

Digital Transformation of the Economy: Problems and Trends of Development

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Abstract—This article examines the digital transformation of the economy, which has become a significant phenomenon for the entire world economy. The results of Russia's transition to the digital economy are considered and analyzed. A number of problems arising in the development of the domestic digital economy have been identified and ways to overcome them have been proposed. Authors note the need for monitoring implementation of information technologies by the Government. Promising directions of development of digital transformation of economy are suggested. Digital transformation of the Russian Federation will lead to a new digital society in which the following components will grow, increase and develop: the role of knowledge and information in life; level of automation; a share of information communications, products and services in GDP; global availability of information resources; level of communication through the use of information technology; degree of satisfaction of human needs in information products and services; and digital competitiveness rating.

Keywords—digital economy, digitalization, information technology, IT, ICT, digital transformation of the economy.

I. INTRODUCTION

The relevance of the suggested research topic driven, on the one hand, by the existing contradictions between the active development of digital technologies in a number of countries and their increasing role in the economy, and on the other hand, by the low growth rate of this segment in our country.

G. I. Abdrakhmanova, K. O. Vishnevsky and L. M. Gokhberg [1] paid special attention to the current state and trends in the development of digital transformation, they considered key indicators that reflect the level and dynamics of the development of the digital economy in Russia in the context of international comparisons. A. Demyanova, O. Zhikhareva, Z. Ryzhikova [6] studied the labor market and presented data on employment in professions that are associated with intensive use of ICT according to the OECD methodology. Russian researcher S. P. Zemtsov [17] considered the potential of robotics and the economy of ignorance in Russian regions. O. A. Vostrikova, M. S.

Agafonova [15] studied the problems and prospects of development of the Russian and foreign digital economy in their works, and S. Baller, S. Datta, B. Lanvin [3] studied features of the processes of development of national innovation systems and identified barriers and prospects for the development of digital technologies in the world.

There is still no single approach to defining the essence of the concept of digital economy, there is no single justification for the criteria for evaluating the process of digitalization, despite the significant scientific contribution of domestic and foreign scientists to the theory of digital transformation of the economy. The urgency of the problem, the lack of scientific development of certain aspects of it and its great practical significance determined the purpose and objectives of this research.

The purpose of this research is to identify the global trends of digital transformation of the economy, as well as the problems and prospects for the development of Russian digital transformation.

The research objectives are:

- to identify the most significant areas of digital transformation of the economy;
- to identify the problems of Russia's transition to the digital economy; and
- to formulate the main prospects for the development of digital transformation of the national economy.

Today, the economic opportunities of all industrialized countries are determined by a significant increase of the significance of science and technology in public consumption, and digital technologies are one of the most important economic resources and have recently received rapid development.

Digital economy requires complex processes and technologies to build platforms and their content, the system requires professionals, powerful infrastructure, high-

performance Internet access, powerful mobile networks and telecommunications.

In course of this research the authors applied methods of analysis and synthesis, the method of graphical display of data, the method of large-scale comparison and comparison of the analyzed phenomena and processes in economic reality, which enabled us to implement the goals and objectives of this study.

II. RESULTS AND DISCUSSION

In recent years we have observed active penetration of digital technologies in all spheres of life, which contributes to the rapid development of the digital transformation of the economy in our country. However, objective indicators show that Russia is significantly inferior to the leading countries in the digitalization process, as indicated by Russia's rank in the world digital competitiveness ranking the IMD WORLD DIGITAL COMPETITIVENESS RANKING 2019 published by the Swiss business school (Table 1) [16].

TABLE I. THE DIGITAL RATING OF COMPETITIVENESS OF COUNTRIES FOR 2019

Rank 2019	Rank 2018	A country	The value of the 2019 index, %
1	1	United States of America	100
2	2	Singapore	99,37
3	3	Sweden	96,07
4	4	Denmark	95,22
5	5	Switzerland	94,65
6	9	Netherlands	94,26
7	7	Finland	93,73
8	11	Hong Kong	93,68
9	6	Norway	93,67
10	14	South Korea	91,30
...
22	30	China	84,29
38	40	Russia	70,40
60	58	Ukraine	55,26
63	63	Venezuela	27,76

The IMD ranking uses 50 criteria, most of which are based on statistical data and survey results. There are 63 places in the rating, which are assigned based on the total result shown in 3 categories:

"Knowledge": countries are ranked in the descending order of the quality of training, education, and science – Russia is ranked 22nd (rank 24 in 2018);

"Technologies": experts rank countries according to the state of Internet and communication technologies, financial capital in the IT industry, and the regulatory environment. In this category Russia maintained rank 43;

"Future readiness": assesses the readiness to use digital transformation – in this category, Russia is in the 42nd rank according to experts (rank 51 in 2018).

