

ICEST 2021

II International Conference on Economic and Social Trends for Sustainability of Modern Society

**DIGITALIZATION OF THE ECONOMIC SYSTEM AS AN
INNOVATIVE DIRECTION OF CRISIS MANAGEMENT**

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Abstract

There is now a rapid development of a new digital technological revolution, involving changes in all socio-economic institutions, and sometimes even the formation of new ones. The technological changes underway bring certain challenges to economic science, when the previous theoretical concepts formed in the pre-digital era cease to work. Today these challenges have been formed for management as a direction of economic science, including crisis management. Practice shows the need to create a new anti-crisis toolkit since the existing one doesn't ensure the survival of companies in modern conditions and crisis phenomena in the economy persist. The work examines the evaluation methodology for assessing the impact of digitalization on the anti-crisis management of a company. The article contains conceptual provisions that uncover a digital economy strategy focused on the growth of modern innovative entrepreneurship, linking all areas of business development. Developing mechanism for implementation of the digital economy as a priority for the development of modern innovative entrepreneurship creates a new basis for solving practical problems, offering and stimulating active participation in the formation of prestige domestic business and the state.

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Keywords: Digital economy, innovation, crisis management



1. Introduction

Innovation is the result of activities aimed at improving products, services, production and other processes in order to meet the growing needs of the market. Modern manufacturing and its technological and economic aspects require constant modernization and improvement including the introduction of innovative technologies.

Innovation stimulates the work of organizations, allowing people to overcome critical moments and improve the quality of work and the resulting final product. The tasks of innovation are set individually, depending on the goals and capabilities of the enterprise for each organization. Obtaining the necessary resources affects the width of the range of goals to be achieved and their sequence.

In general innovation represents an introduced improvement that encourages an increase in the quality of work, service or goods. The main features of innovation include:

- Practicability.
- Adequacy to the needs of acquirers.
- Estimated income.

Four main functions are distinguished:

- Reorganizing: application of theoretical knowledge to obtain a product which is useful for society.
- Motivating: activates the growth of public profits at the expense of potential benefits for participants.
- Renewing: new ideas affect the growth of the country's economic performance, percentage shares of GDP.
- Social: improving people's lives, improving comfort and quality of life; improved environmental performance (Digital Economy of the Russian Federation, 2017).

The performance of these functions is impossible without the presence of two parties to the process: subjects and objects of innovation.

The subjects of innovation are:

- Physical persons or legal entities carrying out entrepreneurial activities in this direction.
- Government agencies responsible for monitoring such activities.
- Participants in the innovation process involved in the creation and implementation of innovations.
- Advocates of interests of subjects creating new ideas.

The objectives of innovation include:

- Increasing the sphere of influence in the consumer market.

- Improving competitiveness parameters.
- Improve your organization's internal workflow.
- Improvement of environmental safety indicators of production and marketing processes.

Innovation helps accelerate digital transformation, both within companies and organizations and at the country level. Russia's main points of growth can be found in traditional sectors of the economy which could rely on using of advanced information technologies.

Today mankind is developing rapidly, including technology and information inventions. The complications of the social system, the basis of which is modern digital technologies, highlights the issue of the formation of the digital economy. The ideas of the digital economy appeared at the end of the twentieth century, when the global web began to step into all spheres of our lives. The digital economy refers to an economy based on digital computer technologies, although many perceive the digital economy in a simplified way, as doing business through the Internet. The digital economy is also called the Internet economy, the new economy or the Web economy. The digital economy is increasingly overlapping with the traditional one (Digital Economy of the Russian Federation, 2017).

