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**Global Challenges and Prospects of the Modern Economic
Development**

**TRENDS IN INNOVATIVE DIGITAL ECONOMY
DEVELOPMENT DURING THE PANDEMIC**

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Abstract

The article substantiates the relevance of the formation of new trends in the development of innovative digital economy in Russia, which should contribute to the achievement of optimal growth indicators for individual sectors of the economy and become triggers for the development of the entire economic system. In the context of the growing economic crisis caused by the mass closure of enterprises, falling consumer and investment demand and rising unemployment, the development of directions for resetting development strategies in the field of innovation and the introduction of digital technologies, as well as state support measures aimed at stimulating both the entire economy and individual groups of its economic entities, plays a crucial role. When planning further government assistance measures, priority should be given to industries focused on meeting the needs of the population that have changed during the pandemic and increasing support in the sector of small businesses and start-ups that are experiencing difficulties in obtaining financial assistance. The analysis of target indicators of innovative development and digital transformation is carried out, the key positive and negative aspects are highlighted. Groups of measures are proposed for enterprises from the most affected industries, as well as the system-forming sector of the economy. The study made it possible to analyze the degree of impact of the pandemic on business innovation and determine the directions for further resetting the strategies of innovative development and digital transformation of the Russian economy.

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1. Introduction

In the context of the COVID-19 pandemic, the relevance of the scientific problem is due to the challenge to reset all sectors of the economy of each country as a whole and the requirement to develop new scenarios for the development of an innovative digital economy, taking into account structural changes. To a greater extent, medium and small businesses pass the test of survival, since the mechanisms for supporting large companies were worked out back in the crisis of 2008-2009, and no universal tools have been developed for small and medium-sized businesses. Also during the epidemic, employers were forced to organize employees' work remotely, which accelerated the transition of organizational interaction to digital technologies to support real-time production processes, which corresponds to the transition to Industry 4.0 in social terms (Gokhberg, 2019).

As a result, the current situation requires new effective management decisions based on a comprehensive analysis in a short time, optimization of production resources and rapid implementation of technological initiatives to support innovative processes in the economy, as well as reduce risks for businesses, enterprises and organizations in the short and long term with the participation of the state, which should develop synchronously with the changing economy and society (Hanna, 2018).

2. Problem Statement

The Covid-19 pandemic and its impact on the economy was only revealed in 2020, but there are already a sufficient number of publications on this topic devoted to various aspects of the impact of the pandemic on the organizational development and efficiency of companies. Thus, some authors consider the peculiarities of the impact of the pandemic on the structure of the labor market (Bondarenko, 2020), others analyze various sources of financing and transformation of budget programs for the implementation of National projects in the context of a pandemic and point to the leading role of the digital economy in the context of pandemics (Leschinskaya & Makarov, 2020; Pechatkin, 2020).

The introduced emergency regulations have a serious deterrent effect on innovation processes in the global community. For Russian companies, it is a triple blow due to previously imposed sanctions, falling world prices for most commodities and food commodities against the background of reduced demand and supply disruptions due to the coronavirus pandemic. According to the World Bank, the world economy expects a recession and a contraction to 5.2% (World Bank Group, 2020). In the Russian federation, the list of industries affected by the pandemic was expanded in October 2020. But at the same time, the pandemic has sparked increased interest in technologies that are part of a new type of infrastructure. There are authors who point out that the pandemic has become a powerful trigger for innovation, since it is the introduction of innovations that becomes the key to the survival and competitiveness of business (Vedyakhin, 2020).

3. Research Questions

The hypothesis of this study is that the impact of the pandemic should give an impetus to the development of an innovative digital economy in its main components-fifth-generation communication networks and data centers (Al-Khoury, 2014; Mullins, 2005), as well as a reset of development directions. Then the task of determining the target indicators of innovative and digital development and the conditions

that contribute to the formation of new trends comes to the fore. This study is aimed at developing a methodological approach to assessing the achieved level of innovation economy and digitalization of most industries, and therefore it is necessary to systematize the main target indicators for their comparison and development of new directions and guidelines in the current conditions.

As for the overall environment for the development of innovative entrepreneurship in Russia, it should be noted that in recent years it has significantly improved:

- new development institutions have emerged, which together provide support at all levels of technology readiness—from basic research to the launch of production facilities;
- clusters, technology parks and business incubators have appeared.

A large set of measures to accelerate technological development and fairly large funds are provided for in the national projects "Digital economy", "Increasing labor productivity and supporting employment", "Science", "Culture" and a number of sectoral state programs. For example, the total amount of funding for the "Science" project in the period 2019-2024 is 636 billion rubles, according to the results of its implementation, more than 250 large companies will be involved in the creation of technologies with the participation of organizations participating in scientific and educational centers and centers of competence of the national technology initiative, 1.5 thousand patent applications are planned. All this allows us to expect that more than 50% of innovative companies will be active by 2024 (National program "Digital economy of the Russian Federation", 2019).

