Analysis of development of economic digitalisation stages: evolution, views, and approaches to concept study

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ORIGINAL ARTICLE

Abstract. The article examines the stages of the development of economy digitalisation, evolution, and change in the perception of the phenomenon under study in the scientific literature. Digitalisation is a key factor in the transformation of global and national economic systems. Indeed, digitalisation importance is a catalyst for the modernisation of all spheres of economic life and the formation of new models of its participant's interaction. The article considers the prerequisites for concept formation and highlights four main stages: 1960s-1990s – automation of individual production processes; 1990s-2000s – the development of network technologies and the introduction of Internet commerce; 2000s-2010s – mobile technologies and platform solutions; 2010s-current time – integration of artificial intelligence, big data and blockchain technologies. The research analyses theoretical, effective, structural, technological, resourcing, communicative, motivational, intermediary-service, instrumental, and managerial approaches to digitalisation. Their study allows ones to comprehensively assess the key aspects of the digitalisation of the economy: from increasing productivity to transforming the entire economic structure. The analysis of each approach reveals how digitalisation affects the economy, transforming its models, processes and resources, and reveals its multi-layered nature in modern realities. In addition, the research focuses on the role of digitalisation in establishing of new economic models, innovative ecosystems, and global digital platforms. However, the article considers the social aspects of digitalisation, including the impact on employment, inequality, and social interactions. Moreover, the article examines the impact of digitalisation on globalization and economic integration, its role in reforming government and corporate structures. The authors emphasise digitalisation as a foundation of a new economy.

Keywords: digitalisation of the economy; stages of economy digitalisation; approaches to understanding of economy digitalisation; digital transformation

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Introduction

The digitalisation of the economy is a phenomenon that in recent decades has become a determining factor in the transformation of global and national economic systems. This process dwells on the rapid development of information and communication technologies transforming the structure, dynamics, and directions of economic development. It provides the modernisation of all areas of economic life and forms new models of interaction between business participants. To understand the impact of digitalisation on the modern economy and its prospects, it is necessary to consider its evolution, identify key stages, and changes in its perception. In addition, the relevance of the study concerns with the need for a comprehensive study of the stages and approaches of economy digitalisation.

The history of digitalisation is closely related to the technological evolution started back in the middle of the 20th century. Initially, the impact of digitalisation was limited to the development of computing technologies and automation of production processes. However, it has transformed into a multi-level process

encompassing all spheres of economic and social life. For a more detailed analysis of economy digitalisation, it is important to consider the conditions for this concept emergence and define the key stages of development. Special attention should be paid to the theoretical approaches and views of various authors interpretations at different stages of its formation. The scientific community is interested in the digitalisation issues. Indeed, researchers M. Castells, D. Bell, D. Bresnahan contributed to understanding the impact of digitalisation on economic processes. However, structural changes and the impact of digital technologies on the labour market, the study of approaches require further research.

The object of the study is the digitalisation of the economy as a complex socio-economic phenomenon.

The article analyses the stages and concepts of economy digitalisation in terms of its historical context and the modern representation.

The purpose of the study is to analyse the stages of economy digitalisation and form a holistic view of its evolution and multilevel impact on economic systems.

Within the framework of achieving the research goal, it is permissible to set the following tasks:

1. to study the prerequisites for the formation of economy digitalisation;
2. to analyse the stages of the development of economy digitalisation in terms of concept evolution in the scientific literature;
3. to explore key approaches to understanding economy digitalisation;
4. to consider the features of the digitalisation of the economy at various levels.

Main Part

The methodological basis of the research is based on the general scientific principles of historical and systemic approaches, methods of logical, criteria-based, and comparative analyses. The evolutionary approach is used contextually in the study of a single inseparable structure of the historical and logistic-analytical line. The article presents a grouping of the concepts of "digitalisation of the economy" on a substantive basis in accordance with the author's vision of the contribution of scientists to the development of the term under study. An attempt has been made to draw historical and logical parallels in terms of the implementation of the evolutionary analysis of the digital economy, based on the principles of complementarity.

Prerequisites for the formation of the concept of "digitalisation of the economy"

The concept of "digitalisation" became popular in the scientific and economic literature in the late 1980s with the formation of the foundations of the global digital economy associated with the active introduction of information and communication technologies (ICT) into production and management processes [12]. However, the prerequisites for the emergence of this phenomenon were formed quite earlier. One of the key factors contributing to the emergence of digitalisation was the widespread use of computer technology started in the middle of the 20th century. In the 1950s, the first computers provided the automation of individual economic sectors. It caused the transformation of production process management methods. The computer technology has made it possible to store and process data more efficiently. It ensured the subsequent digitalisation of the economy.