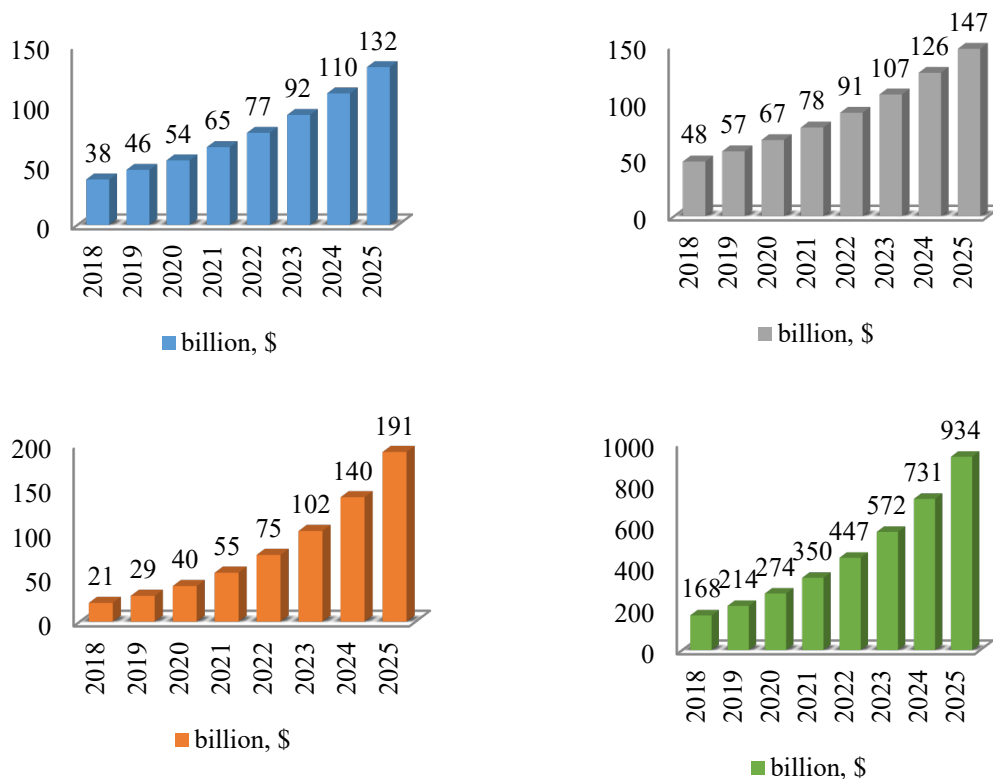
The official Russian definition of the digital economy can be found in the Decree of the President of the Russian Federation of 09.05.2017 No. 203 "On the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030": "the digital economy is an economic activity in which the key factor of production is digital data, the processing of large volumes and the use of the results of analysis of which, in comparison with traditional forms of business, can significantly increase the efficiency of various types of production, technologies, equipment, storage, sale, delivery of goods and services."

The main components of the digital economy include:

1. Blockchain technology. Blockchain technology is a form of distributed computing technology that allows several parties to participate in secure, trusted transactions without any intermediaries. The areas of application of the blockchain include not only cryptocurrencies, but also digital identification, property rights and the provision of targeted assistance.
2. Internet of Things. The Internet of Things (IoT) refers to a growing array of devices connected to the Internet, such as sensors, counters, radio frequency identification (RFID) chips, as well as any gadgets that are built into various household items, which allows them to send and receive various types of data from and to the Internet.
3. 3D printing. Three-dimensional (3D) printing, also known as additive production, can potentially disrupt production processes by transforming international trade from merchandise trade to model trade for later on-site printing.
4. Cloud computing. Cloud computing is not possible without high Internet connection speeds. They significantly reduced the delay time between users and remote data centers, which, in particular, allowed the use of services such as Office365 and the cloud from mail.ru. The cost of storing a unit of information through the development of cloud computing and storage has fallen many times.