Since the COVID-19 pandemic has seen a sharp increase in demand for telemedicine services, online education, and remote work technologies, it has become necessary to form and develop new infrastructure. The concept of "new infrastructure" includes a fairly wide range of areas and applied technologies that were not previously used and were isolated. Now, an additional layer is being added to the traditional infrastructure — information and communication, which provides support for the digital economy. Currently, the new infrastructure most often includes 5G communication networks, actively implemented in many countries, but not yet available in Russia, artificial intelligence technologies, big data and cloud computing. All organizations should be involved in the digital information environment to operate on network principles in the coordination of markets and society (Kannan & Li., 2017). The COVID-19 pandemic will slow down some areas of innovation, but at the same time it is likely to cause a surge in new inventions. The key issue is how the economic impact of the COVID-19 crisis will affect start-up companies, as well as venture capital funds and other traditional sources of innovation funding. Many governments are taking emergency relief measures to mitigate the consequences of quarantine and counter the impending recession.

4. Purpose of the Study

The purpose of this article is to identify and group the main target indicators of the development of innovative digital economy for the development of areas of correlation of programs and subprograms of economic development. Identify indicators that can be attributed to the triggers of innovative growth of the economy. Make a comparison with planned and achieved development indicators. Consider the opportunities for the growth of the digital innovation economy in the context of the pandemic and the transition to digital design and modeling of medium and small businesses. Substantiate the need for a digital

twin in different companies to increase labor productivity, competitiveness and obtain a real economic effect. In this sense, further standardization and the establishment of uniform methodologies and requirements for each industry is extremely important. In the final section, suggest conclusions and discussions for future research.

5. Research Methods

This goal of the study was implemented by conducting an empirical study on monitoring the implementation of innovations and digital technologies and analyzing possible development trajectories in the context of a pandemic. The methodological basis of the study was the modern scientific works of Russian and foreign scientists in the field of digital economy and innovative development. Based on the results of various applied studies on the formation of digitalization of all industries of the economy, methodological provisions of different countries of the world on the development of digital technologies are applied. The main methods used are the synthesis of information, collation of data analysis of different kinds of sources, and analytical materials. The study used a systematic approach that allows us to consider economic development as a system of interrelated phenomena and processes. Methods of theoretical research (abstraction, idealization, induction and deduction) were used to reveal the problem area of research. To describe the main structural incentives for the development of the digital innovation economy, the method of intuitive modeling was used.

6. Findings

This article partly continues the research of Belanova et al. (2020), taking into account the global challenges of innovation development and the digital economy. In the Global Innovation Ranking, Russia ranked 46th out of 129 in 2019 (WIPO, 2020). One of the main tasks of this process is the transition to a digital industry, which is based on digital design and modeling. At present, technological leadership does not just mean economic well-being; it guarantees the very possibility of developing a country and preserving its sovereignty. Information and digital technologies make it possible to rebuild our present, adapt to completely new communications, form new competencies and prepare for the successful implementation of the potential of employees in the conditions of digitalization of the economy. In accordance with our ideas about the structure of the innovative digital economy, we can identify priority areas for transformation:

- retraining of personnel;
- digital transformation technologies;
- development of the information society;
- labor functions (Professional standard);
- introduction of digital technologies.

No less important than creating an infrastructure to enable the use of online services is the development of digital skills of citizens. An empirical analysis of the dynamics of the development of the innovation and digital economy can be carried out according to different target indicators (Table 1).

Table 1. Target indicators of innovative and digital development

Forecast indicators	Current indicators	Program indicators	State regulation indicators
access to information	R&D expenditures, as a percentage of GDP, Average annual GDP growth rate	scientific works; inventions	formation of human capital
demand for utility models; prototypes; industrial designs	articles in scientific and technical journals	selected achievements; topologies of integrated microcircuits	creation and support of high-tech industries
creation of technologies and tools, know-how; trademarks	export of high-tech goods;	information models of business processes; e-campus model; IT service	e-government;
production of innovative products	employed in R&D; patent applications; trademark applications; finished innovative products	creation of technology transfer centers; training of personnel	increasing the share of knowledge-intensive products in GDP; increasing the volume of innovative products
the achievement of "digital maturity»	the mass proportion of socially important services that are available in electronic form; percentage of households with broadband Internet access	expanding opportunities in the field of information technology	greater investment in the domestic decisions in the field of information technology

Source: authors.

The level of innovation activity of organizations in the Russian Federation for all types of economic activity in recent years has decreased from 14.6% in 2017 to 9.1% in 2019 (Federal State Statistics Service, 2020). It should be noted that the peculiarity of the Russian Federation is the fact that public spending on innovation is significantly higher than that of private business, and in the most technologically advanced countries — on the contrary. Government spendings on R&D towards GDP (1%) in Russia is even higher than in Japan, Canada and Switzerland. But in general, investments in research and developments are lower, because there private business invests in innovation three times more than the state - about 3% of GDP, and in Russia - only 0.3% of GDP. Let's compare the target value of innovation and digital development with the current value of each indicator (Table 2).