In addition, the development of telecommunication technologies has played an important role in the emergence of digitalisation as a phenomenon. The occurrence of the Internet in the 1960s and 1970s was a real technological breakthrough; it allowed users and companies around the world to be connected into a single information space. An important stage was the establishment of the World Wide Web in the early 1990s. It made possible to exchange information, form new ways of doing business through Internet platforms, etc. As a result, economic processes began to move into the virtual environment. Moreover, it was one of the key factors in the emergence of the digital economy [15].

The prerequisites for digitalisation can also be viewed through the prism of globalisation and economic integration. Already in the late 1980s, the global market required the faster information exchange and the introduction of innovative technologies; it provided new requirements for companies and government agencies regarding information and process management. This process was closely related to the development of post-industrial society with information as an independent resource. Therefore, it became necessary to revise

economic models and management methods. It causes the realisation of the importance of digitalisation as a new stage in economic development [8].

At different stages of the development of digitalisation, researchers offered their own vision of the process under study. However, views on digitalisation have changed depending on technological progress and economic conditions. It confirms the complexity of this phenomenon.

Stages of development of economy digitalisation and concept evolution in the scientific literature

The digitalisation of the economy has gone through several key stages; each concern with the development of technology and changes in economic and social processes. Therefore, it is important to consider its development in terms of history and how its perception has changed in scientific and economic literature.

For a detailed comprehensive analysis and study of the development of economy digitalisation and the evolution of the concept in the scientific literature, the authors compiled Table 1.

Table 1 – Key stages and evolution of authors' views on economy digitalisation

Stage	Characteristics	The views of the authors
The first stage (1960-1990)	- Introduction of the first computer systems; - Automation of individual production processes.	- R. Solow and D. Norton: digitalisation as a tool to increase production efficiency; - D. Bell: the transition from an industrial society to a society based on information and knowledge.
The second stage (1990-2000)	- Development of network technologies; - Limited implementation of the new trading format.	- M. Castels, N. Negroponte, Don Tapscott: integration of global economic processes and the formation of a new information economy; - James Moore notes the strengthening of digitalisation social aspects.
The third stage (2000-2010)	- Strengthening the role of mobile technologies and the platform economy; - Transformation of the principles of economic activity.	- T. Bresnahan: the introduction of platform business models; - Strengthening the role of digital ecosystems.
The current stage (since 2010)	- Artificial intelligence, blockchain, IoT, big data.	- Klaus Schwab: The Fourth Industrial Revolution, the fusion of physical, digital, and biological systems; - It impacts on the technical aspects of production, companies' organisational structure, business models, and forms of employment.

Source: composed by the authors

The first stage of digitalisation. It was in 1960s-1980s and focused on automation and computerisation of individual production processes, and introduction of the first computer systems in enterprises. It significantly improved the information processing and management of production processes. Notably, digitalisation concerned mainly large corporations and government agencies, as computer systems remained quite expensive and complicated in use. For instance, the introduction of the first computer systems at Ford and General Motors plants has significantly increased labour productivity by automating a number of operations [23].

The introduction of a modular conveyor assembly line at Ford plants has significantly improved the company's production and financial performance. Automation and the use of modular assembly reduced production costs and increased productivity. It allowed Ford to produce cars with high efficiency and lower costs. As a result, the company was able to scale production, respond to growing market demand and remain competitive. It resulted in increased profits and strengthened its position in the industry. These innovations

have also enhanced Ford's ability to adapt to market changes, contributing to its long-term growth, and financial stability. Since 1980, Ford has been investing in automation of the production line. Financial indicators increased markedly in 1986. There is a natural increase of the company's assets. In 1980, the company's assets amounted to $23,524.6 mln USD. In 1985 Ford is actively investing in the improvement and automation of the production line. Since 1986, the volume of products and the company's profit has increased significantly from $52,774.4 to $71,643.0 mln USD in 1988[1].