The final position of Russia in the IMD 2019 digital competitiveness rating is 38, which indicates an upward trend.

The United States of America, Singapore, and Sweden have consistently led the rankings for the second year in a row. Denmark and Switzerland are ranked 4th and 5th. None of the CIS countries could come close to the leaders of the rating, however, Kazakhstan (currently ranked 35th in the rating) demonstrates the best growth trend in 3 categories, and

Ukraine demonstrates the worst downward trend with its rank dropping by 2 positions to rank 60. Venezuela takes the last place in the rating [16].

Russia has the necessary list of indicators for the development of the digital economy [3]:

- the availability of ICT;
- population's ability to use technology;
- high level of education and literacy; and
- development of the ICT infrastructure.

We note that the transformation of existing economies in the world may lead to significant changes in existing business models and even possibly result in change of world leaders. Therefore, for the prosperity of our state at this stage, one needs to take implementation of digital infrastructure and its modernization seriously, especially given that Russia is far behind the digital leaders in the rankings (Fig. 1) [10].



Fig. 1. The level of digitalization of the world's countries

The Russian "companies" segment has the lowest digitalization index, however, the indicator is slightly higher in other segments.

We selected the following criteria that affect changes in the dynamics of statistical indicators to assess the level of digital transformation of the Russian economy:

- assessment of the overall level of digital technology use in the Russian Federation;
- introduction of digital technologies to Russian business; and
- impact of digitalization on employment.

It is necessary to consider the impact of the information and communication sector within the most important sectors of life in order to assess the level of use of digital technologies in Russia, see figure 2 [1]. In total, the ICT sector contributed RUB 2,443 billion to the Russian economy. Trade, mining and real estate operations account for the largest percentage of the ICT contribution – 349.3 billion rubles (14.3%), 315.1 billion rubles (12.9%) and 224.7 billion rubles (9.2%), respectively. The lowest contributions have been made by the content and media sector – 7.3 billion rubles (0.3%), the production of motor vehicles – 9.8 billion rubles (0.4%), and the chemical industry – 24.4 billion rubles (1%).

Over the past years, information technologies have become widespread in business. Many traditional business models and concepts have been modernized.



Fig. 2. Contribution of the ICT sector to the development of the Russian economy in 2018 (as a percentage of GDP)

To assess the level of digital technology penetration in Russian business it is necessary to review the annual rating provided by the financial and economic magazine Forbes. The 2020 the rating covered only those companies that specialize exclusively in the Internet business (Table 2) [12].

TABLE II. TOP 20 THE MOST EXPENSIVE COMPANIES IN RUNET

Rank 2020	Rank 2019	Company name	Company value 2020, USD million	Company value 2019, USD million	Variation, %	Function
1	1	Yandex	14 640	10 724	+36,5	Search, advertising, services
2	2	Mail.ru Group	5 285	5 362	-1,4	Mail, games, services
3	3	Avito	3 850	3 850	0	Bulletin board
4	-	QIWI	1 160	-	-	Payment service
5	6	HeadHunter	1 150	299	+284,6	Job search
6	8	2Gis	320	243	+31,7	The geolocation service
7	-	Rambler Group	305	-	-	Advertising, services, online media
8	10	IVI	255	204	+25	Online video
9	-	Eruditor Group	225	-	-	Online recruitment and education
10	11	Aviasales	180	196	-8,2	Traveling Services
11	15	1С-Битрикс	135	106	+27,4	Digital book stores
12	-	ЛитРес	130	-	-	Online education
13	14	Skyeng	130	109	+19,3	Online education and recruitment
14	16	TalentTech	120	97	+23,7	Online auction
15	-	CarPrice	115	-	-	Bulletin board
16	17	CIAN GROUP	115	96	+19,8	Job search
17	19	Superjob	115	93	+23,7	

18	-	ESForce	110	-	-	ESports, online media
19	-	Дром.ру	100	-	-	Bulletin board
20	18	B2B-Center	95	95	0	Electronic bidding

The top three most expensive companies remained unchanged. The market value of Yandex has increased by 36.5% to \$ 14.6 billion. Valuation of Mail.ru Group has decreased by 1.4% to \$ 5.3 billion, whereas valuation of Avito has remained approximately the same at \$ 3.9 billion.

