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Viktoriya TINYAKOVA,
Natalia MOROZOVA,
Manya ZIROYAN,
David ARAKELYAN

DIGITAL ECOSYSTEM AS A MODEL OF EFFICIENT AND SAFE INTERACTION OF ACTORS IN VIRTUAL SPACE

Abstract

In the article, the authors emphasize that the formation and development of the digital economy is an inevitable and objective process of society's transition to a new technological order. To maintain their competitive state, business entities need to transform the existing business model by integrating smart technologies, the Internet of Things and artificial intelligence into its basis. The emergence of new formal and informal institutions should regulate the rules of behaviour of economic agents in the digital economy. To this end, it is necessary to form and develop a legal framework that regulates the relationship between customers and owners of digital platforms. We believe that digital ecosystems will have a certain interest in the new society. Unlike traditional models of interaction between actors, digital ecosystems will create a single information field and a new form of constructive cooperation and coordination between participants in the virtual space. The state should become the initiator of creating this kind of digital ecosystem, which will make it possible to implement the mechanism of reasonable digital protectionism, the purpose of which will be to protect the interests of users and owners of digital platforms in cyberspace.

Keywords: Innovation, innovation infrastructure, regional development, quality of life, innovation policy, business incubator, venture capital fund, region.

Introduction

At the beginning of the 21st century, information and telecommunication technologies are increasingly being used in all critical areas of human life - in business, state and municipal government, and everyday life. Digitalization literally revolutionizes all sectors of production, destroying traditional technological processes of creating goods and services and their delivery to the end consumer, develops digital channels of communication with the external and internal environment, determines the nature of a person's professional activity and shows the vector of the evolution of his skills and abilities, seeks to reformat the structure of society and checks the strength of established values. Competencies

such as network self-identification of a person, digital literacy, ecological thinking, risk-based goal setting, continuous personal self-development, and several others are becoming more and more in demand.

In addition, the use of IT removes spatial and temporal restrictions when making commercial transactions, increasing the availability of goods and services anywhere in the world and at any time, forms new models for managing economic entities and territories, the purpose of which is to combine the economic, political, social and scientific life of the state and its subjects into a single whole for further growth of the well-being of the population in the context of the development of the digital economy.

The aspiration is to increase labor productivi-

ty and minimize transaction costs for control and management; that is the ultimate goal of society's transition to a new technological order. This is achieved because in the new business model, the interaction between the customer and the person providing goods or services is carried out without intermediaries, and wherever the process can be formalized and expressed using algorithms, robotics is used, which, unlike humans, can work in the 24/7 format, without rest and loss of productivity

Indeed, today artificial intelligence is still developing and is yet subordinate, imitating human behaviour, performing tasks and gradually learning based on the information collected. However, its successful development in the future will allow it to have more advanced capabilities than humans have. As a result, the question naturally arises about the role and place of a human being in the new digital society. Will humans retain their competitive advantage in the world of high technology? Or will the most terrible prophecies of science fiction writers about the war between robots and people come true, and will human labour be replaced by machine labour? Or is it still possible to establish more constructive forms of interaction between natural and artificial intelligence? (Tinyakova, Morozova, Gunin, & Kireeva, 2019; Tinyakova, Morozova, Ziroyan, & Falkovich, 2018; Tinyakova, Morozova, & Gunin, 2019; Tinyakova & Morozova, 2018). All these and several other issues actualize the need to study the essential features of the digital economy and the practical use of high technologies in various spheres of human life.

Methodological Aspects of the Formation of a New Management Model in the Digital Economy

For the formation of a scientific hypothesis and the choice of a theoretical and methodological basis for research in the field of a new management model in a digital economy, the fundamental works of domestic and foreign researchers in the field of informatization of the modern

society, the development of network and virtual forms of management are of great interest.

We emphasize that management will be effective only when considered a well-organized information process. Just as matter and energy are the substances of the physical world, information underlies effective management and informed management decisions.

The study of the general patterns of obtaining, storing, analyzing and transmitting information in complex systems to control and regulate the processes occurring in them is carried out by such science as cybernetics. It is nourished by other sciences and tends to self-develop. One of cybernetics and artificial intelligence theory founders is the American mathematician N. Wiener. Another "father of the information age" is justly considered an American engineer, cryptanalyst and mathematician, K. Shannon. In this regard, in the study of control systems, the general methods used in cybernetics are "system analysis", "operations research", etc.