Table 2 – Report on Ford's financial performance, 1980-1988

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988
Revenues, $ mln USD	45,513.7	37,085.5	38,247.1	37,067.2	44,454.6	52,366.4	52,774.4	62,715.8	71,643.0
Income $ mln USD	1,169.3	-1,543.3	-1,060.1	-657.8	1,866.9	2,906.8	2,515.4	3,285.1	4,625.0
Assets, $ mln USD	23,524.6	24,347.6	23,021.4	21,961.7	23,868.9	27,485.6	31,603.6	37,933.0	44,956.0
ROI, %	-14.8	-29.4	-10.2	132.1	65.4	11.2	35.3	51.4	39.1

Source: Ford Motors company statistics[2]

The views of the authors. At the beginning of digitalisation development, it mainly concerned with the automation of production processes. Indeed, R. Solow and D. North considered digitalisation as a tool to increase production efficiency. According to them, the introduction of computer systems and automation made it possible to significantly reduce the cost of production operations and increase labour productivity. However, digitalisation was considered as a narrow phenomenon, limited mainly to the sphere of production [21, 24].

In the 1980s, D. Bell introduced the term "information society" to refer to the transition from an industrial society to a society based on information and knowledge. He considered information technology would become the most important resource and catalyst for changes in the economy and social structure of society [1].

The second stage of digitalisation. It began in the 1990s with the development of the Internet and telecommunications. The World Wide Web and the development of network technologies have become the basis for the globalisation of economic processes. This period is also characterised by establishing of the first Internet companies such as Amazon and eBay. They introduced a completely new trading format based on online platforms. Indeed, at this stage digitalisation concerns large companies, small, and medium-sized businesses. Internet commerce is becoming an important element of economic development, and digital technologies began to have an impact on an increasing number of economy sectors.

The views of the authors. In the 1990s views on digitalisation began to change. Indeed, M. Castels and N. Negroponte considered digitalisation as a process affecting on production, communication, and information exchange. They emphasised it provides globalisation and the formation of a new information economy [4, 20].

In the 1990s, the development of the Internet and mobile technologies provided the use of the concept of "digitalisation" in relation to the globalisation of economic processes and the increasing role of information technology in international trade. Meanwhile, M. Castells proposed the idea of a "network society". He considered digitalisation as a concept changing the principles of economy with information and knowledge exchange networks as key factors. This influenced the understanding of digitalisation as a process changing

[1] *Fortune 500: Ford Motors company statistics. URL: https://money.cnn.com/magazines/fortune/fortune500_archive/snapshots/1988/529.html (Accessed: 19.10.2024)*

[2] *Fortune 500: Ford Motors company statistics. URL: https://money.cnn.com/magazines/fortune/fortune500_archive/snapshots/1988/529.html (Accessed: 19.10.2024)*

the entire structure of the economy [4].

Tapscott in his work considers digitalisation as a fundamental element of the formation of a new information economy with knowledge and data as the main resources. Moreover, innovative technologies and the Internet play the role of catalysts for global economic transformations [25].

Hence, many authors highlight economic and social aspects of digitalisation. J. Moore, in his theory of "digital ecosystems" dwells on the modern economic systems should be considered as complex ecosystems with companies, consumers, government, and international organisations interactions through digital channels and platforms. In this ecosystem information is an essential resource; the success of companies and states depends on their ability to effectively use and manage data. In his theory, the author illustrates how digitalization is changing the understanding of the economy, turning it from a linear system of exchange of goods and services into a complex network of interconnections and data [19].

The third stage of digitalization. It began in 2000-2010. Those time mobile technologies and platform solutions began to play a key role in the economy. The process changes the mechanisms of business operation and principles of economic activity. Digitalisation allows companies to operate globally with minimal infrastructure and operational costs. An example of this is the phenomenon of the so-called "platform economy". It is based on the use of digital platforms to provide services, organise sales, and interact with consumers and partners. Smartphones, mobile applications, and cloud technologies provided digitalisation into business and people's daily lives. An important element of this period was the development of the platform economy. The companies such as Uber, Airbnb, and Alibaba were able to establish global platforms providing access to various services. These platforms became the basis for a new stage of globalisation; companies and individuals were able to interact directly through digital technologies [16]. The level of Internet consumption is growing rapidly: from 414 mln people worldwide in 2000 to 2.2 bn people by 2010. In 10 years, the indicators have increased 5.3 times. By 2010, Asia was the leader in the number of consumers of the service, reaching 940.35 mln households [3].

The views of the authors. In 2020, the term "digitalisation" is a more complex phenomenon, concerning with various aspects of the economy, such as digital platforms, e-commerce, digital government, etc. According to T. Bresnahan, the development of digital technologies ensured the formation of new economic models based on the use of data and digital platforms for business organisation and production process management [22].