5. 5G mobile broadband communication. Fifth-generation wireless technology (5G) is expected to be a critical link for IoT because of its greater ability to handle huge amounts of data. 5G networks can handle about 1000 times more data than modern 4G systems.
6. Virtual and augmented reality. Augmented reality is a perceived mixed reality created using a computer using "augmented" elements of perceived reality when real objects are mounted in the perception field.
7. Automation and robotics. Automation and robotics technologies are increasingly used in manufacturing, which will have a significant impact on employment, which in turn is a problem for civilization.
8. Telemedicine. Telemedicine is the provision of health services when distance is a critical factor, by health workers using information and communication technologies to share the necessary information for the diagnosis, treatment and prevention of diseases and injuries, conducting research and assessments, as well as for continuing education of health workers in order to improve public health and develop local communities.
9. Artificial intelligence and data analysis. The development of artificial intelligence, including machine learning, is possible due to the large amounts of digital data that can be analyzed, which in turn allows people to generate new ideas and predict the behavior of various objects using machine algorithms (Nosova et al., 2017).

According to the Figure 1, the dynamics of change in the global digital marketplace show scientists, practitioners, leaders and citizens the need to think more deeply about society with technology in order to understand how our collective actions (or inaction) determine the future.



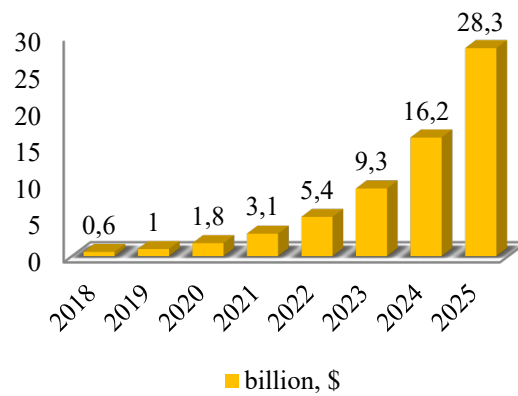


Figure 1. Forecast of the global digital technology market (billion dollars)

If the necessary investments are accomplished, digitalization will be a key factor in economic growth (Figure 2) (Dranev et al., 2018). By 2030, GDP growth will be more than half connected with digitalization and is ensured not only by the development of the information industry, but also as a result of increasing the efficiency and competitiveness of other sectors of the economy. So, in general, for the period from 2017 to 2030, the contribution of the information industry to GDP growth will be almost 4%, and digitalization of sectors of the economy - about 30%.

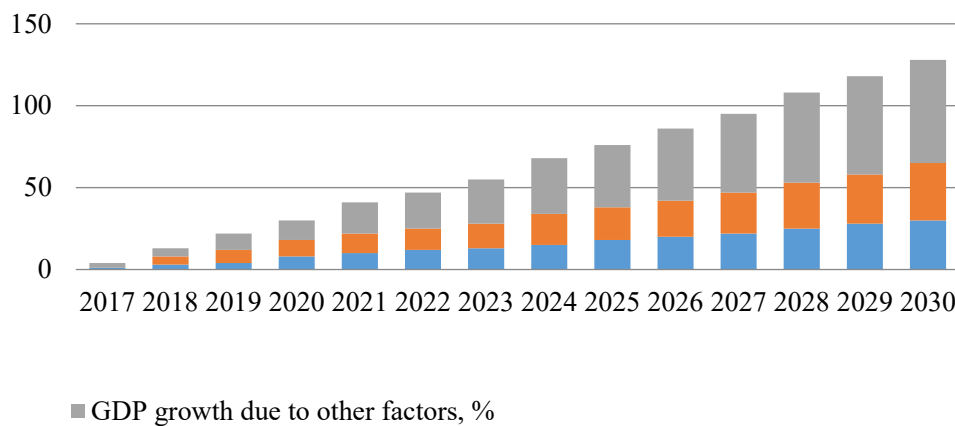


Figure 2. Contribution of digitalization to economic growth (cumulative total from 2017 to 2030, %)

2. Problem Statement

At the beginning of the development of the digital economy, when its volume was small, and its impact on the economy was almost invisible, only few suspected that in two decades the digital economy would require new laws, new tax rules, and new communication procedures in society.

The digital economy makes it necessary to rewrite international laws, international trade laws, customs and other laws.