Seven new companies entered the top twenty for the first time in 2020. These companies initially relied on business in the Internet, their products or services can not exist outside the online environment. In 2019, a similar rating also considered large online platforms with offline points of sale.

In general, domestic companies have started to implement technologies in their fields of activity quite actively. However, most companies currently do not have a comprehensive digitization program, which may negatively affect the results in the future. The use of IT technologies such as robotics, chatbots, big data analysis and machine learning has become widespread in companies. In fact, more than 50% of companies have already used such information technologies, although percentage of digital technology adoption varies depending on the industry.

Digitalization has also had a huge impact on employment. According to the research conducted by the Higher School of Economics, the share of employees engaged in ICT sector in foreign countries ranges from 5% to 22%. The highest values were recorded in Luxembourg – 22%, the USA – 18% and the UK – 17%; the lowest – in Italy, Slovakia, Greece – approximately 7% each and Turkey – 5%. The Russian indicator is comparable to the average for the European Union. Also in the countries included in the study, ICT professionals make up between 1% and 7% of the employed in the economy, while workers of other ICT professions make up between 4% and 17%. For ICT professionals in all ICT professions, it the share varies from 17% in Lithuania to 43% in Finland [6].

The Russian Federation has set out a list of professions that may be replaced by robotics in the coming years (Fig. 3) [17].

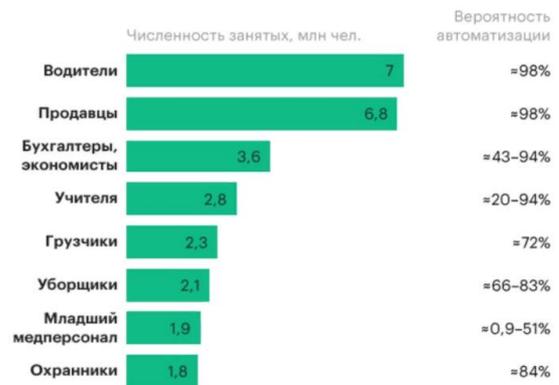


Fig. 3. Probability of automation of the most popular professions in the Russian Federation

Drivers and sellers are two categories that are most susceptible to automation, these categories together account for 13.8 million jobs and 16.2% of the total working-age population of our country.

The tasks and responsibilities of employees will be markedly different from the modern ones with the advent of automation.

Digital transformation in the labor market suggests that by 2030, people will begin to create new production infrastructures to acquire the skills and knowledge they need to successfully perform their work. They will regularly improve, learn from each other, and create their own path. Some will rely on past experience, frameworks, or mental models. Others will experiment on different platforms, discovering their own paths and innovating.

Based on the data of The Institute for Development of the Information Society, the results of assessing the level of development of the digital economy in Russia were revealed (Fig. 4) [2].



Fig. 4. The level of development of the digital economy in Russia in 2018

The experts have transferred quantitative indicators into a 5-point scale using various algorithms, depending on the availability of comparable data for other countries:

1. If international data was available (for individual indicators or composite indices) for a wide range of countries with different levels of development (for example, data from the UN-ITU, UNESCO, UNDP, DESA, World Economic Forum data), to determine the rating on a 5-point scale, the interval from the lowest to the highest value in the world was divided into 5 intervals and, depending on the interval in which the value of the indicator fell for Russia, a rating from 1 to 5 was assigned.

2. If there was comparable statistics only for Russia and developed countries (OECD and / or EU), the difference between the maximum and minimum values of the indicator for the OECD or EU countries was divided into 4 intervals (score from 2 to 5) and, depending on the values of Russia, an estimate was made. If the value of the indicator in Russia was less than the minimum in developed countries (almost never the case), a score of 1 was given [2].

The introduction of digital technologies has already affected every vital sector. Almost every sector under review has average results of readiness for digital transformation. However, at this stage of development, it is already possible to identify five areas with a good indicator of readiness for digital transformation, namely: new digital technologies,

digital platforms, digital infrastructure, trust and security, and human capital.

Non-digital sectors also affect the overall development of the digital economy, and the indicator for the non-digital sectors is satisfactory. The reason is weak interaction of the state with the private sector and scientific and educational communities, which negatively affects the pace of digital transformation, the implementation of key governmental programs, and the introduction of new technologies.

