

Analysis of the Level of Development of the Digital Economy in Russia

Bondarenko N.Y¹, Kalyakina I.M^{1,*}, Kobets E.A²

¹Don state technical University, Rostov-on-Don, Russia

²Southern Federal University, Rostov-on-Don, Russia

*Corresponding author. Email: inessakalyakina@yandex.ru

ABSTRACT

In modern conditions, scientific and technological progress contributed to the evolution of economic relations, which shifted to the information sphere, or their implementation was transformed due to the development of information and communication technologies. The transition from the traditional to the digital economy is taking place at a fast pace, which implies the use of digital technologies in the process of implementing the economic process in all spheres of the economy

Keywords: digital technologies, information sphere, digital transformation

1. INTRODUCTION

In modern conditions, scientific and technological progress contributed to the evolution of economic relations, which shifted to the information sphere, or their implementation was transformed due to the development of information and communication technologies. The transition from the traditional to the digital economy is taking place at a fast pace, which implies the use of digital technologies in the process of implementing the economic process in all spheres of the economy.

In December 2018, the Government of the Russian Federation approved a system of the implementation of the "Digital Economy of the Russian Federation" program, the main objective of which is the development of the digital economy, in which digital data is a key factor of production in all spheres of socio-economic activity, which increases the country's competitiveness and the quality of life of citizens, ensures economic growth and national sovereignty.

The modern trend of digital transformation, expressed in the integration of "end-to-end" digital technologies and

"Industry 4.0" technologies in almost all sectors of the economy and spheres of human activity, significantly affects many areas of business, politics, society and contributes to the emergence of more modern forms of organization of state and the private sectors of the economy. Therefore, the problem of the formation and development of the digital economy is relevant both at the theoretical and at the practical level of study because of the decisive role of digital technologies in the formation of the country's strategic competitiveness.

Methodology of the study. Most of the international ratings, which determine the positions of countries in terms of digital development level, record the progressive growth of Russia's positions.

The most authoritative international rating - the ICT Development Index (IDI) - is published annually by the International Telecommunication Union (ITU). The latest publicly available ITU report dates back to 2017, and Russia, according to this report, ranks 45th (7.07 points) (Fig. 1). At the same time, as follows from the data of the diagram, starting from 2008, the index shows an upward trend.

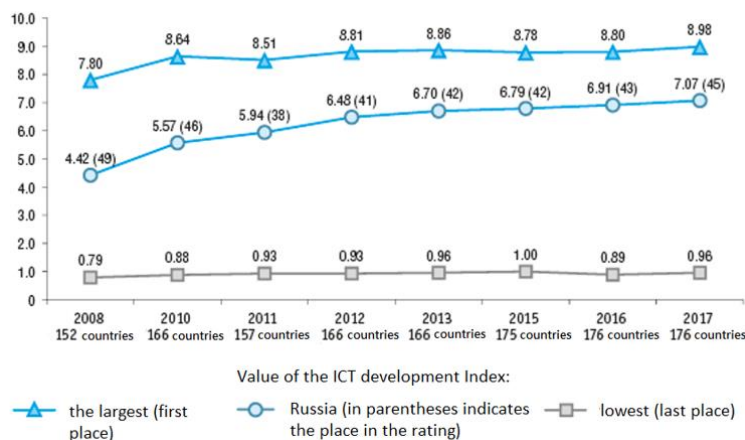


Figure 1 ICT Development Index [1]

The next rating is the International Digital Economy and Society Index (I-DESI). It is calculated by the European Commission's Directorate General for Communication Networks, Content and Technology for non-EU countries. According to data, published in 2018, Russia ranks 12th among 17 countries, participating in the study. At the same time, our country was ahead of China, Turkey, Mexico, Brazil, and Chile.

Bloomberg Agency - Bloomberg Innovation Index annually compiles and publishes a rating of the most innovative countries in the world. In accordance with this rating, in 2019 Russia ranks 27th (taking into account the fact, that the rating includes 60 countries of the world).

According to the data of 2020, Russia has moved up one more position and currently ranks 26th in the world.

In the past few years, Russia's positions in international ratings of digital economies have been improving. This is primarily due to the fact, that the development and widespread use of digital technologies in Russia is one of the priorities of state policy: for the implementation of the "Digital Economy of the Russian Federation" national program in 2019-2024, it is planned to allocate 1 837 696 million rubles. (including 1 099 589 million rubles from the federal budget) [2].