Ordinary consumers in the digital economy are forced to completely change life in order to fit into the new economic landscape.

The digital economy is based on the production sector of digital goods and the provision of services related to digital technologies. There is considerable potential for the use of modern digital technologies in enterprises. It is also worth considering that digital technologies have significant potential to accelerate innovative processes, therefore, investment indicators in the development of the digital potential of an individual enterprise are an important factor in its competitiveness at the current stage. Completely new business models are emerging, network structures based on collective production and consumption methods transform market relations and require the development of new management solutions. The subsequent development of digital technologies is important for the whole economy. The development of digital technologies in the public sector of the economy is crucial. Digital government and innovative technologies can ensure the effective participation of public administration in shaping sustainable development. Digital government will allow public authorities to provide better and more timely services and be more open to the public (Kochetkov, 2019; Meshkova & Moiseichev, 2016).

The main advantage created by the digital economy for the buyer is to eliminate intermediaries in transactions.

Other advantages of the digital economy include:

- Productivity growth.
- Increasing the competitiveness of organizations and access to closed markets.
- Reduction of production expenses.
- Reduction of unemployment.
- Overcoming the threshold of poverty and social inequality.

The development of the digital economy provides the opportunity for communication, the exchange of ideas and experience. Digital technologies can also play a key role in training employees, sharing skills and knowledge, and implementing innovative ideas in all areas of the economy.

One of the directions of state policy is the myth of the industrialization of economic processes or the development of digital economy as the driving force of general economic processes that stimulate innovation.

The digitalization of the Russian economy is relevant not only from a the logical point of view, but also from a practical point of view, as it takes into account the main role of innovation in the development of digital technologies on the way to the development and adoption of new strategies for the competitiveness of the country.

3. Research Questions

In course of the study the following questions were raised:

- How the digital economy is effective as a tool for integrating innovative solutions into the organization?

- How to improve the management of the economic entity in a situation of crisis and economic disasters?
- What methodology of the digital economy should be applied to the anti-crisis management of the organization?

4. Purpose of the Study

The purpose of the study is to explain that the digital economy has an impact on the anti-crisis management of the organization with a certain methodology.

5. Research Methods

5.1. The formation of digital economy

The formation of the digital economy is explained by some scientists as a result of the electronic information revolution or the neuro-network technological revolution. The emergence of technological innovations in the production industry is highlighted as a presupposition. In the field of communications and telecommunications, there is a digital transformation that allows you to reduce loads, increase the throughput of data, automate processes and solve information security issues by:

1. Conducting productive research in the field of information technology.
2. Introduction of domestic developments in the field of electronic economy and increasing the competitiveness of Russian in information technologies.
3. Independence of domestic industry from foreign technologies due to introduction of own developments in production of products.
4. Creating favourable conditions for the entrepreneur to conduct business in the Russian Federation to increase the level of competitiveness of companies.
5. Production of technological products for domestic and global markets.
6. Increase the level of scientific and technical potential of information safety.
7. Carrying out research in order to create promising technologies.

The progressive introduction of all kinds of digital technologies will help reduce Russia's innovative lag from leading countries and increase prospects for economic growth.

It is planned to create mobile communication systems that will be integrated with smart city, smart home, GPS, COMPASS, Galileo, GLONASS and satellite communication systems (Kochetkov, 2019).

In general, the analysis of trends in the development of digitalization revealed significant intersections with the topic of anti-crisis management. This made it possible to confirm the hypothesis that digitalization becomes an integral part of the sustainable and anti-crisis development of enterprises. In particular, the following may be noted:

- Digitalization invades into all spheres of socio-economic life, transforming the processes of interaction between subjects: the state and society, the state and business, society and business.