The current stage of digitalisation. It began in the 2010s and continues to the present considers digital technologies as an integral part of all sectors of the economy. Artificial intelligence, big data, the Internet of Things (IoT) and block chain are actively integrating into various industries, from finance to agriculture, providing new opportunities for economic growth. For instance, the use of big data in agriculture makes it possible to optimise yield management processes and use resources more efficiently; block chain technologies are used in logistics and the financial sector, ensuring transparency and security of transactions [17]. Digitalisation is considered not only as an automation tool and innovative ecosystem for interaction of companies, government agencies and citizens at a new level [2].

The views of the authors. K. Schwab' modern view on digitalisation emphasizes the complex nature of this process. Digitalization is considered as a transformation of the entire economy, including business processes, public administration, social structures, and interaction between different levels of economic agents. In his concept of the "Fourth Industrial Revolution", K. Schwab focuses on the fusion of the physical, digital, and biological spheres. It establishes fundamentally new opportunities for economic growth, innovation, and acceleration of social change [11].

Modern scientific literature offers many definitions of the economy's digitalisation, representing the complexity and multi-layered nature of this phenomenon. One of the most recognised is the definition proposed by the OECD (Organization for Economic Cooperation and Development). According to it, digitalisation is the process of integrating digital technologies into the daily activities of companies and citizens, causing establishing of new forms of economic activity and improvement of existing ones. Indeed, digitalisation affects all sectors of the economy and contributes to increased productivity and efficiency [18].

Moreover, A. McAfee and E. Brynjolfsson defines digitalisation as the process of introducing digital technologies, providing a fundamental transformation of business processes, consumption patterns, and interaction between economic entities. According to them, digitalisation impacts on the technical aspects of production, companies' organisational structure, business models, and forms of employment. This definition focuses on the transformational nature of digitalisation affecting on social aspects such as inequality, employment, and access to technology [14].

According to the Higher School of Economics, Moscow, Russia report, digital transformation represents significant changes in business processes or methods of economic activity (in business models) caused by the introduction of digital technologies and leading to significant socio-economic effects [10].

According to the World Economic Forum, digitalisation is "the process of introduction and use of new technologies to transform the economy, creating new opportunities for growth and innovation"[3]. This definition focuses on the innovative aspect of digitalisation, correcting existing processes, providing economic development, establishing new industries and jobs.

Based on the existing definitions, we can propose our own author's definition of digitalisation of the economy: digitalisation of the economy is a multidirectional process of introducing digital technologies into economic mechanisms, accompanied by corresponding transformations of socio-economic and institutional relations between participants in the national economy.

This definition emphasises the complex nature of the digitalisation of the economy as a multidirectional process concerning with the introduction of digital technologies into economic mechanisms causes changes at the level of socio-economic and institutional relations. The definition focuses on the multilevel impact of digitalisation, considering simultaneously its economic, social, and institutional aspects. It also assesses its ability to change business processes, connections between economic agents, the structure of interactions and norms within the national economy.

Moreover, each of the studied stages is characterised by the development of technologies, changes in economic models and management approaches. Hence, digitalisation has gradually transformed the economy, provided conditions for the formation of a new knowledge economy with information and technology as key resources.

Therefore, it is possible to identify key approaches to understanding the digitalisation of the economy.

The approaches to understanding economy digitalisation

1. The efficiency approach. In the format of this approach, digitalisation is interpreted as a set of effects caused by the use of digital technologies in socio-economic activities. The differentiation of these effects considers an increase in economic growth, labour productivity, the number of jobs in related industries by at least 3-5 times; acceleration of the dynamics of small and medium-sized businesses; saving of budget expenditures; reduction of poverty level, etc. This approach improves the efficiency of production and service provision. Indeed, the use of new technologies, process automation and optimisation of business processes, enterprises become more flexible and competitive. It contributes to the growth of labour productivity, reducing costs, and increasing the profitability of production. Moreover, through digital platforms, the development of Internet technologies and the expansion of e-commerce opportunities, the propensity for innovative economic development is increasing. Hence, it stimulates technological progress, accelerates the occurrence of new ideas and solutions, and develops new industries and areas.

2. A structural approach. Digitalization is considered as a transformation of the entire economy, including business processes and public administration, social structures and interaction between different levels of economic agents. The result is a change in the entire structure of the economy.

3. The process approach. Digitalisation contributes to the integration of technologies and digital resources into various sectors of the economy. It has a significant impact on its development and productivity. In fact, this is a new vision of digitalisation as a process concerning with the automation of production, and entire matrix of the modern economy.