The key indicator of the implementation of the national program is the "Internal costs for the development of the digital economy from all sources by share in the country's gross domestic product" indicator. Studies, carried out by the ISSEK NRU HSE, make it possible to state the volume of internal costs for the development of the digital economy in 2018 at the level of 3794 billion rubles, or 3.7% of GDP.

At the same time, about 44.6% of the specified volume of costs are concentrated in the business sector, and 36.8% are spent by households (Fig. 2).

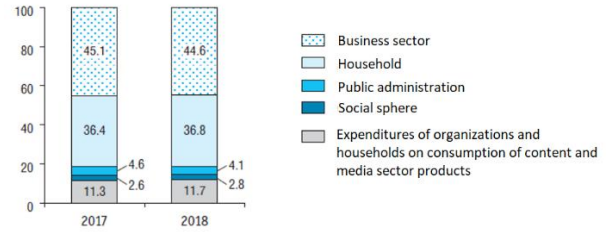


Figure 2 Structure of internal costs for the development of the digital economy by sector [3]

This distribution of internal costs is due to the fact, that in these sectors of the economy, the socio-economic results of the implementation and use of digital technologies can be obtained in the shortest term.

Most of the international ratings, which determine the positions of countries in terms of digital development level, record the progressive growth of Russia's positions. Nevertheless, it place is still far enough away from leadership positions.

The digital infrastructure in Russia is quite developed and has significant strengths and weaknesses. The strengths include: the competitiveness of the telecommunications market, high penetration indexes of mobile cellular communications, the affordability of broadband access, the state of cybersecurity. At the same time, the weaknesses are: the development of fixed broadband access, cellular communication of the 4G generation, the territorial distribution of data processing centers, and the development of domestic companies in the data analytics market. The overall assesment for this index is good.

In Table 1, we present summarized data on the level of development of the digital economy in the Russian Federation.

Table 1 Summarized data on the level of development of the digital economy in the Russian Federation

| Indicator name | Development level | |
|---|-------------------|------|
| | satisfactorily | good |
| 1 | 2 | 3 |
| Public policy and strategic planning | + | |
| Institutions and leadership | + | |
| Statutory regulation | | + |
| Human capital | | + |
| R&D and innovation in the digital economy | + | |
| Business environment | + | |
| Digital infrastructure | | + |

Thus, according to the indicators under consideration, the level of development of the digital economy in Russia can be assessed as - satisfactory +.

After assessing the digital development of the economy in the context of the implementation of the "Digital Economy of the Russian Federation" Programm, which provides for the development of the economy in five areas: "Information infrastructure", "Information safety", "Statutory regulation", "Formation of research competencies and technological premise" and "Personnel

and education". [5] Consider in more detail the degree of development of each of them.

The degree of ICT infrastructure development is directly reflected in the number of Internet users in the country (fig. 3).

In Russia, 77% of the population in the 12+ segment uses the Internet - this is 97.5 million people. Every year more and more users are switching to mobile devices. In 2019, 28% more people began to access the Internet not only on PCs but also on mobile devices.

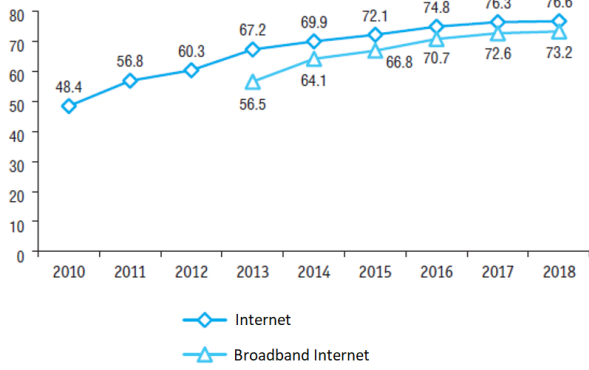


Figure 3 Internet access in households in 2018, %x [1]

Internet access among the urban population exceeds the access among the rural population, which indicates the presence of “digital poverty” in Russia (fig. 4).

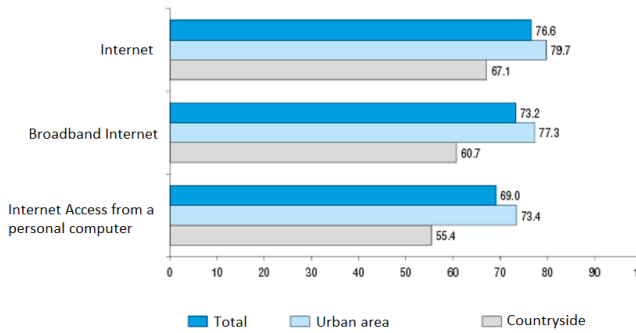


Figure 4 Internet access in households in urban and rural areas in 2018, % [1]

Most often, the Internet is used by the population aged 15 to 24 years, as well as aged 25 to 34 years (fig. 5).

