

# The effects of the digital transformation

Andrey Ulezko

*Department of Information Support and  
Modeling of Economic Systems in  
Agriculture*

*Voronezh State Agricultural University  
named after Emperor Peter the Great*

Voronezh, Russia  
[arle187@rambler.ru](mailto:arle187@rambler.ru)

Pavel Demidov

*Department of Land Cadastre  
Voronezh State Agricultural University  
named after Emperor Peter the Great*

Voronezh, Russia  
[79204170254@yandex.ru](mailto:79204170254@yandex.ru)

Alexander Tolstykh

*Department of Information Support and  
Modeling of Economic Systems in  
Agriculture*

*Voronezh State Agricultural University  
named after Emperor Peter the Great*

Voronezh, Russia  
[iomas@yandex.ru](mailto:iomas@yandex.ru)

**Abstract**—Digital economy is understood as the level of development of a social production system, involving the massive use of digital, information and communication technologies and allowing of fundamental modernization of the system of intersubjective interactions, while digital transformation is interpreted as a process of transition of socio-economic systems to this level of development. The global goal of digital transformation is to form a new information and technological continuum as a qualitatively different environment for social development. The system of local objectives of digital transformation reflects the set of directions for the appearance of the expected transformation effects. The digitalization of the economy generates not only positive, but also negative transformational effects associated with the negative consequences of the large-scale introduction of digital technologies in public life and digital expansion into all spheres of human activity. The article describes the range of tasks facing the state, business and individuals, the solution of which will allow minimizing the negative transformational effects and the consequences of the identified threats.

**Keywords**—digital economy, digital transformation, digitalization, digital technologies, digital effects

## I. INTRODUCTION

The evolution of socio-economic systems objectively implies periodic radical changes in the technical and technological base of the social reproduction system and the development of the system of economic and social relations. The change of technological structures allows the society to resolve the accumulating development controversies, to ensure the growth of labor productivity and the efficiency of the processes of the economic benefit production, necessary to meet the growing needs of society, to improve the living standards of the population, etc. High rates of scientific and technical progress ensured the formation of objective conditions for the mass transition to the technologies of the fifth technological stage (microelectronics, information and communication technologies, nanotechnologies, biotechnologies, genetic engineering, etc.) and the development of technologies that match the characteristics of the sixth stage (artificial intelligence technologies, mass robotic automation of the production processes, quantum technologies, molecular biology technologies and advanced genetic engineering, technologies of efficient use of renewable energy sources, etc.). Digital transformation of the economy is considered as one of the key technological directions of the development of society at the present stage. Digitalization of the economy as a form of technical and technological modernization of the processes of socio-

economic development and improvement of the system of social reproduction, as well as digital expansion in all spheres of human activity creates, along with positive effects, potential threats that negatively affect the quality of development of socio-economic systems and require not only awareness and identification, but also the rationale for tools to effectively combat their manifestations.

## II. RESEARCH OBJECTIVE AND TOOLS

The objective is to study the effects arising from the digital transformation of the economy, and to identify problems that society may encounter in the process of digitalization.

Research is based on the study and synthesis of scientific approaches to the study of the formation and development of the digital economy in the context of the emergence of heterogeneous transformation effects.

## III. RESEARCH RESULTS

Without going into the discussion about the need to clarify the content of the category “digital economy” and to describe its minute properties, we will focus on defining the digital economy as the level of development of a social production system based on the massive use of digital and information and communication technologies and allowing of the fundamental modernization of the system of interaction between economic entities, while the process of transition of socio-economic systems to this level of development we will term as the digital transformation or digitalization [1-10].

The global nature of the transition to a new technological order objectively necessitates the implementation of the following basic provisions, which largely determine the success of the transition to a new model of social development:

- The strategy of digital transformation should be consistent with the strategy of socio-economic development and respond to the challenges that set the vector of the social system movement and determine the totality of the issues facing society;
- The scale of the digital transformation issues requires the active participation of the state as a macro-regulator of digitalization processes, as an entity controlling a significant part of the national economy, as an entity providing a substantial amount of digital services;

