

# Digital Technologies in the Field of Public and Territorial Administration: New Challenges and Global Trends

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**Abstract**—Today, the main challenge for economic development is the digitalization of all aspects of public life. The main task of public authorities is to create a digital ecosystem, which, unlike the traditional one, would reduce the time and financial costs for collecting, processing and transmitting information necessary for the implementation of their functions in interaction with citizens and business entities. The creation of a unified database for the provision of public services and the need to authorize each person in it leads to the emergence of categories such as digital avatar, digital or virtual citizenship. The article raises the question of studying these categories and the need for their legal justification. This is a key task not only for the development of theory, but also for the practice of state and municipal administration. In order to receive feedback and strengthen the involvement of citizens in the legislative process, new tools can be used (crowdsourcing, a digital profile of a citizen, a single trust space for an electronic signature, etc.). Informatization of all spheres of public life creates objective prerequisites for the formation and development of network, virtual structures in various fields of activity, including politics, economics, science and education. To provide the stable development of such a system and the coordination of the activities of the participants, new mechanisms of self-regulation and self-development are needed, as well as a new management model adequate to the challenges of the digital world.

**Keywords**—*regional economy, digital management technologies, quality of life of the population, spatial analytics, territorial development, performance efficiency, territory, social policy, economic growth, electronic administration systems.*

## I. INTRODUCTION

Today, the ubiquity of digital technologies leads to a radical transformation of the way of life, the line of socio-economic development. A certain trigger was the pandemic announced by the World Health Organization, which forced the society to switch to new formats of communication and management models. Technologies such as “smart cities”, “smart enterprises”, “smart homes”, “smart information and analytics”, “smart medicine”, “safe city”, e-government and a number of others are becoming common and regular. This kind of transformation requires new skills and competencies

from people and businesses, but, above all, psychological readiness for innovation and constant mobility.

In the field of business, the level of competitiveness has already begun to be determined by the speed of implementation and the efficiency of using digital technologies. Artificial intelligence, robotics, the Internet of things, wireless technologies and others are those production factors that can replace a human being or significantly increase his labor productivity.

Traditional processes of creating goods and services are collapsing. To convert resources into finished products, the technologies of additive manufacturing or 3D printing are increasingly used, which can significantly reduce the manufacturing time of a product and remove intermediaries from the production process.

Many companies consider e-commerce as the main point of business growth and expansion of geography of presence. Today, mobile communications are no longer the privilege of the elite and are becoming an integral part of every person's daily life. Thus, mobile gadgets are becoming an effective tool for doing business. Following e-mail, companies are starting to develop mobile versions of corporate portals. One can take as an example the most popular business applications - mobile versions of Lotus Notes or MS Outlook; CRM and ERP systems; portable business analytics (“Manager's Tablet”); various software products that automate the production and management process depending on the scope and extent of activity.

Companies are beginning to compete with digital platforms, and it takes a small group of talented enthusiasts to create a large, fast-growing industry.

Scientific and technological progress and ubiquitous digitalization do not leave an ordinary person without attention. The development of social networks and all kinds of entertainment sites, mobile banking, mobile e-commerce - all this is already becoming the norm of life.

With the advent of various digital services and the development of "smart" spaces, human life is changing, it becomes more comfortable, free and rational.

However, the growing flow of information in the modern world is so great that a person is not able to cope with it on his own. He is helped by electronic assistants and artificial intelligence, which allow deep and comprehensive analysis of large amounts of data, to get the most out of them and to receive an unprecedented level of accuracy from their analytical processing.

The rapidly growing volume of data begins to exceed the human capacity to assimilate it, which leads to an increase in demand for artificial intelligence (AI) technologies and electronic assistants.

Certainly, digital technologies, like any phenomenon, are not without negative consequences. First of all, this is the disappearance of certain professions, types of activities and markets, imperfection and vulnerability of the personal data storage system, the growth of cybercrimes, the lack of "digital literacy", especially among the elderly. In addition, the development of digital technologies erases geopolitical boundaries, a certain threat to the territorial integrity and geographical sovereignty of the community arises. The internal control system improves the efficiency of functioning and economic development, representing a way of business expertise [12].

All this somewhat reduces the level of public trust to the digital environment and slows down its development. As a response to this challenge, it is necessary to reinforce the role of public authorities in the processes of regulation and stimulation of the development of the digital economy. A definite step in this direction has already been taken. So, in the Decree of the President of the Russian Federation of May 7, 2018 No. 204 "On national goals and strategic objectives of the development of the Russian Federation for the period up to 2024", the nationwide vector of development of Russia was determined - the accelerated introduction of digital technologies in the economic and social spheres. This message of the President of the Russian Federation received legislative support in a number of legal acts: in the Decree of the Government of the Russian Federation of 03/02/2019 No. 234 "On the management system for the implementation of the national program "Digital Economy of the Russian Federation" [5], in the "Passport of the national project "National Program "Digital Economy of the Russian Federation" (approved by the Presidium of the Council under the President of the Russian Federation for Strategic Development and National Projects, Protocol No. 7 dated 04.06.2019).

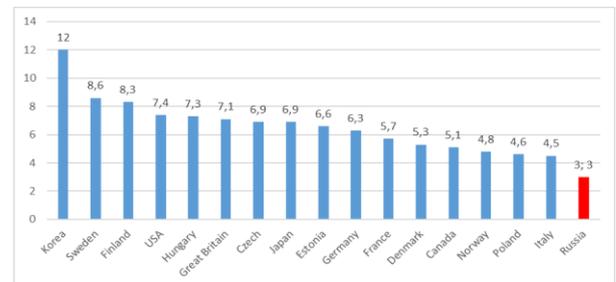
Despite the short period, the first steps have already been taken in the field of building a virtual model of territorial administration:

- a digital communication platform has been developed in the field of strategic management, which creates a certain platform for the development of common actions and their coordination at all levels of government in the process of developing a strategic plan;
- there has been developed AIS "Typical cloud solution for the automation of project activities of public authorities" (TOP APD);

- a national data management system (NDMS) has been created;
- the Unified State Platform for Data Collection of the Industrial Internet of Things has been developed and its development has been ensured, namely: a toolkit has been developed for analyzing objective data on supervised objects based on approved departmental data models used in the CTD, etc.

Evaluating the achievements of our country in terms of key indicators of the introduction of digital technologies and their development, we can conclude about its dynamic development. According to a study by the Higher School of Economics, for the period 2010–2017, the ICT sector, which includes telecommunications services, the production of software and information / communication equipment, and the wholesale of ICT goods, grew by 17%, almost doubling GDP growth [1].

However, Russia's indicators in the global space for the development of the digital sector and its contribution to the economy are rather modest (Figure 1).



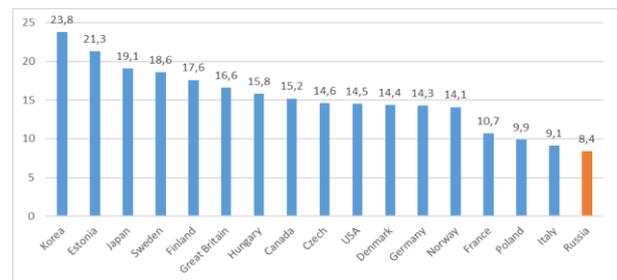
\* Excluding the ICT goods wholesale industry

Source: OECD, HSE ISSEK, Institute of Growth Economics calculations

Fig. 1. Contribution of the digital sector to GDP (as of 2017, in %)\*

According to data on Figure 1, Korea is the absolute leader in terms of the share of the digital sector in GDP. Russia is almost fourfold behind the leader in this indicator.

A rather low value in Russia has the indicator "the number of employed per 1,000 workers" (Figure 2). Here again, Korea is the undisputed leader, but Russia's lag behind the leading country is slightly less - twofold.



Source: ISSEK HSE, OECD, Institute for Growth Economics calculations

Fig. 2. The number of people employed in the ICT sector per 1,000 people in 2017, units

According to the rating of the World Economic Forum, Russia in 2018 ranked 43rd among 140 countries, and in the area of "Penetration of information and communication technologies" – 25th [11].

At the same time, Russia's lagging behind can be viewed from a positive point of view. This suggests that Russia has potential and opportunities to expand the number of jobs in this area of activity. This process can be stimulated by public authorities, which should create favorable conditions for the development of the digital economy and narrow the gap in the spread of information technologies in comparison with the leading countries of the world.

In other words, the public authorities are faced with the task of radically changing the technologies and management methods used, which would become adequate to the new conditions of a high-tech society, and certain work is also needed to reduce the gap between Russia and the world's leading countries in terms of the level of development of the digital sector and its contribution to the economy, as well as the creation of a domestic unified information and telecommunications system for managing territorial development, integrating and harmonizing various databases formed by various public authorities, business entities, credit and financial organizations and others.

## II. METHODOLOGY

For the formation of a scientific hypothesis and the choice of a theoretical and methodological basis for the research, fundamental works of domestic and foreign scientists in the field of the digital economy and the development of network and virtual forms of management were of great interest.

The methodological foundations of informatization of modern society were laid by N. Wiener, an American mathematician, one of the founders of cybernetics and the theory of artificial intelligence. K. Shannon, an American engineer, cryptanalyst and mathematician, is rightfully considered another "father of the information age".

Among other foreign scientists dealing with the development of information resources, who, as it should be noted, are the leaders in this area, are D. Bell, P. Drucker, F. Kamman, M. Castells, J. Maleski, F. Machlup, M. Malone, S. Park, P. Pilzer, T. Sakaya, D. Siegel, T. Stewart, O. Toffler, C. Handy, L. Edvinson and many others.

In the domestic economic science, the problems of informatization and the use of information resources, until recently, were not the subject of close analysis. The works of such scientists as O. Antipina, S. Dyatlov, V. Inozemtsev, R. Nizhegorodtsev, V. Tambovtsev, R. Tsvylev and others had a significant impact on the development of the information paradigm.

Conceptual provisions of virtual management are one of the backbone and stabilizing factors for the functioning of the digital economy. The basic aspects of the functioning of virtual organizations and management were studied in the works of V. Afanasyev, A. Babkin, M. Granovetter, V. Inozemtsev, M. Castells, V. Makarov, L. Pidoimo, A. Ursul, S. Fabrichnov, L. Yakobson and others.

However, the problems of the formation and effective use of information resources as factors in the development of the regional economy still require their scientific understanding.

We believe that there is a need for scientific modernization of the theory of territorial development management from the point of view of the possibility of introducing elements of virtual management into it and developing mechanisms for constructive interaction through digital platforms of three

active subjects: the state, business and individuals. The new paradigm of territorial development should unite the economic, political, social and scientific life of the state and its subjects and stimulate the further effective development of the information society and the digital economy. This formulation of the problem translates this problem into a transdisciplinary task.

The model of virtual territorial development management should be built using geodata, geoinformation, spatial data models, GIS, as well as using "cloud" technologies. The process of building models, in our opinion, will allow in a visual form and at a lower cost to show how the interaction of a real object and the external environment occurs, as well as to identify the factors and conditions under which this interaction will be optimal. Unlike traditional modeling, geoinformation will allow one to make a binding to the terrain and visualize spatial data using various methods. All this will make it possible, without significant costs, to consider various ways of developing the territory, locating productive forces, regional planning, reconstruction and housing development of individual parts of the territory. Considering the virtual models of the future city, it is possible to identify design flaws and possible consequences of the decisions made for the environment and the development of the social sphere at an early stage. Working with virtual and augmented reality opens up opportunities for the emergence of new methods of data analysis, as well as new forms and methods of reporting and forecasting. The virtual management process is able to quickly respond to the changes in the external environment and the emergence of new innovative developments.

The new paradigm of virtual territorial development management should take into account the heterogeneity of spatial development and the provision of resources (natural, human, economic and others) in order to pursue a policy aimed at leveling territorial development and an equal increase in the level and quality of life of the population.

In addition, any territory as an administrative-territorial unit is a complex, highly dynamic and open socio-economic system. As a result, there is an increase and complication of economic ties. And this leads to the emergence of the so-called mobile network environment, which allows the establishment of interactive, multilateral and regular interoperations between economic agents for the sharing of knowledge and the exchange of resources.

The deep fragmentation of the economy existing in Russia creates certain obstacles for the development of network forms of interaction. A certain reengineering of the institutional structure of society and strategic guidelines for the country's economic development in the conditions of an innovative economy is required. Since even the most advanced technologies cannot successfully develop and function in a poorly developed business and institutional environment.

To ensure the stable development of the state and its subjects, today we need not just discrete innovations, but continuous innovative activity. This situation is achieved only within ecosystems, where new products and technological innovations are created together, in the format of collective actions.

A situation arises when, on the one hand, it is necessary to investigate the reality and trends of its development, and, on the other hand, to provide prompt and reliable information for

interested stakeholders, first of all, as well as public authorities, in the form of a set of supporting signs in order to make operational management decisions. In this situation, it is necessary to turn to the methodology of simulation modeling, which will allow transferring the collected information from the category of inert material into the evaluation process, thereby increasing the efficiency and validity of management decisions. The information collected is usually quantitative and qualitative in nature, which complicates the process of its analysis and evaluation. In this regard, optimization-qualimetric management models will be of certain interest. The effectiveness of their use will lie in the possibility of variable management in conditions of uncertainty and in assessing the quality of the decisions made before their implementation.

Theoretical and practical thoughts about this problem could be found in articles of such authors as Czarnecki M.T. – “Managing by measuring: How to improve your organization's performance through effective benchmarking” [5], Dorfman R., Samuelson P.A., Solow R.M. – “Linear programming and economic analysis”, Brown R.G - “Economic Order Quantities for Materials Subject to Engineering Changes” [3], Bellman R. - “On the Computational Solution of Programming Problems Involving almost Block Diagonal Matrices” [2], Fleming Q.W., Hoppelman J.M. – “Earned value Project Management” [6], Tijms H.C. - “Stochastic Models – An Algorithmic Approach” [8], Morse P. - “Queues, Inventories and Maintenance” [7].

The advantage of using the optimization-qualimetric model is the possibility of using an inverse algorithm, which allows, based on the required estimated level, to determine the actual parameters for extrapolation. This is of great practical importance in the field of territorial administration. Public authorities preliminarily determine the values of indicators that will signal the successful development of the territory, and then, comparing their values with the actual ones, develop strategic plans for the development of the territory.

When using the optimization-qualimetric model, it is necessary to determine the values of the "boundary states of the balanced system" with the designation of their boundaries. In other words, the set values of the indicators can deviate both in the positive and in the negative direction. However, such deviations within a certain interval will be considered normal. Only deviations that go beyond the boundary state will require prompt intervention from the authorities. The use of this category will be considered as a criterial assessment of the effectiveness of the developed program document, and the threshold values of the indicators will allow timely corrective actions to be taken in order to prevent critical deviations and make informed management decisions.

Certain restrictions in the construction of a new model of territorial development management will arise due to the uncertainty of the development of one of the main resources of the economy - personnel. It is the knowledge and ability of people, their key competencies that will determine the success of modernization of the territory development management system, as well as the possibility of its effective operation.

Thus, the new virtual model of territorial management, based on optimization-qualimetric modeling, will increase the flexibility and efficiency of the management process, move away from hierarchical management systems and create a horizontally connected network environment for the free flow

of technologies and innovations between sectors and territories.

### III. INNOVATIONS IN THE FIELD OF SPATIAL DEVELOPMENT AND PUBLIC ADMINISTRATION

In the digital age, information is turning into a strategic asset of public authorities, which can be used to significantly increase the effectiveness of implemented policies. The use of artificial intelligence and robotization of a number of routine processes will significantly reduce transaction costs and risks, improve the quality of service and the level of customer satisfaction.

The goal of digital transformation in the field of state and municipal administration is to create a digital ecosystem under the guidance of the state, which would make it possible to build constructive interaction in the virtual space of authorities with commercial and non-profit organizations, financial institutions and citizens.

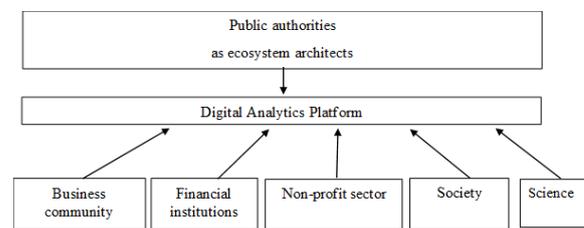


Fig. 3. Public administration ecosystem in the context of digital transformation

In a number of foreign countries, various standards for the provision of digital services have been developed and are being implemented, a digital government is being created, the priority task of which is to collect and integrate information about the economic situation, legal entities and individuals into a single database, available for joint use by various public authorities. Of course, this form will not replace the actually operating authorities, it is a kind of shell, an electronic form of communication between state authorities, local governments, business structures and citizens based on information and communication technologies.

Mass digitalization raises many philosophical and legal questions. By authorizing himself on digital platforms, a person provides his personal data and transfers certain rights for supporting him in various life situations. Thus, a person has a "digital twin" and new forms of citizenship - digital, virtual.

In business, the digital platform is shaping the new infrastructure of markets by eliminating intermediators and hierarchical relationships. This approach allows businesses to reduce costs, expand their geography and market share. At the same time, by entering the business models of economic entities, the owners of digital platforms gain control over supply chains and the pricing process. In other words, there is a strategic threat for a business to become dependent on the owners of digital platforms or even lose control over their business.

In this regard, public authorities need to protect the market from being monopolized by the owners of digital platforms, to form control mechanisms and norms of behavior for users and owners of digital platforms in cyberspace. To solve this problem, it is necessary to implement reasonable digital protectionism, provide state guarantees and preferences to

increase consumer trust in digital platforms, as well as develop technologies for personal identification and analysis of digital traces.

Note that the ideas of customer focus and maximizing the usefulness of the activities of public authorities for citizens have become very popular in the leading countries of the world. Moreover, there takes place a borrowing and adaptation of management methods used at the level of an economic entity in relation to territorial management. This is not accidental, since the business sector is highly dynamic and less formalized due to the high level of competition, which determines its rapid adaptation to the turbulence of the external environment and leads to the need for a constant search for new management solutions to increase competitiveness.

Within this approach, the territory is considered as a quasi-enterprise with a geographic location, resources, objects of economic activity, infrastructure, qualitative and quantitative composition of the population and the actual administration elements (public authorities). However, the purpose of the activity of such a quasi-enterprise, in contrast to the traditional one, is to achieve a social effect, and not to maximize profits. In this regard, this kind of quasi-association can be called a "social corporation". In turn, residents of the territory, local and foreign business, public organizations and associations are clients, on the quality of service of which the prosperity of the territory and the quality of life of the population will depend.

The key factor for the success within this approach is the competitiveness in all fields and on all levels of management. Public authorities, to manage the territory, should use not administrative, but the economic influence methods applied at the single enterprise level and adapted to the conditions of managing complex social-economic systems which help to compete for clients and other territories.