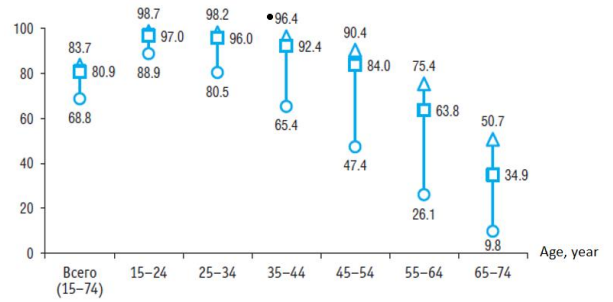


Figure 5 Use of the Internet by population by age group in 2018, %

In today's digital world, cybercrime is a key threat to the growth of the global economy. Raise of a culture of online behavior among citizens, as well as the dissemination of clear global rules against cybercrime, can help fight against such crimes. According to the Ministry of Communications and Mass Media of the Russian Federation, it is reported, that in the 2017 rating of the International Telecommunication Union according to the cybersecurity index, Russia ranked tenth. But in 2018, Russia lost 16 positions and lowered its rating to 26th place.

Despite the rating decrease, Russia is actively developing national standards in such areas as information security, BD, Internet of Things (IoT), "smart manufacturing", "smart cities" and "artificial intelligence", that can be developed and approved in 2020.

In addition, in 2020, a concept of the development of legislation on robotics and cyber-physical systems, including the classification of such systems, information on their use of BD, and risk insurance may be approved in Russia. The Government of the Russian Federation also provides for tax incentives for companies, implementing digitalization: investments, aimed at the transition to robotization, quantization, opticalization, intellectualization, and convergence of space and nuclear technologies, are exempted from taxes. [5]

Building a strong digital economy depends on stimulating innovation and its dissemination in society. Innovation is recognized as an important source of business competitiveness. They can do this in many ways: by reducing production costs, increasing the existing range of products, and also leading to the creation of new products, more efficient ways of supplying and selling them.

The following figure presents the results on studies and development in organizations in the ICT sector (Fig. 6).

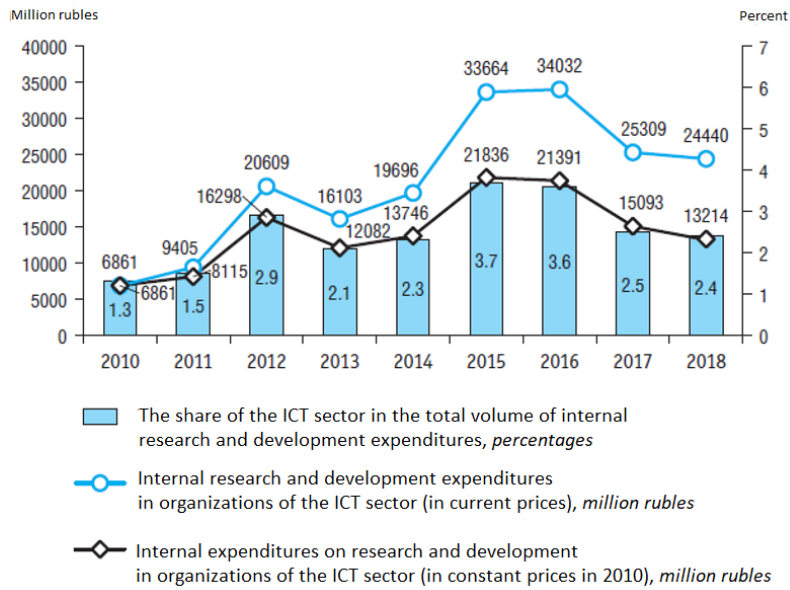


Figure 6 Studies and development in organizations of the ICT sector [5]

Based on the data in the figure, it is possible to conclude, that the peak of the volume of internal costs of the ICT sector fell on 2015-2016, after which their value began to decline. And if in 2015 their share was 3.7%, then in 2018 their share decreased to 2.4% in the total volume of internal costs.