- The strategy of digital transformation and the scale of the digitalization processes should be consistent with the economic development level as well as the financial potential of the country, regions, and business units;
- The start of the large-scale digital transformation is impossible without achieving the required level of information infrastructure, ensuring the formation of the united information space and the possibility for deep modernization of the system of interaction between economic entities;
- The integration into a single information space increases the requirements for ensuring the level of information security of the digital economy subjects and necessitates the formation of effective mechanisms to counter the cyber threats;
- The efficiency of digital transformation processes is largely determined by the quality of the innovation system of society and its ability to generate and actually use the solutions that continuously improve the technical and technological basis of the system of social reproduction;
- The implementation of the digital transformation strategy requires coordination and synchronization of the development of separated territories and industries and the prevention of the emergence of a technological gap between them that can dramatically reduce the performance efficiency of the entire macroeconomic system;
- The massive introduction of digital technologies in all areas of activity requires the modernization of the domestic electronic industry, which forms the element basis of the digital economy and minimizes the level of technical and technological dependence on foreign countries;
- The digital transformation objectively affects the growth of labor productivity in the real sector of the economy and the changes in the population's employment structure, and thus requires the development of a strategy to minimize the consequences of a massive dismissal of employees in traditional sectors of production;
- The massive transition to the use of digital technologies is impossible without the modernization of the vocational education system, associated with the significant change in the content of the workers' competences at various levels and the need for their constant self-education and self-development;
- High intensity of the digital transformation under the conditions of significant differentiation of territories in terms of economic development can enhance the existing and give rise to additional controversies associated with the deepening inequalities in access to digital benefits.

According to the views of futurologists, the digital future is presented as the achievement of the level of society development, ensuring wiping out all physical and routine mental work (and creative one in some cases as well) by robots and artificial intelligence systems, orientation of

production to the individual needs of each person, virtually unlimited communication capabilities for people and widespread use of bio-, nano- and other currently unavailable technologies.

The scientific and technological groundwork created by society allows to build fairly optimistic forecasts, but also makes it necessary to critically evaluate the level of development of various socio-economic systems, their financial capacity, the readiness of society, economic units, and individuals for digital transformation, the state's ability to provide the necessary level of information security and control over the actions of individual subjects and their groups in the information space.

Obviously, the process of digital transformation will be long and uneven and will take place within the framework of a certain strategy of creating the digital society. It should be clearly understood that if the main task of informatization was to create the conditions necessary for the realization of the strategic goals of developing certain socio-economic systems based on the extensive use of information technologies, the beginning of digital transformation requires not only rethinking these goals, but also recognizing the global nature of the future changes. That is why the control of the digital transformation processes should be considered, first of all, as change management at the levels of the state, economic branches and spheres of activity, individual economic entities and individuals. Digital transformation is an alternative to the operational sustainability paradigm of the economic entity (through it should not to be confused with the sustainable development paradigm): if one wants to function effectively, one must change all the time according to changes in the technological basis of digital communities. Moreover, the pace of the technological change can be extremely high.

A significant differentiation of economic sectors and fields of activity according to the existing level of informatization and the potential of digital development should be acknowledged. The IT industries, high-tech industries of the traditional sectors (chemical industry, metallurgy, some machine-building industries, etc.), the banking sector, communications and telecommunications, part of the service sector are potentially ready for radical digital modernization, but due to objective reasons, such sectors as agriculture or mining need to develop their own digital transformation programs, taking into account their sectoral features and difficulties in generating adequate information infrastructure.

The global goal of the digital transformation, from the point of view of the society, is to form new information-technological continuum as a qualitatively different environment of social development.

The local objectives can be formulated as a set of guidelines and indicators of the society development:

- Growth of labor productivity in the real sector of the economy, ensuring the satisfaction of growing social needs, and formation of new employment structure;
- Formation of the digital sector of economy as a driver of the innovation development of socio-economic systems and modernization of the technical and technological basis of the entities generating economic benefits;

- Complete digitalization of public services and minimization of the support costs for the management apparatus of the society development control while increasing the efficiency of state and municipal government;
- Minimization of expenses not directly related to the production of economic goods, and their redistribution in favor of industries and areas that ensure their generation;
- Legalization of all types of economic activity, focus on the complete elimination of the shadow sector of the economy and the fight against corruption by means of transparency of interaction between the subjects of the digital economy;
- Formation of a completely new system of intersubjective interaction within the single information space under the new paradigm of economic and social cooperation;
- Digitalization of all information resources of the society and provision of their physical and economic accessibility, wide use of technologies for processing large data bodies;
- Provision for the growth of the living standards due to digitalization of the environment and the implementation of models of individual consumer preferences;
- Development of distance learning technologies, access to various information resources, providing opportunities for self-development and self-realization of individuals;
- Creating conditions for intensifying the processes of social self-organization and social globalization, changing the principles of forming social groups and their impact on social development processes, enhancing the role of civil society, etc.