[3] *G20 Digital Economy Ministerial Declaration (2017). G20 Ministerial Conference on Digital Economics. Dusseldor, 6–7 april 2017. URL: http://www.eurasiancommission.org (Accessed: 19.10.2024)*

4. The resource approach. The information and digital economy transit from an industrial society to a society based on information and knowledge. Therefore, information technology becomes the most important resource and catalyst for changes in the economy and society. Digitalisation is changing the very principles of the functioning of the economic system.

5. The communicative approach. It considers digitalisation as a broader process affecting production, communication, and information exchange. For instance, the new properties of information presented in digital format are as follows:

– the ability of using a variety of physical principles of its representation, storage, and transmission of information, including the ability to encrypt a message, transmit it in this form, and then decrypt it again;

– the ability to transfer information using various material media; copying and dissemination of information without loss of its accuracy;

– the multiple increase of recording density and transmission speed, replacement of analogue technologies by digital ones.

6. The motivational approach. It provides an increase of competition. Indeed, digital technologies enable companies to implement marketing strategies more effectively, monitor the market and conduct online sales. It increases competition in the market and stimulates businesses to find new ways to attract and retain customers, improve the quality of goods and services. Hence, a comfortable environment for innovation and business development is being formed.

7. The intermediary-service (platform) approach. Comprehensive digitalisation has actually established a new market structure. It is so-called platform economy. It includes the total contribution of digital platforms to the GDP of the Russian Federation, according to various estimates, ranges from 2 to 5%[4]. Many digital platforms are actively increasing their potential in Russia today. However, every segment has its own active players or platforms responsible for the state of entire market segments. The platform economy makes the market more structured and segmented. As a result, sellers of goods and services compete on various platforms. It ensures the end user benefits by receiving a variety of offers and better conditions. The use of fundamentally new technologies supports the simplicity and transparency of transactions; eliminates geographical barriers; enables suppliers to collaborate with multiple platforms simultaneously, increasing their target audience and revenue growth potential. In this case, digital platforms serve as intermediaries between different market participants, linking needs with resources, suppliers with consumers, demand with supply, reducing transaction costs, speeding up the search and payment for goods and services. According to the experts, 80% of companies in various industries work with suppliers and partners through digital platforms. It reduces their costs by more than 50%. Many analysts emphasize the role of the network effect, increasing the value of the offer to the consumer due to the growing number of manufacturers [5]. It ensures an increase in the speed of service provision and a reduction in cost. The platform service provides increased transparency of relations between market participants. Moreover, the management of the Yandex Taxi, Ozon, and other platforms support this issue.

8. The instrumental approach. It considers digitalisation as a tool for integrating digital technologies into people's daily activities, increasing accessibility to a range of services. Currently, digitalisation is a key tool for the development of the economy and the society. Hence, online platforms and applications provide the opportunity to receive services at any convenient time and in place. In 2023, more than 340 mln services were provided through the Public Services portal GOSUSLUGI; the daily user audience was 11 mln people. Consequently, digitalisation appears to be an essential tool for accessing socially important state and municipal services, contributing to increased efficiency of service delivery, saving processing time and improving the quality of customer service. Since 2020, the volume of the online commerce economy has grown 3.5 times and amounted to more than 16 trln. RUB [9].

9. The management approach. It emphasises the development of digital technologies and the formation of new economic models based on the use of data and digital platforms for business organisation and

[4] *Digital Economy of the Russian Federation (2024). URL: http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf (Accessed: 19.10.2024)*

management of production processes. Therefore, artificial intelligence, big data, the Internet of Things and other technologies make it possible to improve resource management and reproduction processes. For instance, distributed registry systems (blockchain), allow ones to significantly simplify the management of trusted information about individuals, organisations, assets, and activities, increase the protection of public service systems and government databases, improve transparency of the budget process, reduce the risk of corruption, facilitate and accelerate the interaction of citizens with authorities and interdepartmental interaction. Quantum communications, thanks to quantum effects, make it possible to use computing systems considered promising communication and information security schemes. For instance, there are a number of applications of quantum technologies. They are as follows: the creation of reliable protection for IoT, the organisation of the quantum Internet, the development of a new element base in terms of the transition of state data centers to optical communication, etc. In general, digital technologies in the format of new public administration develop digital administration.

Levels of economic digitalisation

The digitalisation of the economy can be considered at various levels – from global to national and corporate ones. These levels interact with each other and form a holistic picture of the digital transformation process, affecting the aspects of economic life.

Globally, digitalisation provides the integration of global markets and formation of new digital platforms to interact worldwide. For instance, