494 million, imports - $ 21,401 million. The largest share in the export structure was made up of computer services - 48.5%, telecommunication services - 21.5% and communication equipment - 6%. In the structure of imports, communication equipment dominated - 31.5%, computers and peripheral equipment - 23.7%, computer services - 14.3%. Globally, the leading positions in the export of ICT goods and services belonged to China, the USA and Singapore (Abdrakhmanova et al., 2017).

To assess the level of digitalization of the economy, we propose using the method of method of constructing a correlation matrix, which describes the relationship in the processes. As indexes of the digital economy, we will use 2 composite indicators, sub-indexes, calculated by the World Bank (World Bank, 2020). The first is the network readiness index, the second is the quality of government institutions as a support to the digital economy.

The network readiness index is an integral indicator that includes 53 variables that are aggregated into three subindexes:

1. The subindex of the external environment: market environment, political environment and infrastructure. It reflects the general state of the business and legislative sphere from a digital perspective, the presence of healthy competition, innovative potential, the necessary infrastructure, the possibility of financing new projects, etc.

2. Sub-index of readiness: individual readiness, business readiness and Government readiness. It includes the state position in relation to the promotion of ICT, government spending on the development of this industry, the level of accessibility of ICT for private entrepreneurship, the coverage and mobility of the Internet, the cost of cellular communications, etc.

3. Subindex of use: individual use, use by business and use by the Government. It contains quantity of personal computers, mobile and Internet subscribers, the development of an electronic government system, as well as the combined creation and application of ICT in the country.

More than half (55%) of the indicators included in the network readiness index are qualitative indicators obtained on the basis of expert estimates, respectively, 45% are quantitative relative indicators. The calculation of the Network Readiness Index is partially based on the statistical indicators of international organizations such as the ITU, the WB, Eurostat, the UN and others, as well as the results of annual surveys of business leaders from different economic field, which the World Economic Forum conducts in cooperation with its own network of institutions partners (consulting organizations) in the states included in the survey protocols for this study.

Quality indicators of government institutions supporting the digital economy include: transparency and accountability, political stability, government performance, legal base, obedience to law, prevalence of corruption.

The data on the countries of the European Union and Russia were used to determine the dependence of the country's network readiness index and institutional area of the digital economy.

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3. Results

The study showed a close positive correlation between the index of digital economy and the institutional factors. The correlation coefficient with the indicator "Government performance" was 0.9, with the mark "legal base" - 0.9, with the prevalence of corruption - 0.9 (Table 01). The correlation is statistically significant (p-value <0.05) (Table 01). Therefore, the higher the quality of state institutions, the higher the probability that the country's technological readiness index will be higher, which stimulates innovation, the formation and development of a new technological order, accelerating the diffusion of innovations in technical and economic systems.

Table 1. Matrix of pair correlation coefficients of the network readiness index and institutional factors

No.	1	2	3	4	5	6	7
1	1,0	0,6	0,7	0,9	0,9	0,9	0,9
2	0,6	1,0	0,6	0,7	0,8	0,7	0,7
3	0,7	0,6	1,0	0,7	0,7	0,8	0,8
4	0,9	0,7	0,7	1,0	0,9	1,0	1,0
5	0,9	0,8	0,7	0,9	1,0	0,9	0,9
6	0,9	0,7	0,8	1,0	0,9	1,0	1,0
7	0,9	0,7	0,8	1,0	0,9	1,0	1,0

1 - network readiness index
2 - transparency and accountability
3 - political stability
4 - government performance
5 - quality of legislation
6 - degree of rule of law
7 - level of corruption

The institutional structure of Russia lacks formal institutions, as well as mechanisms for their support, which are necessary for the existence of efficient markets. The institutional structure that determines the basic structure of production is one of the factors that maintain a low level of development. Given the weak and ineffective protection of intellectual property rights, the unfulfillment of adopted legal acts in practice, the existence of monopolistic restrictions, administrative barriers to entry into the industry: economic agents, driven by the desire to maximize profits, are inclined to choose a short-term strategy and use a small amount of basic capital. The most profitable occupation is trade, redistribution or operations in the informal sector. At present, the Russian economic system calls for selling, i.e. to be competitive in selling a product. This is an institutional feature of the domestic economy, which countries of the post-industrial economy have long abandoned.

4. Discussion

One of the areas of the electronic economy can be called e-commerce. Recently, many new players have gained popularity in Russia, including jd.com, Aliexpress, Alibaba, and others. These organizations make it possible to purchase both retail and small and large wholesale lots of goods. A national b2b site www.globalrustrade.com was organized, allowing Russian enterprises to sell goods to Latin America, Southeast Asia and the BRICS. This concept has already been put into operation, users of the site have

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concluded a number of contracts with customers, about 120 organizations are still in the process of signing contracts.

Amazon is another example of an e-commerce market - the first contender to overcome the $ 1 trillion market cap. However, a business that revolutionized trade in the late 1990s may not be able to withstand competition from an innovation such as blockchain by the end of the 2020s. Distributed ledger technology can damage existing e-commerce forms. On the other hand, according to e-commerce analysts, Amazon's departments like Alexa (analysis of online resource traffic), Whole Foods (offline organic food stores) or Amazon Prime (fast delivery) see blockchain as unlikely. The emergence of decentralization of information or the evolution of voice services, which can bring new experience to users, will have a big impact for these units.

Ecosystems will be replaced by traditional marketplaces where the seller and the client can interact directly - BBEP (blockchain based e-commerce platform). These decentralized sites are not subject to national or regulatory pressure, and the dominant influence of any organization and its marketing are also excluded. Examples of such sites that have an unprecedented impact on the global economic system are the impact of Google, Facebook, Amazon and Apple.

The introduction of blockchain in e-commerce will provide the formation of customized market niches. This will be contributed by an addition of quantity of users of the electronic economy: the threshold for entering a business will become lower over time, thanks to digital tools based on development of supply chains of products, knowledge and information, which will significantly reduce operating costs. Thanks to projects such as Open Bazaar or Can Ya, the foundation has been laid for the formation of free zones in which the combination of b2b, b2c and c2c transactions will be possible simultaneously.

One of the leaders in using e-commerce blockchain technology is Alibaba Australia, which is launching a pilot project of the Food Trust Framework to track product supply chains using blockchain technology and QR codes. Innovation should ensure transparency and accountability of logistics, as well as increase user confidence in deliveries and create a favorable environment for international trade. Huawei creates blockchain technology to protect intellectual property. JD is introducing blockchain technology into its work, which will track the supply of meat products for sale. The primary aim of the project is to enable buyers to track the process of meat supply, from the farm to the consumer's refrigerator.

5. Conclusion

Thus, in the dynamically developing market of the digital economy, Russia has the opportunity to occupy its niche in key technologies related to the development of the Internet of things, additive manufacturing, cyberphysical systems (CPS) and open source production technologies. The existing technological groundwork and the opening technological windows of opportunities can provide an impetus for increasing the competitiveness of the structure-forming spheres of the economic system of Russia. The results of the study are of great scientific and practical importance for world economic science and reflect the authors' contribution to the development of the theory of digital technology management in enterprises of the real sector of the economy.

The study provides an opportunity to systematize the following conclusions:

1) the active development of the fourth industrial revolution causes complex changes in the economic content of modernization transformations in innovative systems, focusing on digitalization;

2) the key factor in building the potential of digital transformations in economic systems is the quality level of state institutions that perform the function of a regulator of innovative processes;

3) the materials of the article can be used for further studies of key determinants and inhibitors of the digitalization of economic systems.

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