According to the Institute for Statistical Research and Economic Knowledge of the Higher School of Economics the forecast estimates of the resource support for the development of the digital economy are as follows (Fig. 5) [9]:



Fig. 5. Forecast estimates of resource support for the development of the digital economy in Russia

One can observe a trend of the gradual increase in spending on research and development during the period under review. By 2030 the expenditures are planned to increase by approximately 9 times and will amount to just under 600 billion rubles.

If Russia raises funds from households, corporations and state funds to increase its investments in information and communication technologies, the level of digitalization of the economy can grow to 5.9% of GDP. According to forecasts, the percentage of the digital economy in Russia's GDP may increase to 5.6% in 2021, mainly due to the process of digitalization of industries (No.13, 2020).

Increasing investment in scientific research and development should help increase the number of researchers by 3 times, as well as increase the number of people employed in the field of digital technologies.

The program "Digital economy of the Russian Federation" was developed and approved in Russia for effective formation of digital transformation and development of the digital economy. The application of this program will contribute to the transition into a new digital format in the economy [7], however, the program is not sufficiently developed at this time. Against this background, application of the following solutions aims to improve the program and the legal regulation of relations that emerge in the Russian digital economy.

It is necessary to:

- Finalize the existing national project "Digital economy of the Russian Federation", namely:
 - determine technological development of the digital economy as a priority area;
 - emphasize individual areas of the digital economy;
 - develop specific plans for growth of certain areas of the digital economy; and

- involve regional authorities in the implementation of the program.
2. Consider the possibility of various risks, so it is important to adopt a special document that will elaborate on the development of the digital economy in Russia.
 3. Adopt a list of benefits for companies that develop digital technologies, as well as to develop state standards for product quality.
 5. Form new legal institutions of the digital economy. Rules for disclosure of any type of information, copyright protection in the web, financing of innovative developments – all these matters should be regulated by certain standards [15].
 6. Provide a favorable legal environment for data collection, storage and processing.
 7. Create certain legal conditions for the most effective use of the results of intellectual activity in the digital economy.
 10. Implement a set of measures to improve standardization mechanisms.
 12. To introduce new reporting rules, including statistical information.

The main problems of Russia's transition to the digital economy today are:

1. Slow pace of development and adoption of legislation and bylaws in the field of digital economy development.
2. Insufficient involvement of business in the formation of the legal framework.
3. Low level of digital literacy of the population.
4. The use of outdated technologies which contributes to the emergence of infrastructure constraints.

As a condition for Russia's effective transition to digital transformation, it is necessary to:

1. Modernize the non-digital foundations of the economy with the government focusing on the role of digital transformation in achieving national economic development goals.
2. Ensure flexibility in adopting changes to legislation necessary to adapt to the rapidly changing requirements of the digital economy.
3. Increase the efficiency of using digital technologies and ensure that it can be used to achieve the development goals of the domestic economy.
4. Expand the rights and opportunities of the digital system, which includes government agencies, institutions and organizations responsible for promoting digital transformation and mitigating the disruptive effects of technology applications.

III. CONCLUSIONS

Over the past decade, we observed an increase in the volume of digital technologies, which has led to structural changes in the country's economic activity. IT contributes to the rapid development of the digital economy of our state;

however, the level of digital competitiveness of Russia is estimated as average today. The reasons are weak interaction of the state with the private sector and scientific and educational communities, which results in reduced effectiveness of digital transformation, of implementation of key state programs and of introducing new technologies. In general, the companies are not prepared to carry high costs of acquisition and further maintenance of IT programs, which further results in low level of application of digital technology.

To maintain the growth trend, increase the level of digital competitiveness, and then consistently maintain its position, Russia should pay attention to improving the economic security when implementing digital technologies.

The Government should monitor implementation of information technologies and impact of digital transformation in all sectors of the country's economy, both at the regional and municipal levels, as well as in the areas of public administration, industry and services. It also needs to continue improving digital funds through investment in intellectual infrastructure and security, which in turn contribute to the active promotion of digital growth. Further, to successful development of society as a whole, it is necessary to improve digital education, as well as digital literacy of Russian entrepreneurs.

Digital transformation of the Russian Federation will lead to a new digital society in which the following components will grow, increase and develop:

- the role of knowledge and information in life;
- level of automation;
- a share of information communications, products and services in GDP;
- global availability of information resources;
- level of communication through the use of information technology;
- degree of satisfaction of human needs in information products and services; and
- digital competitiveness rating.

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