The following goal will be of decisive importance here: creating a favorable social, economic and ecological climate for people to live and attracting investors. In order to realize this goal, it is necessary to develop infrastructure, provide for a flexible system of benefits and preferences for local taxes, create conditions for attracting qualified labor resources, etc.

In this regard, the issues of rational distribution of productive forces and district planning began to acquire great importance. A figurative comparison can be made here. Just like the alignment of combat forces on the fronts largely determines the outcome of hostilities, the location of production plays a decisive role in the economic and social development of a territory.

The creation of an integrated system of spatial development of the territory is the only opportunity to preserve the spatial integrity of the territory and ensure its stable socio-economic development. In order to see the "whole picture" of spatial development, geospatial data are widely used, including maps, transport and other layers, and address data. Relying on spatial analytics, authorities can get answers to questions about the real state of business in a particular territory, about the possible vector of changes associated with the turbulence of the external environment, obtained on the basis of modeling and forecasting. We believe that further economic development of the country is impossible without the development of technology for

collecting, processing and analyzing spatial data, and this task should be considered as a national priority for Russia.

The system of identification of spatial objects existing today includes all kinds of registers and cadasters, developed by various federal executive authorities. With the joint use of such spatial data, various kinds of difficulties appear, so today there is a need to harmonize and integrate databases, to build a single information space for the country. Without such a system, spatial development will proceed spontaneously, which will ultimately lead to fundamental changes in the geopolitical sphere and will threaten Russia's national interests and security.

Automation of the spatial objects identification system will enable public authorities, organizations and citizens to gain free access to spatial data, which will ensure transparency and efficiency of management.

For increasing involvement of the population into the development and implementation of state and municipal policies, digital technologies can be used (crowdsourcing, a digital profile of a citizen, a single trust space for an electronic signature, etc.). The tools and methods of e-government are quite diverse and are constantly updated due to the rapid development of the information society. Crowdsourcing, which, like many other technologies, initially proved its business efficiency in the field of entrepreneurship, presents ample opportunities for increasing civic engagement and getting feedback. For example, the UK government created the "Jolitics" social network (<https://twitter.com/Jolitics>), which allows citizens and public groups to lobby their interests in the legislative process. In the United States, this task is performed by the "Pop Vox" crowd platform (<https://www.popvox.com/about>), which is open to proposals for draft legislation pending in Congress. In Finland, citizens can initiate amendments to laws through the resource "Open Ministry" (<http://openministry.info>). One of the most developed platforms in Russia is the "Moscow Government Crowdsourcing Projects" website (<https://crowd.mos.ru/>).

However, it takes time and a high level of information propaganda about the functions and benefits of the new electronic service to promote any new phenomenon.

#### IV. CONCLUSIONS

Summarizing the above, we note that today digital technologies are a reality that permeates all spheres of everyday life, economic and management activities. Not only modern business, but also public authorities are gradually moving into the virtual space. The level of success and competitiveness is beginning to be determined by the quality of digital platforms used by business and government, as well as the speed of implementation of advanced technologies.

The world is on the verge of a radical restructuring of the management system. Information technologies create objective prerequisites for the creation and evolution of network as well as virtual management structures in various spheres of public life, including politics, economics, science and education. Networked business communities do not know spatial boundaries and do not have a lifetime, their functioning is determined by the timing of the project concept implementation. The networks are based on the principles of cooperation of legally independent enterprises, geographically distributed and operating in an integrated information space. The coordination of the actions of the network participants

occurs within the framework of the implementation of joint projects, and the interaction is dynamic in nature.

The transition to a digital economy and a new territorial management system will increase the level and quality of life of each person and create certain conditions for realizing the potential of each person. Russia has already done a lot to catch up with the world's leading countries in terms of digitalization, but there is still much to be done in order to take its rightful place in the global high-tech market.

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