To make decisions in the field of managing socio-economic processes in a complex dynamic system, one should consider a vast number of different factors that have a multidirectional effect on the system under study, to develop various scenarios for the sequence of events and choose from them the option that will ensure the balanced development of the leading sectors of the economy. It is difficult to formalize the task of considering and assessing the impact of feedback on the state of a complex system, which is the territory. All this predicates the necessity of developing simulation models and their integration with databases.

Simulation modelling tools and methods make it possible to transfer the collected information from the category of inert material to the evaluation process, thereby increasing the efficiency and validity of making managerial decisions. The collected information, as a rule, is of a quantitative and qualitative nature, which complicates the process of its analysis and evaluation. In this regard, optimization-qualimetric control models will be of particular interest. Theoretical

and methodological aspects of this problem can be found in the works of the following authors: R. Bellman (1957), R. G. Brown (1971), M. T. Czarnecki (1999), R. Dorfman, P. A. Samuelson, R. M. Solow (1958), Q. W. Fleming, J. M. Hopelman (1996), P. Morse (1958), H. C. Tijms (1994). The effectiveness of their use will lie in the possibility of variable management under conditions of uncertainty and in assessing the quality of strategic decisions made before their practical implementation.

Thus, a new virtual model for managing socio-economic development in the digital economy conditions, based on optimization-qualimetric modelling, will make it possible to increase the flexibility and efficiency of the management process, move away from hierarchical management systems and form a horizontally connected network environment for the free flow of technologies and innovations between sectors and territories.

The Process of Establishing a Digital Economy: Triggers and Limitations

Issues of digital transformation and the future of the world order are becoming a topic of discussion at authoritative global platforms: The United Nations Conference on Trade and Development (UNCTAD) Digital Economy Report (2019); The United Nations Conference on Trade and Development (UNCTAD) Trade and Development Report (2019), World Economic Forum in Davos (World Economic Forum in collaboration with McKinsey & Company: Fourth Industrial Revolution Beacons of Technology and Innovation in Manufacturing, January 2019; The Global Competitiveness Report, 2018). Such close attention to the problem is not accidental. Humankind is on the threshold of a new economy based on the global analysis of information and the intense development of telecommunication technologies. Information is gradually becoming the main asset. Indeed, it has always been of crucial importance for the development of society. However, today, ob-

taining and processing information is turning into a strategic resource for developing socio-economic systems of various levels of complexity. To describe the processes taking place in society, Nicholas Negroponte, in 1995, proposed a new term – “digital economy”.

The point of view that modern society is on the verge of a new technological phase of its development is also emphasized by Klaus Schwab, the President of the World Economic Forum in Davos. He writes that “we are at the origins of a revolution that will fundamentally change our lives, work, and communication. In terms of scale, volume and complexity, this phenomenon, which I consider the fourth industrial revolution, has no analogues in all previous human experiences. We have yet to realize the fullness of the pace of development and the scope of the new revolution” (Schwab, 2019, p. 9). “The Fourth Industrial Revolution is not just a name for the changes brought about by technological progress... It is an opportunity to frame the public debate that helps everyone, from politicians and technology leaders to citizens of all countries, from all social groups and at all income levels, to understand how powerful, promising, interacting technologies affect our world and to learn how to direct this influence” (Schwab, 2019, pp. 18-19).

In the scientific world, heated discussions have also unfolded about the modernization of a human being, increasing his natural capabilities to harmoniously integrate into the new digital society and assessing the ethical consequences of such intervention. In particular, Anders Sandberg’s research concerns the study of cognition, neuroethics and global catastrophic risks caused by such research and the publication of its results (Lewis, Millett, Sandberg, Snyder-Beattie, & Gronvall, 2018; Pugh, Pycroft, Sandberg, Aziz, & Savulescu, 2018).

Elena Postigo Solana, in her interview, emphasizes that convergent technologies - artificial intelligence, genetics, nanotechnology and neuroscience - offer simply fantastic opportunities. However, they also impose great responsibility

not to harm future generations. All this is done by bioethics. Issues such as gene editing or the application of artificial intelligence in healthcare will be on the agenda in the coming years. She emphasizes that we must be wise and prudent enough to self-regulate and follow the classic saying: “first do no harm” (Entrevista a la Dra Elena Postigo, Directora del Instituto de Bioética de la U. Francisco de Vitoria, 2021).