This fluctuation in indicators may be associated with the point funding of certain research projects and programs due to the lack of clear criteria of the efficiency of such funding.

At the same time, analyzing the indicators of the publication activity of authors in the field of ICT, it is possible to state its progressive increase. The domestic programming school is still high-level, developers compete on equal footing at the global level. For example, Schlumberger, the world's leading oilfield services company, claims, that more than 80% of its AI specialists are from Russia.

The digital transformation of the economy requires new skills from millions of people. New forms of education, primarily online education, help to acquire the necessary skills. High technologies are radically changing business processes in many sectors of the economy, familiar professions are being transformed, some disappear, others appear.

There is a clear imbalance in the labor market: there are not enough people with IT skills. Not enough for everyone, not just for the IT business. The need of companies for IT specialists is growing rapidly: only from 2016 to 2018, the share of relevant ads on HeadHunter increased by 5.5%.

Nevertheless, it is possible to note the positive trends as related to training in the field of digital technologies, that have occurred in recent years (Table 2).

Table 2 Training in the field of digital technologies and the production of related products and services [1]

| Key enlarged groups of professions and specialties | Training programs for skilled workers, office workers | | Training programs for mid-level specialists | |
|--|---|------------------------------------|--|--------------------------------|
| | Number of students at the beginning of 2018/2019 | Turnout of skilled workers in 2018 | Number of students at the beginning of 2018/2019 | Turnout of specialists in 2018 |
| 1 | 2 | 3 | 4 | 5 |
| Informatics and computer engineering | 18.4 | 6.8 | 169.5 | 29.5 |
| Information Safety | | | 12.7 | 1.7 |
| Electronics, radio engineering and communication systems | 5.8 | 1.7 | 35.3 | 6.8 |
| Machine industry | 4.1 | 1.4 | 20.0 | 3.9 |
| Management in technical systems | | | 15.7 | 2.9 |
| Screen arts | | | 2.1 | 0.4 |

But demand outruns supply. According to analysts of ACITB, in order to meet the market demand for IT personnel, it is necessary to increase the enrollment and graduation of students of the relevant specialties at least 2.5 times. This is echoed by the goals of national projects: by 2024, universities should offer the market 120 thousand graduates in the IT field, and the share of the population with digital skills should reach 40%. [2] Moreover, the country has a fairly high level of readiness for digital transformations (Fig. 7).

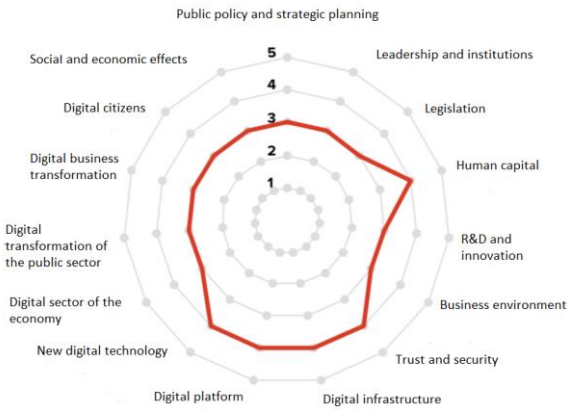


Figure 7 Results of assessing Russia's readiness for the digital economy [6]

Thus, the results of the readiness analysis of Russia define it as a country, that is moving to a digital economy by creating a solid platform for the digital leap. Basing on its historical strengths: human capital, scientific evidences and strong leadership, the country has invested in digital infrastructure, strategic planning and regulation, and this is already paying off.

It is necessary to implement the developed strategies and direct efforts to accelerate the pace of transformation of the private and public sectors; raise public awareness about the use of digital technologies, strengthen the interaction of the scientific and educational community with the private and public sectors; as well as create a business environment, favourable to the innovations, the development of R&D and entrepreneurship - all the main elements of the culture of the digital economy, which are now lacking in Russia.

2. DISCUSSION OF THE RESULTS

Despite the positive achieved results, presented in the previous section of the work, the development of the digital economy in Russia is associated with a number of problems. Consider the main ones.

The first problem, and the most acute one, is associated with a possible increase in the number of unemployed, due to the dying-away of traditional types of activity and the emergence of demand for specialists in new professions and new competencies. Not everyone will be able to retrain or improve their qualifications. A rise in

unemployment levels can lead to a differentiation in the population's income and an increase in the poverty level.