- Advanced technologies make significant adjustments to the company's business processes, to value creation processes at all stages and become a competitive advantage. This explains the existence of a measure of innovation costs in many sustainable development assessment methodologies.
- All developed governments try to use digital technologies as a tool to achieve sustainable development goals by investing in improved access to communications, digital skills and public services.
- The priority direction for the development of digitalization at present is cybersecurity, personal data protection and crisis management, which, on the one hand, is strategically important for the government as a barrier to cybercrime, and on the other hand, it is a necessary condition for the development of digitalization in other areas. Therefore, the availability of a cybersecurity system and data protection are part of sustainable development indices and characterize the quality of anti-crisis management of the company.

5.2. Methodology for assessing the impact of digitalization on the anti-crisis management of a company

At this stage of the study, a methodology was developed to assess the impact of digitalization on the company's anti-crisis management. In the process of developing the methodology, a tool was used to draw analogies with existing approaches to assessing sustainable development and digitalization.

1 stage. Develop a set of indicators to assess the impact of digitalization on sustainable development. At this stage, a set of indicators is being formed that will be used to assess the impact of digitalization on sustainable development.

The set of indicators proposed in this study reflects the digitalization processes that influence the company's progress in sustainable development and crisis management. The indicators are divided into several groups and supplemented with weight coefficients. The selection of indicators is based on indicators used in the international indices of the OECD, the EU, the World Bank, as well as those included in the National Program "Digital Economy of the Russian Federation" and used by the HSE to assess the development of the digital economy of Russia and organizations of the business sector (Kozyrev, 2017). The development of a set of indicators was based on the principle of completeness and sufficiency of statistics so that the evaluation process was not labor-intensive, but it was possible to display the real situation for each group of indicators. This approach is characteristic of international DAI and I-DESI indices, which, despite the availability of diverse information, contain a simple, balanced and transparent set of indicators (Khalin & Chernova, 2018; Kozyrev, 2017). The grouping of indicators on aspects of sustainable development is carried out on the basis of the hypothesis that digitalization has an impact on the sustainable development of the company, as it contributes to the transformation of its business processes. To reflect the impact on sustainable development, it is proposed to use the concept of a triple outcome, which involves development in three areas: improving the economic situation and quality of management, reducing the negative impact on the environment and participating in the development of society. This approach is characteristic of sustainable development indices and ESG ratings (Apokin et al., 2015; Romashkin, 2018; Verkhovsky, 2018).

Determination of weights within groups based on expert evaluation. To select expert data, it is necessary and sufficient to fulfill at least one of the following conditions:

- Sustainable development or corporate social responsibility activities (counselling, training, etc.);
- activities related to the creation of assessment methods or the calculation of ratings in the field of ESG, transparency, etc.;
- a position in a production company related to the preparation of public reporting (annual, environmental, social, etc.).

The expert evaluation was carried out through a study of representatives suitable for the designated criteria.

During the study, experts were asked to assess the significance of indicators within groups, as well as to propose boundaries for rationing quantitative indicators. In the first case, it was proposed to arrange the weights for each indicator in this way: the higher, according to the expert, the effect of the aspect on sustainable and anti-crisis development, the higher its weight should be, while the sum of the weights in each group should be equal to 1.

The determination of the degree of consistency of experts' opinions is based on the calculation of the concordance coefficient according to formula (1):

$$W = \frac{12\sum D_i^2}{m^2(n^3-n)-mb} \quad (1)$$

D_i - the sum of the ranks assigned by all experts to each sample element, minus the average value of these rank sums;

m - the number of experts or features whose relationship is assessed;

n - the sample size (number of indicators);

B - an amendment in the presence of related ranks, which is:

$B = \sum (B_3 - B_k)$, where B_k is the number of related ranks

The concordance factor is between 0 and 1. In case of complete coincidence of coefficients $W = 1$, in case of complete divergence of opinions of experts $W = 0$. If the value of the concordance coefficient W exceeds 0.40-0.50, then the quality of the assessment is considered satisfactory, if $W > 0.70-0.80$ - we can notice a high degree of consistency of opinions and a good quality of expert assessment.