Table 2. Some target indicators of innovative and digital development programs in comparison with the current value in the Russian Federation

№	Target indicator	The target value	The current value (2019) (Federal State Statistics Service)
1	R&D expenditures, as a percentage to GDP	3	1

2	share of Russian publications researchers in the total number of publications in world scientific journals, %	3	2.67
3	share of exports of high-tech goods in the total world volume of exports of high-tech goods, %	2	0.25
4	the number of domestic patent applications on inventions filed in Russia, per 10 thousand people.	20	1.59
5	the share of industrial enterprises engaged in technological innovations in the total number of industrial production enterprises, %	40	9.1
6	the mass proportion of socially important services that are available in electronic form, %	95	-
7	percentage of households with broadband Internet access, %	85	75

Source: authors.

In the Russian Federation, the industrial production index (IPI) in the 3rd quarter of 2020 amounted to 95.5% compared to the 3rd quarter of last year, for mining enterprises — 88.7%. Production volumes decreased in almost all significant sectors of the economy: the output of petroleum products decreased by 39.4%, motor transport — by 20.4%, metallurgy products - by 2.2% (Federal State Statistics Service, 2020).

Among the key sectors of the economy, the pandemic did not affect only the chemical industry, manufacturers of machinery and equipment, rubber and plastic products, electrical equipment, wood and paper. Enterprises of the non-petrochemical industry managed to maintain stable performance in the "coronacrisis economy". For example, in the production of products to combat the pandemic, raw materials for protective glasses, masks, gloves and suits for doctors, as well as medical products and equipment, antiseptics and medicines were in demand. The pandemic helped a number of enterprises to repurpose them: factories began to produce air sanitizers, decontaminators and other products to combat the virus. As a result, the volume of production of medical equipment increased and the index of production of medicines and medical products increased.

Thus, it should be noted that the opportunities for innovative growth and digitalization are rather sectoral and are associated with two groups of incentives — structural (socio-economic changes, state policy) and conjunctural (financial condition of the industry, its growth, availability of financial resources) (Table 3).

Table 3. Key structural incentives for innovative growth and digitalization by sectors

Incentives	2017-2018	2019-2020	2021-2024
The growth of the domestic market	-	Healthcare, education, insurance, IT, industry	
The growth of the export market	Gas production and transportation, chemicals, transport infrastructure		
Import substitution	Agriculture, food industry, household chemicals, tourism	Light industry, electrotechnology and electronics, building materials, pharmaceuticals	
Support for the state of fixed assets	Infrastructure (electricity, heat, roads), services (repairs and maintenance)		

Source: authors.

It is the level of internet penetration and the full range of modern industry achievements 4.0 (big data processing technologies, the internet of things, virtual and augmented reality, 3D printing, blockchain, autonomous robots) that contribute to digital transformation and influence changes in various sectors of the economy (the structure of demand for personnel and employment, e-commerce, public and municipal services) (Strang & Sun, 2017).

The use of a digital twin allows to significantly expand the capabilities of cloud-based analytical services used in the concept of the industrial internet of things of the fourth industrial revolution. The main resource of the digital twin is information, and in production it is real assets. It follows that the main function of digital transformation is to improve production processes. Using digital twins, companies can create copies of their smart businesses in a digital environment, identify vulnerabilities (in components, systems, processes, and other assets), test potential solutions, model the results of interactions between components, and predict stochastic changes that may occur during operations. Such simulation saves the organization the time, resources, and money needed to test working hypotheses in practice. But it should be noted that the question of using digital twins can only be raised if their implementation will reduce production costs. For small and medium-sized enterprises, this process still brings high costs.

7. Conclusion

Thus, the study made it possible to analyze the degree of impact of the pandemic on business innovation and determine the directions for further reset of development strategies. At the present stage, two directions of economic transformation are most relevant, ensuring its transition to a new economic paradigm:

- technical and economic re-equipment of enterprises' activities aimed at using digital technologies;
- personnel policy related to investment in human capital and reproduction of social relations that ensure the development of human capital and the susceptibility of the economic system to innovations.

To implement these directions, a fairly wide range of measures should be taken, which can be taken both at the level of a separate sector of the economy, and individually by entrepreneurs:

- modeling cash flows taking into account debt levels and important transactions to create pragmatic innovation financing plans based on emergency triggers;
- forecasting of global wave effects in production and sales for planning development scenarios based on the strategies of the "digital twin", which will allow to most effectively determine the necessary resources for the implementation of the project; at the early stages to form risks and problems that may arise and formulate ways to solve them, if necessary;
- build crisis response teams to facilitate an open and consistent flow of accurate information between key stakeholders to support trust in business innovation processes;
- development by the state of additional tax benefits up to the suspension of tax payments and regulation of financial support of innovative projects;
- digitalization of innovation processes based on a digital twin strategy to reduce costs and increase the attractiveness of customer loyalty programs to stabilize demand (for example, priority segments).

The main supporting tool should be state financial assistance not according to OKVED (Russian Classification of Economic Activities), but according to the results of reporting business revenue, which will allow large enterprises, medium and small businesses to choose directions for further reloading innovations taking into account global challenges.

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