This range of issues generally reflects a set of heterogeneous positive effects expected by society from digital transformation, but it does not show the issues aimed at preventing the problems posed by the digitalization of various aspects of social development and bearing certain threats associated with the negative consequences of large-scale introduction of digital technologies in public life the level of society, state, business structures, territorial entities, social groups and individuals.

One of the main threats of the digital transformation is associated with the inevitable reduction of jobs in traditional industries and areas of activity and the need of employment of significant number of people or of ensuring their social welfare. According to the figurative expression of some researchers, this problem belongs to the category of “digital nightmares” and requires urgent awareness of its magnitude, since the cost of its solution can be quite comparable with the expected effects. This problem will be particularly acute in the territories where high-tech industries and areas of activity do not dominate the employment structure of the population.

Along with the reduction in the number of employees, we should expect the simplification of labor functions and drop in the requirements for a person’s creative potential and interpersonal communication skills. With the spread of

interpersonal communication technologies, there is the danger of degradation of the communication forms, social interaction and the exchange of non-formalized knowledge, loss of empathic ability, growth of the level of Internet addiction; and even the processes of de-socialization of individuals and their conscious withdrawal from social communities are possible. And all this will take place against the background of the growing level of information overload, informational stresses and the development of technologies for total control over the activities of individuals, various social groups, and society as a whole.

The development of network forms of business and social communications and the expansion of information communities beyond territorial boundaries creates a threat to the state as a key macro-regulator of social development processes and the traditional institution for coordinating economic and social activities in local macroeconomic systems and requires modernization of the entire institutional environment. It is expected that the governing, coordinating and controlling role of the state will weaken in the case of emergence of supranational systems of economic, social and political process control and the wide dissemination of technologies that allow moving trading and financial activities outside the jurisdiction of individual states.

The emergence of new markets and networking technologies determine the transformation of the competitive environment and traditional models of economic behavior of business entities, while the high speed of technological changes and the short life of competitive advantages make it necessary to constantly adapt the technical and technological base of the business units generating economic benefits along with their business models to the changes in the needs of elements forming the digital ecosystems.

The existing differentiation of territorial entities in terms of economic, technological and informational development can intensify the digital inequality, form the gap in the speed and intensity of digital transformation, deepen the imbalances in the distribution of digital effects, provoke an increase in monopolization of the digital service market. It should be noted that the success of the digital transformation of individual industries and spheres under the significant technological lag of the other sectors of the economy may aggravate the contradictions between them, and the growing imbalance in development rates will significantly limit the size of the cumulative digital transformation effect across individual socio-economic systems.

Besides, the large-scale integration of subjects at various levels into the united information space activates cybercrime, associated with obtaining economic benefits through unauthorized access to information, bank cards and e-wallets, bank accounts, and so on, illegal content, copyright and intellectual property infringement, cyber-terrorism, etc.

#### IV. SUGGESTIONS

Awareness of the problems of digital transformation allows not only to identify threats to social development, but also to understand the content of the issues aimed at minimizing their consequences.

At the national level these issues may include the following:

- Development of regulatory support of the digital transformation processes taking into account the



changes in the content of the social development paradigm and its information and technological continuum;

- Development of the system of norms and standards ensuring the integrity of the information space and the integration of any subject into it;
- Formation of the mechanisms to ensure transparency of the virtual economy and its legalization;
- Development of the concept of providing employment for the population under the conditions of the expected job reduction in traditional industries and fields of activity, and its social welfare;
- Development of information infrastructure and provision of economic and physical availability of information resources and digital benefits of all economic entities and units;
- Development of the digitalization strategy for the state and municipal government system and its transformation in response to the challenges of the growing influence of supranational structures and network communities;
- Formation of the system for countering cybercrime and ensuring the information security of the digital economy;
- Modernization of the system of general and vocational education in order to form the competencies needed by individuals for comfortable integration into the processes of digital transformation.