The second problem can be identified as follows: with the wealth of application developments in the domestic market, our support for science and research is "is poor". So the "Digital Economy" national program does not set tasks for the development of studies for the IT sector. Everything, that is said about science and education, concerns only the issues of personnel training and increasing the IT literacy of citizens. This is not stimulation of science at all. As a result, we have few patents on the Internet of Things, blockchain, quantum technologies, automation in production, business, services. The state understands the urgency of the problem: for example, it intends to invest 44 billion rubles in the development of the quantum in order to eliminate the lag behind the USA, the EU and China. Given, that the costs of study and development in Russia are not lower, than the world average, in terms of efficiency they are three times lagging behind the world average. [7]

In addition, there are regulatory problems. There are many initiatives, they look good on paper, but in fact they have multidirectional goals. For example, in order to implement a "smart" and accessible urban environment, citizens are offered convenient digital services - public transport schedules in Telegram bots. At the same time, regulators recognize Telegram out of law and are trying to block it.

A more specific example: the register of domestic software requires the software of Russian developers to support Russian databases and operating systems. There is almost no Russian system software, the Linux, for instance, is not widespread both in the country and abroad. And this despite the fact, that now the software, as a rule, is geared to international Windows and iOS. It follows, that vendors are encouraged to develop software, that is in demand not only in the local market, but in individual segments of the local market.

The next problem, that can be identified, is the problem with protecting information from misrepresentation. The creation of new channels for the transmission of information, as well as the use of digital means of processing data arrays can lead to the emergence of the possibility of misinformation, accidental or intentional. Intentional misrepresentation of information can be characterized by a situation of manipulation of mass consciousness. To overcome this problem, it is necessary to constantly monitor the data, check the relevance of storing, updating or ignoring data.

A particular problem is the safety of data, that comes from external sources. Data is considered safe and reliable, if it has been verified by three independent sources. The analysis, carried out in the previous section of the work, showed, that the cybersecurity rating of Russia has decreased its value over the past year, which increases the urgency of the problem under consideration.

The development of the digital economy (the accessability of data and the speed of it processing) leads to a sense of endless possibilities in developing and making the best decisions. Moreover, the illusion is created, that decisions, made in real time, can be free from errors. There are even

statements, that economic science, sociology and some other sciences are no longer needed, since the technology of decision-making is light years away from. But the models and analytical platforms themselves may not reflect the real changes, taking place in the economy, and there will always be a problem of improving not only the analytical apparatus, new methods of preparation, folding and aggregation of data, but also the conceptual construct and assessment of the tightness of connections between system parameters. As the system itself is changing rapidly, the question of whether the past really determines the future and to what extent are we able to determine it is raised with a vengeance.

Since the methods of working with information and decision-making technologies for most users will be

identical or similar, the question arises about the possibility and even inevitability of the "crowd effect", or, in other words, panic, caused by a sudden change in the situation on the markets, especially financial ones.

An analysis of the problems of the digital economy also showed, that the implementation of the digital economy in all areas of social and economic activity can destroy the national sovereignty of the country. Experts associate this fact with the development of most technologies, based on foreign digital platforms.

Summarizing the analysis of the development of the digital economy and the identified problems of such development, we present a SWOT analysis (Table 3).

Table 3 Matrix of SWOT analysis of the development of the digital economy in Russia

| | Strengths (S) | Weaknesses (W) |
|---|---|--|
| 1 | 2 | 3 |
| | 1) The growth of e-commerce. The digital economy allows economic transactions to be carried out through networking and ICT. 2) Development of an electronic payment system, which saves time for both business entities and the population, when performing economic transactions. Also, the electronic payment system allows to reduce the volume of the "shadow" economy, making payments transparent and controlled. This, in turn, helps to reduce the level of corruption in the country. 3) Development of e-management. Faster, safer and more efficient alternative to traditional management 4) Development of "Electronic government" systems. Transformation into electronic form and publication on the portal 112 of the services, provided by regional executive authorities, is provided. Now the portal has 839 federal, 266 regional and 2,200 typed municipal services. 5) Creation of new job sites. The digital economy has great potential for expanding employment opportunities in new markets as well as in some existing fields of activity in the government. | 1) The contribution of the digital sector, the core of the digital economy, to the Russian economy is significantly inferior to developed countries. Its value in Russia is 3% of GDP, while in most developed countries it is 6-7% of GDP on average. 2) Low-level employment and a small number of enterprises in the information and communication technology (ICT) sector per 1,000 people are a serious constraint of the development of the Russian digital sector. 3) High costs for the implementation and support of "e-government", "online voting" and other forms of ICT. 4) There is too much state presence in the digital sector of Russia. The state acts as one of the drivers of growth of the digital sector, but at the same time creates limitations for its development 5) "Electronic poverty" of the population. |
| Opportunities (O) | SO-strategy | WO-strategy |
| 1) Industrial companies are the foundation of the Russian economy. Advance investments in "Industry 4.0" technologies will allow them to take the lead in this still undeveloped direction 2) The state will be able to involve the population in the digital economy by providing citizens with an accessible ICT infrastructure, developing digital literacy of the population, and further digitalizing state and municipal services 3) Penetration of digital technologies into key aspects of Russian life and integration | 1) Budget savings due to the increasing transition of state authorities to the digital direction. 2) Increased confidence in government bodies due to the presence of feedback when implementing networking through ICT. 3) Improving the efficiency of public administration. 4) The growth of democratization of society. | |