To estimate the significance of the concordance coefficient, the Pearson test value (χ^2) is calculated using formula (2) (Meshkova & Moiseichev, 2016):

$$\chi^2 = m(n - 1)w \quad (2)$$

The calculated χ^2 is compared with a tabular value for the number of degrees of freedom $k = n - 1$ and at a given significance level (for example, at $\alpha = 0.05$ to form leads with a probability of 95%). If the calculated value is larger than the table value, then it can be explained how the value of the concordance coefficient is not random, and the opinions of experts are agreed at a given level of significance. If the views of the experts are agreed, the weights within the groups are determined by calculating a simple arithmetic mean from the estimates received from the experts.

If the opinions of the experts are not agreed, the calculation of weights for the indicators will depend on the typical mean, which is checked using the coefficient of variation (V):

- at $V < 33\%$, the average value will be typical, and therefore can be used in determining weights for the indicators;
- at $V > 33\%$, the application of the average value of expert estimates will be incorrect, so there is a need to use a modal or median value. At the same time, the modal value can be used at a mode frequency greater than 3, that is, if more than half of the experts noted such a value, otherwise, the coefficients are calculated as the median values of the experts' opinions for each indicator.

In any variant of coefficient determination, it is important to observe the rule that the sum of weights within each group should be 1, so that when calculating the modal or median value, rounding is allowed according to mathematical rules (for example, 0.18 round to 0.20, etc.).

2 Stage. Define information sources for key figures. In determining the sources of information, emphasis is placed on public, open sources of enterprises (reporting, official website, open internal documents, etc.) so that the calculation, on the one hand, is based on the official data of the company, and on the other, it is open and transparent. It should be noted that the set of indicators proposed by us to assess the impact of digitalization on the sustainable development of the company can be considered as a working one. Its formation took into account not only the information that companies currently publish, but also other indicators that, from our point of view, must be disclosed to assess the impact of digitalization on sustainable development and crisis management. The list presented can be expanded in the process of testing in various enterprises, as well as new technologies or the publication of a more expanded set of quantitative indicators in the field of economics, environmental impact and relations with stakeholders. Due to the balance between the groups, the set of indicators remains flexible, and the integral indicator, which is planned to be calculated in the second stage of the proposed methodology, is resistant to change.

3 Stage. At this stage of the methodology implementation, the proposed set of indicators should be integrated into a generalized indicator, which reflects the impact of digitalization on the sustainable development of the company. The generalizing index will allow assessing the degree of transformation of business processes due to the introduction of advanced technologies with their division into areas of sustainable development.

6. Findings

Thus, information derived from the developed indicator for assessing the impact of digitalization on sustainable development will somehow be useful to a large number of stakeholders. For some stakeholders, information will be useful in terms of cooperation and financing, for others - it will serve as a signal to jointly solve socially significant problems. At the same time, the main user of the information, as noted, is a directly evaluated company, which, based on the data obtained, will be able to adjust activities, attract investments, as well as realize social function. Thus, the study made it possible to note the development of a methodology for assessing the impact of digitalization on the sustainable development of the company,

based on the integrated application of statistical and expert estimates and involving the calculation of a synthesis index that takes into account the three dimensions of sustainable development (impact on the economy, environment and society), which allows people to assess the degree of use of digitalization as a tool for achieving progress in sustainable development at the level of an individual company and creates an information and analytical base for assessing the effectiveness of the use of digital technologies by business and society as a whole.

7. Conclusion

New models of data and technology management enable rapid response to emerging challenges and challenges of the twenty-first century, which is certainly a factor of success in terms of country competitiveness.

Thus, the formation of the digital economy is a new type of economic relations and one of the main conditions for an innovative breakthrough. This is a set of organizational, economic, technological and other events carried out in the information and communication sphere, which form a favourable innovative climate. The intensification of innovation development is an essential condition for further better and more efficient development of the Russian economy. In this respect, the digitalization of a country is of particular importance.

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