Rafael Monterde Ferrando in his study “El ocaso de la humanidad: la singularidad tecnológica como fin de la historia” notes that as a result of technical influence, a man is transformed into raw material for the production of a superman. This kind of improvement requires a reassessment of all human values, especially those related to the protection of human dignity (Monterde Ferrando, 2021).

Thus, the progress and transition of society to a new technological foundation actualizes the question of the need to improve the human being himself, turning him into a post-human, freed from suffering, illness, ageing and death. Nevertheless, will interventions of this kind not lead to the loss of a person’s species essence? These and a number of other questions remain to be answered.

Continuing, we note that the technological foundation, the core of the new digital economy, is the developed infrastructure of communication channels and the competitive production of goods and services in the field of IT technologies. The information and telecommunications market allows the interaction of market entities in the information space and stimulates the creation of unique, previously non-existing market segments (mobile communications market, software, data centres, etc.). Without its development, it is impossible to build a full-fledged digital society.

Today, the information and communication technology market is a reasonably dynamic sector of the economy, although the pandemic has seriously tested its strength. Thus, according to the analytical company Gartner, the volume of

the global market of information and communication technologies in 2020 decreased by 3.2% compared to 2019 and amounted to \$3.69 trillion (ICT (world market), 2020). This is because, in pandemic conditions, according to John-David Lovelock, vice president for research at Gartner, top managers of leading companies have to find a balance between cost savings and the expansion of technological infrastructure.

However, after the global shock and chaos in 2020, companies will have to increase their use of IT technologies, especially in the field of business communications, in order to maintain their competitive positions and financial stability. This hypothesis was confirmed in 2021. The ICT sector has proven resilient, driven by the growing demand for digital goods and services among the public and businesses. This trend will continue in the future since the ICT sector is assigned the role of a driver in the digitalization of the economy and the social sphere.

Even after removing restrictions caused by the pandemic, most companies preferred to maintain hybrid forms of work, with fewer people in the office and more remotely. This will allow companies to reduce rental costs and operating costs by closing physical branches, offices and salespoints. At the same time, a flexible office and new conditions for organizing workplaces will require new technologies for automation, technical support and information security, which are additional costs. Furthermore, it is not yet clear how they will affect the company’s financial budget. Will the organization benefit financially from the closure of offline premises or lose?

Nevertheless, one thing is sure development in the digital economy will be impossible without the company’s presence in the online space. The leaders of companies that cannot build their strategy in the virtual space will lose out in the competition, as the traditional market will gradually become a thing of the past, turning into an anachronism.

Conceptual Model of Interaction of Actors in Virtual Space

We believe that the new business model should organically integrate “smart” technologies and artificial intelligence, which can transform information opportunities into new services and, accordingly, into growing income. Such a new model can be a digital ecosystem, which should not have restrictions in the form of geographical boundaries. It is designed to provide interaction to millions of customers located in any time zones.

The sizeable Russian company Sber has al-

ready announced the creation of a new generation ecosystem on its platform, which is based on the following principles: customer centricity, an open API mechanism, machine learning and automated customer service, data processing, and a number of others.

In our opinion, the digital ecosystem, unlike the traditional one, will be aimed at creating a single information field and a new form of constructive cooperation and coordination between participants in the virtual space, which is characterized both by cooperative relations and competition (Fig. 1).

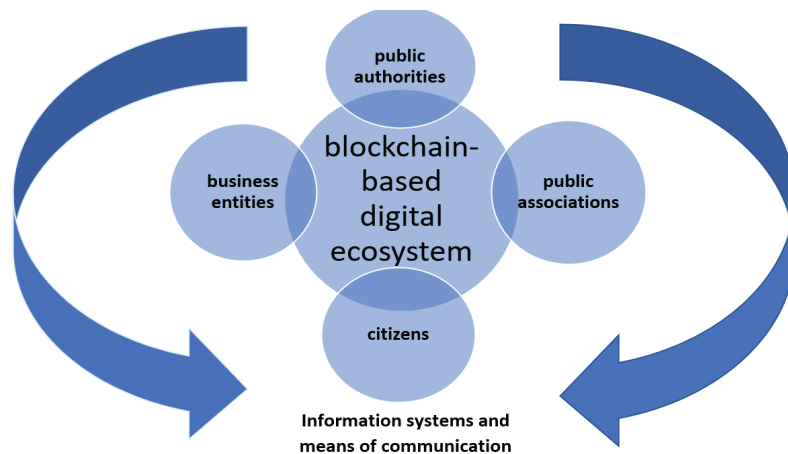


Figure 1. - Model of Interaction Between Actors in the Digital Ecosystem of the State.

The creation of such an ecosystem under the guidance of the state will make it possible to implement an intelligent digital protectionism mechanism that will protect the interests of users and owners of digital platforms in cyberspace.

The cause for this is that mass digitalization leads to the fact that an individual or business entity will need to log in to various digital platforms, provide their personal data and transfer certain rights to their support in various life situations. Thus, a “digital twin” of an economic entity or an individual will appear in the virtual space and new forms of citizenship – digital or virtual. Naturally, the question arises about protecting personal data and commercial information in cyberspace and the legal consolidation

of the rights and responsibilities of owners of digital platforms that collect unique information. As answers to these questions, legal acts are needed to institutionalize the rules for agents’ behaviour in the virtual space.

In addition, special control should be over data representing the country’s national security. Furthermore, this is a series of data accumulated by public authorities. Not all of them can be open, and some information will have the status of confidential, intended only for executives who make management decisions. The leakage of this kind of information can cause a significant stroke to the country’s national security. To solve this problem, it is necessary to implement intelligent digital protectionism that regulates the norms of

behaviour and protects users' interests and owners of digital platforms in the virtual space.

To protect data, the digital ecosystem must be implemented using blockchain technology, or as it is sometimes called, the "Internet of Values", which, unlike the existing ones, already has security and high reliability at the database level, which is especially important for the efficient operation of public authorities, accumulating and exchanging confidential information (Blockchain (European market), 2020).

A digital ecosystem based on blockchain technology will make it possible to harmonize and integrate various databases, registries, cadastres, and registries developed by various public authorities, thereby launching the implementation of the concept of cross-chain interaction. Creating such a system will reduce the time and financial costs for collecting, processing and transmitting information necessary for implementing their functions by public authorities in cooperation with citizens and business entities.

Thus, the emergence of blockchain technology is comparable in scale to the invention of the Internet, and therefore the refusal to accept it can slow down the pace of state development. Therefore, Russia's interest in this technology is not accidental.

Conclusion

According to experts, the countries that are the first to introduce a new management model based on new IT technologies will receive significant competitive advantages in the global economic space. The expediency of creating a virtual model for managing socio-economic development in the form of a digital ecosystem will allow, at lower cost and more clearly, to show how the real object interacts with the external environment, as well as to identify the factors and conditions under which this interaction will be optimal. Unlike traditional modelling, virtual geoinformation modelling will make it possible to bind to the terrain, identify spatial objects, and visualize spatial data using various IT tools. All

this will allow, without high costs, to consider various ways of developing the territory, distributing productive forces, regional planning, reconstruction and building of individual parts of the territory. Using virtual models, it is possible to identify shortcomings in the design and possible consequences of the decisions made for the environment and the development of the social sphere of the territory already at an early stage. Working with virtual and augmented reality opens up opportunities for the emergence of new forms and ways of distributing innovative products. Without such a system, socio-economic development will occur spontaneously, ultimately leading to fundamental changes in the geopolitical sphere and threatening Russia's national interests and security.

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ABOUT AUTHORS

Viktoriya TINYAKOVA - PhD in Economics, Professor of the Department of Mathematical Methods in Economics and Management, State University of Management, Moscow, Russian Federation.

ORCID iD: <https://orcid.org/0000-0001-9768-3458>

E-mail: tviktoria@yandex.ru

Natalia MOROZOVA - PhD in Economics, Professor, Volgograd Cooperative Institute (branch) Russian University of Cooperation, Volgograd, Russian Federation.

ORCID iD: <https://orcid.org/0000-0002-1434-1047>

E-mail: miss.natalay2012@yandex.ru

Manya ZIROYAN - PhD in Economics, Professor of Department of Complex Systems Security Management, National University of Oil and Gas (Gubkin University), Moscow, Russian Federation.

ORCID iD: <https://orcid.org/0000-0002-7055-1946>

E-mail: zirmanya@mail.ru

David ARAKELYAN - Independent Researcher, Chief Specialist of Moscow Credit Bank, Moscow, Russian Federation.

ORCID iD: <https://orcid.org/0000-0003-0325-4711>

E-mail: dav.arakelyan@mail.ru