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Lunyak V., *Postgraduate student of the Classical Private University, Zaporizhzhia*

Луняк В.Е., *аспірант, КПУ, м. Запоріжжя, ORCID: 0000-0002-3469-3680*

ANALYSIS OF THE FUNCTIONING OF PUBLIC ADMINISTRATION MECHANISMS IN THE SPHERE OF DIGITALIZATION OF INNOVATIVE ACTIVITIES ABROAD

АНАЛІЗ СТАНУ ФУНКЦІОНУВАННЯ МЕХАНІЗМІВ ПУБЛІЧНОГО УПРАВЛІННЯ У СФЕРІ ЦИФРОВІЗАЦІЇ ІННОВАЦІЙНОЇ ДІЯЛЬНОСТІ ЗА КОРДОНОМ

The state of functioning of state policy mechanisms in the field of digitization of innovative activities abroad has been studied. The role of development vectors of public management mechanisms in the field of digitization of innovative activities is substantiated.

Keywords: *public management, mechanisms of public management, digitalization, digitalization technologies, innovative activity.*

Досліджено стан функціонування механізмів державної політики у сфері цифровізації інноваційної діяльності за кордоном. Обґрунтовано роль вектори розвитку механізмів публічного управління у сфері цифровізації інноваційної діяльності.

Ключові слова: *публічне управління, механізми публічного управління, цифровізація, технології цифровізації, інноваційна діяльність.*

Problem setting. In the world economy in recent years, there have been changes in the main course of informational and technological development of economic entities, industries and regions. Universal informatization is being replaced by digitization (digitalization), which should result in the establishment of a digital economy. The digital economy (DE) as a new phenomenon attracts a lot of attention from politicians and economists. The governments of many countries have already chosen the digital path of development. National initiatives of South

Korea, USA [7], Great Britain [19], Singapore [4; 10], China [12] and other countries with developed or rapidly developing economies are aimed at realizing the possibilities of digitalization and achieving new effects of CE. The need for new sources of innovation that ensure sustainable economic growth is the main impetus for national initiatives of many countries to transfer the economy to a digital development path.

Recent research and publications analysis. Organizational, legal, economic and other aspects of the formation and implementation of state policy in the conditions of digitalization were studied in the scientific works of scientists L. Anaya, L. Antonova, O. Borysenko, M. Castells, L. Gren, O. Gromyko, A. Davidson, S. Nambisan, N. Nasir, A. Pomaza-Ponomarenko, Yu. Ulyanchenko, A. Khaletska, E. Shchepansky, and others.

Paper objective. The purpose of the article is to analyze the current state of implementation of public management mechanisms in the field of digitization abroad.

Paper main body. Innovative activity, like other types of activity, undergoes significant changes under the influence of digitalization of society [9]. Digitization of society is expressed in the integration of IT, accumulated by society, into the IT infrastructure, which becomes available for use in the economic activities of citizens and organizations. As a result, new opportunities were created for the creation of innovations by organizations. The achievements of digitalization should include the ubiquitous coverage of the territory by telecommunication networks, the spread of the Internet of Things, the availability of state support and a legal framework for the development of the digital economy. Thousands of mobile application developers have the opportunity to offer their software to smartphone users around the world through a mobile computing device owned by users. In essence, digitalization, as a stage of IT application in society, differs from informatization in that the scale of electronic communications and interaction has acquired a truly global character, including people, organizations, and numerous devices via the Internet.

The source of new opportunities for innovative activity is also the modern IT culture of society, which includes the widespread use by citizens of personal mobile computing devices (smartphones and tablet computers), personal computers, as well as high information and computer competence of citizens. According to the estimates of the World Bank [17], Ukraine ranks 27th among 180 countries according to the index of readiness for the digital economy (Table 1).

The results of research by international organizations [8] show that digitization creates opportunities for organizations to transition to a digital economy, i.e., to increase the efficiency of their activities due to the use of accumulated IT aggregates and large volumes of data. However, the use of these opportunities depends on the innovative activity of the organizations themselves.