At the level of business structures the digitalization issues include the following:

- Developing new business models ensuring integration into digital ecosystems, and diversify of the business;
- Focus on individual preferences of the end users and mastering the technologies for direct interaction with them;
- Building the potential for modernization of the technical and technological base of production and the need to introduce fundamentally new technologies to create economic benefits;
- Mastering the new digital platforms providing for creation of the conditions of convergence between digital technologies and business models;
- Introduction of new technologies and forms of inter-subject interaction within digital ecosystems;
- Use of new labor organization forms and improvement of the business social responsibility.

Quite ambitious tasks of confronting the threats of digital transformation are facing individuals. The key ones among them are:

- Formation of the competencies allowing of being a qualified digital platform user as well as participating in their design and development;
- Understanding of the functionality of the existing and emerging digital services, the development of skills to

work with digital technologies to meet personal information needs;

- Formation of the ability for self-development and self-realization, readiness to use new forms of socialization and interpersonal communication;
- Formation of skills to provide personal information security and privacy protection in the information space.

The formation of effective mechanisms to counter potential threats is a necessary and incumbent condition for the success of digital transformation and obtaining significant effect sufficient to meet the interests of all subjects in the digital economy.

## V. CONCLUSION

The scale of the digital transformation processes requires systematic assessment of the totality of possible transformation effects and awareness of the complexity of the tasks facing various subjects of the digital economy. With the country's technological lag compared to the world's leading economies, the main driver of Russia's transition to the digital economy should be the government, ready to ensure the creation of the necessary information infrastructure, adequate institutional environment, and security of integration into united information space for all economic units, both producing and consuming economic benefits. At the same time, the government should develop mechanisms to mitigate the negative social consequences of digital transformation by means of fair redistribution of digital dividends, from the point of view of public interests, and to prevent the deepening of digital inequality between individual sectors and areas of activity, territories and social groups. Objective differentiation of industries and territories in terms of the development level and quality of digital infrastructure requires, along with national projects and programs for the digitalization of the economy, the development of sectoral and territorial digital transformation strategies that ensure the necessary level of coordination and synchronization of the processes of digital economy formation throughout the macroeconomic system.

## REFERENCES

- [1] O. A. Alekseenko, and I.V. Ilyin, "Digitalization of the global world and the role of state in the digital economy," *Information society*, vol. 2, pp. 25-28, 2018.
- [2] M. Izmailova, M. Veselovsky, and M. Abrashkin, "Digital transformation of the Russian economy: risks, perspectives and scenarios of the innovative development of the industry," *12Th international days of statistics and economics*, pp. 698-707, 2018 [12th International Days of Statistics and Economics, Prague, Czech Republic, September 2018].
- [3] G. G. Golovenchik, "Digital economy as a new stage of globalization," *Digital transformation*, vol. 1, pp. 26-36, 2018.
- [4] E. A. Khitskov, S. V. Veretkhina, A. V. Medvedeva, O. L. Mnatsakanyan, E. G. Shmakova, and A. Kotenev, "Digital transformation of society: problems entering in the digital economy," *Eurasian Journal of Analytical Chemistry*, vol. 12(5b), pp. 855-873, 2017.
- [5] E. V. Maymina, and T. A. Puzynya, "Specifics and tendencies of the digital economy development," *Bulletin of Belgorod university of cooperation, economy and law*, vol. 6(67), pp. 37-45, 2017.
- [6] N. I. Protopopova, V. D. Grigoriev, and S. Y. Perevozchikov, "Information and digital economy as an economic category," *Advances in Intelligent Systems and Computing*, vol. 726, pp. 300-307, 2019 [5th National Scientific and Practical Conference on Perspectives on the Use of New Information and Communication

- Technology (ICT) in the Modern Economy, Pyatigorsk, Russia, February 2018].
- [7] V. V. Reymer, M. A. Zhukova, and A. V. Ulezko, "Transformation effects of the transfer to the digital economy," *Agricultural economy of Russia*, vol. 2, pp. 14-21, 2019.
- [8] R. W. Scholz, E. J. Bartelsman, and S. Diefenbach, "Unintended side effects of the digital transition: european scientists' messages from a proposition-based expert round table," *Sustainability*, vol. 10(6), num. 2001, January 2018.
- [9] A. V. Ulezko, "Digital economy: the essence and transition difficulties," *Production and processing of the agricultural products: quality and safety management*, vol. 1, pp. 231-235, 2018 [Prof. conf., Voronezh, VSAU].
- [10] T. N. Yudina, and I. M. Tushkanov, "Digital economy through the prism of business philosophy and political economy," *Business philosophy*, vol. 1, pp. 193-200, 2017.