Continuation of table 3

| Threats (T) | ST-strategy | WT-strategy |
|--|-------------|---|
| 1) Growth in the number of unemployed, due to the dying-away of traditional types of activities and the emergence of demand for specialists in new professions and new competencies. 2) Threat to cybersecurity. 3) The threat of a reduction in budget funding for program measures within the framework of the programs: "Digital Economy" and "Information Society" | | 1) Increasing the share of the digital sector in Russia's GDP through the development of digital platforms and the expansion of e-commerce. 2) A gradual decline in the state share in the digital sector due to an increase in the share of small and medium-sized businesses, involved in the digitalization process. 3) Maintaining the volume of funding for digitalization programs at the planned level by monitoring the efficiency of the implementation of relevant programs |

3. CONCLUSION

In conclusion, it should be mentioned, that the implementation of digital technologies in the economic and social sphere is inevitable. This is a progressive and very important part of modern life, which will bring a lot of changes to the existing society. The advantages of its implementation include: a change in the state management

REFERENCES

- [1] G. I. Abdrakhmanova, K. O. Vishnevsky, L. M. Gokhberg et al., Digital economy: 2020: a short statistical collection, Nat. issled. University "Higher School of Economics" - M.: NRU HSE, 2020, 112 p.
- [2] Passport of the national program "Digital Economy of the Russian Federation" (approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects on December 24, 2018, No. 16). <https://base.garant.ru/72190282/>
- [3] Internal costs for the development of the digital economy. <https://issek.hse.ru/news/281236984.html>
- [4] Yu.V. Khokhlov, Assessment of the level of development of the digital economy in Russia. <https://www.econ.msu.ru/sys/raw.php?o=46780&p=attachment>
- [5] T.V. Ershova, Yu.V. Khokhlov, S.B. Shaposhnik, How to assess the readiness of the country for the digital economy: "Digital economy country assessment" tool, IX Intern. scientific-practical conf. "Modern economy: concepts and models of innovative development", pp. 11-25, 2018.
- [6] N.G. Malyshkin, E.A. Halimon, Analysis of the level of development of the digital economy in Russia, University Bulletin, 8 (2018) 79-86.
- [7] Report on the development of the digital economy in Russia. <http://documents.worldbank.org/curated/en/848071539115489168/pdf/Competing-in-the-Digital-Age-Policy-Implications-for-the-Russian-Federation-Russia-Digital-Economy-Report.pdf>
- [8] M. Zemlyanikina, Russia and Digitalization Trends, Journal "Boss", 2019.
- [9] A.A. Borisova, I.M. Kalyakina, N.Y. Bondarenko, Development of methods of the solution of management problems in social and economic systems, Int. Business Management, 8 (6) (2014) 348-352.
- [10] N.Yu. Bondarenko, I.M. Kalyakina, Especially the planing of investicii at the meso-level: the indicative approach, Science and Society, 1 (2) (2017) 65-72.
- [11] A. Kozhukhova, L. Tolmacheva, I. Dmitrieva, I. Kalyakina, The dependence of the performance of the process of finishing vibration processing on the shape of the abrasive tool, XIII Int. Scientific and Practical Conference State and Prospects for the Development of Agribusiness - INTERAGROMASH, 2020.
- [12] O.N. Sakharova, I.A. Dmitrieva, I. M. Kalyakina, Digital Technologies in Management of Logistic Systems on the Transport Service Market WoS, Advances in Economics, Business and Management Research, vol. 138, 2nd Int. Scientific and Practical Conf. MTDE 2020, pp. 650-655, 2020.