Table 1

Top 40 countries according to the World Bank's digital economy readiness index, 2019 [17]

Rating	Country	Index	Rating	Country	Index
1	Singapore	0,871	21	Italy	0,765
2	Luxembourg	0,863	22	Spain	0,765
3	Austria	0,862	23	Great Britain	0,764
4	South Korea	0,858	24	Uruguay	0,759
5	Malta	0,855	25	Chile	0,756
6	Germany	0,840	26	France	0,754
7	Netherlands	0,838	27	***Ukraine***	0,747
8	Japan	0,835	28	Iceland	0,744
9	Estonia	0,833	29	Latvia	0,739
10	Sweden	0,832	30	Czech	0,731
11	UAE	0,823	31	Slovenia	0,724
12	Switzerland	0,822	32	Australia	0,715
13	Finland	0,807	33	Qatar	0,712
14	Norway	0,804	34	New Zealand	0,708
15	Lithuania	0,793	35	Canada	0,706
16	Denmark	0,791	36	Hungary	0,691
17	Israel	0,788	37	Poland	0,691
18	Bahrain	0,786	38	Slovakia	0,690
19	Portugal	0,785	39	Serbia	0,690
20	Belgium	0,780	40	Malaysia	0,687

From the table 1 shows that Ukraine is ahead of 11 countries in terms of the level of use and distribution of IT, but is inferior to 43 countries in terms of the level of innovative activity of organizations. Thus, we can single out Russia, Chile and Poland as countries where the potential of accessible IT in innovation is not fully used [17].

A low level of innovation activity hinders the development of the digital economy, since the use of IT or its availability alone does not lead to increased efficiency. IT needs to become a source of innovation for organizations. The results of Russian researchers confirm that the introduction of IT into the activities of enterprises does not automatically lead to changes in business processes, products, services or methods of their distribution. While studies conducted among European [11] and Arab [5] organizations show the great influence of IT on the creation of different types of innovations.

The ongoing changes in the information technology paradigm of society create opportunities for expanding the list of subjects and resources of innovation

activity. At the same time, the modern idea of the innovation environment in which the interactions of subjects and resources of innovation activities take place does not take into account new opportunities for its development due to the digitalization of society.

Many researchers focus their attention on financial [5], regional [8; 11; 12] and other aspects [16] of the innovation environment. Research into the innovation environment is acquiring great importance in the context of the development of digital economics, since obtaining new economic effects is possible by using the achievements of digitalization of society in innovation activities.

Research in the field of DE has been carried out in world science since the end of the 20th century. In early studies, the digital economy was most often understood as the use of information technology in economic activities. At that time, the terminological apparatus was just being formed and many concepts were identical in meaning and were used equally widely in the academic and business communities. Such identical terms include "digital technologies", "electronic technologies", "information technologies", and derivative concepts such as "digital economy", "electronic business", "information society". Later, many terms began to be clarified and adjusted. The author of some of the first works on CE, Don Tapscott, [16] a professor at the University of Toronto, introduced the concept of "wikinomics" in his later works.

The first studies on the digital transformation of society were carried out by scientists: Manuel Castells [2; 6], professor at the Open University of Catalonia, Frank Webster, professor at the University of London, and many others. The impact of innovation on economic development was studied by Robert Reich [15], an American professor, and Peter Drucker [1], a professor at Harvard University. Russian economists have studied the importance of information support in the formation of resources of an innovative economy - knowledge.

Researchers [15; 16] confirm the fact of the transition to the next phase of socio-economic development from post-industrial (information) to "post-information" (smart, digital). A distinctive feature of DE is the ability of business entities to carry out innovative activities using a set of IT and information resources, covering almost the entire IT infrastructure. Achieving high socio-economic results is ensured through the synergistic effect of information resources accumulated in society and technologies that allow working with them. Thus, the entire IT infrastructure will be involved in the creation of new economic benefits in the digital economy, including the computing power of the business entity itself, other organizations, as well as individual devices of its consumers (clients).

Based on the definition of the digital economy, the main resource for increasing the efficiency of various types of economic activities lies in the digital form of data representation. This is practically the entire modern volume of information. In rare cases, the form of information presentation may be non-digital.

In the context of government initiatives and steps taken to promote the idea of digital economics, the key to transformative activities on digital data lies in their automated processing and analysis, which serves as the basis for the creation of new knowledge that can lead to the creation of innovations.

Working with information resources should allow business entities to obtain new economic effects in production, promotion of goods and services, interaction with clients, i.e., achieve a new level of efficiency thanks to the totality of IT and information resources accumulated in society.

Indeed, the totality of information technology accumulated by society, including user and corporate computing devices, the volume and quality of Internet connections with various systems and Internet services leads to the accumulation of information resources in the systems that were previously inaccessible. Every entity or device connected to the network leaves a long-lasting and detailed digital trail across multiple systems and Internet services. This footprint, expressed in digital data, is stored in data centers.

Automated processing of collected data using predictive analytics, machine learning, and artificial intelligence technologies can provide a new quality of decisions made, for example, in customer service (customization), organizing the safety and comfort of citizens. In a broader sense, information resource activities involve analytics. Information analytics methods applied to digital data provide new insights that lead to innovation.

Since the beginning of the intensive development of IT, three stages can be distinguished in the practice of their use in the economy: automation, informatization and digitalization (Table 2). As IT developed and penetrated into production and management processes, automation occurred, first of individual functions and operations, and then of entire economic and management systems.

So, the development of IT keeps pace with the development of the theory of managing the economy as a cybernetic system, which must be managed taking into account the many complex elements and relationships that arise in this system.

It is possible to measure and control changes in individual elements of the system only using electronic computer systems. Their use makes it possible to automate routine operations performed according to a given algorithm. Thanks to automation, the speed of data processing, its accuracy, and the number of errors are significantly increased compared to human data processing.

The spread of the cybernetic approach to the management of economic systems leads to the formation of a need for IT and an increase in demand for IT and communication lines. At the same time, the formation and intensive development of the IT industry and IT market is taking place. The IT industry includes the design and production of computer and telecommunications equipment, as well as the creation of software for a variety of applications and computing devices.

Table 2

Stages of using information technologies in economic and management systems

IT application stage	Target of IT impact	Core IT	Characteristics of socio-economic and management relations
Automation 1960s	Routine operations, agglomerated functions	Software calculation algorithms, automated workstation TPS (Transaction ProcessingSystem)	Post-industrial economy
Informatization 1980s	Business process, new types of management activities	Analytical information systems, management information systemsDSS (Decision Support System), ERP (Enterprise Resource Planning)	Network economy. Information economy E-government
Digitalization 2000s	Market, industry, new types of economic and management activities	Digital platforms IoT (Internet of Things), distributed registry systems, augmented and virtual reality, neurotechnologies, mobile applications that help improve the quality of administrative services	Digital economy or web-economy

As IT develops and spreads, a post-industrial economy is being formed, where competitive advantages are based on intangible assets and the quality of automated data processing. With the development of the post-industrial economy in the world, the need for national economic systems in IT is growing. Figure 1 shows the dynamics of the number of countries participating in the global IT market.

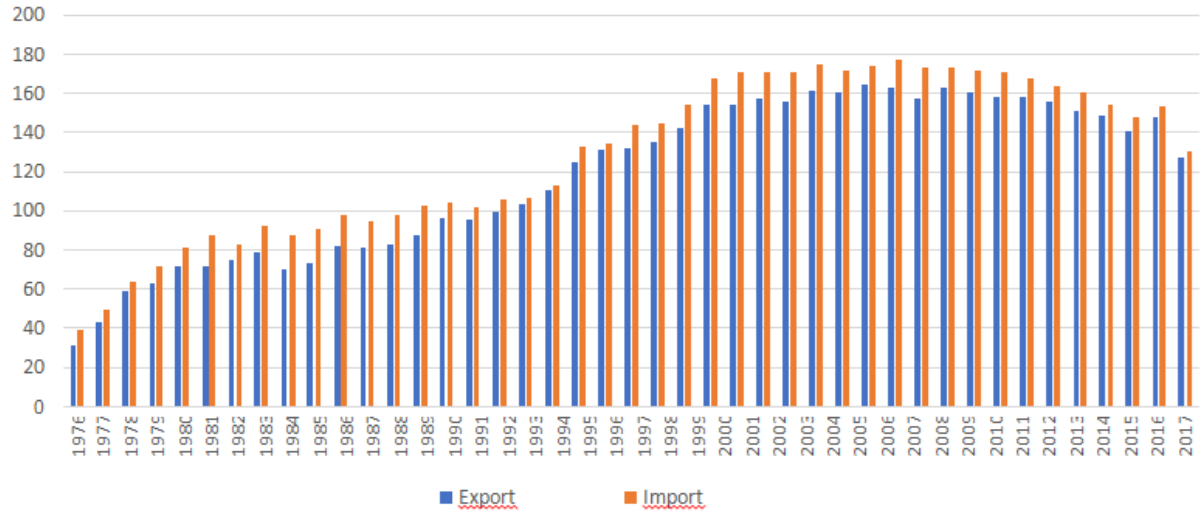

Figure 1. Number of countries involved in international trade in computer and telecommunications technologies, 1976–2018

Source: Developed by the author based on UN Comtrade data [19]

The dynamics of the global market for computer and telecommunications equipment indicate high rates of its development, which are many times higher than the growth rates of other markets during the formation of the post-industrial (information) socio-economic phase. The development of the IT industry leads to technologies becoming more productive and complex. In 1965, Gordon Moore established a pattern that microcircuits with double the number of transistors on one chip appear on the market every 1.5 years [19].

At the same time, IT is becoming more accessible for use in various areas due to lower costs. Figure 2 shows market dynamics in US dollars. In physical terms, the growth rate of the global IT market will be significantly higher.

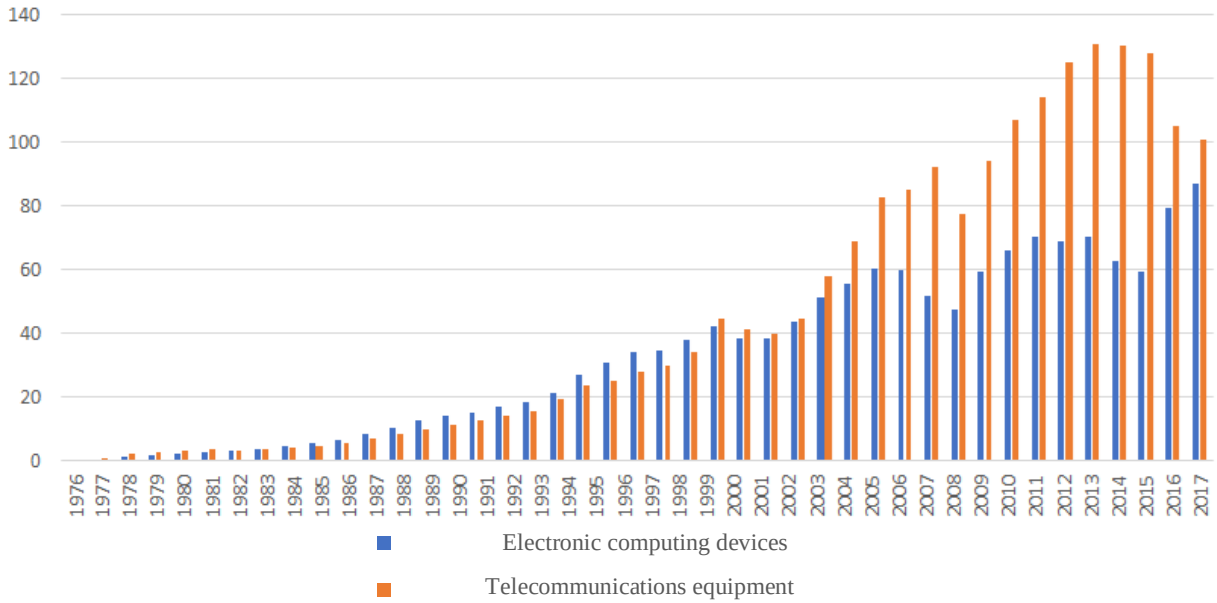

Figure 2. Dynamics of the global market for computer and telecommunications equipment, 1981–2018, billion dollars.

Source: Developed by the author based on UN Comtrade data [19]

Thus, as IT penetrates into society and the economy, the importance of the quality of information support for the development of business entities and regions increases, and the need for more complex information solutions grows.

Conclusions of the research. The information infrastructure created in society, consisting of telecommunication networks, computing power, and volume of content, creates the basis for the expanded use of IT. In essence, digitalization characterizes a new level of use of the totality of IT in the economy and society, which involves not only the devices of the business entity itself, but also the consumers of its products and services. Thus, digitalization makes it possible to use

access to computing power and information resources to use the totality of IT society in its economic activities.

The processes of automation, informatization and digitalization do not replace each other, but reflect the consistent path of an economic entity to a digital economy and management system.

The transition from automation to informatization is characterized by comprehensive coverage of the business process by the information system. And the transition from informatization to digitalization involves the collection and processing of digital data using the IT infrastructure of a business entity, as well as government bodies that provide electronic public services, and consumers who, using their personal computing devices, interact with IT services or digital platforms. Fundamental changes in information technology support occur as a result of the fact that the content of information systems changes significantly. At the automation stage, the business entity carries out algorithmic processing of resources, structured data that it collects independently as a result of its production activities, or purchases data resources from suppliers. At the stage of informatization, needs expand to flows of various information, structured, semi-structured and unstructured, requiring appropriate IT and methods of management and use. The number of sources and formats used for data is growing. During the transition to digitalization, data sources increase many times over, and the volume of information resources to be processed increases sharply.

The digitalization of society has led to the creation of the following significant achievements: the integration of numerous computer and telecommunication devices into the IT infrastructure of society; accumulation of large volumes of information resources; growth of computing power; regulatory support; widespread use of the Internet and IT by citizens (76% of the population are Internet users, 53.1% use mobile Internet, 99% own a mobile phone, and 76% are users of social networks).

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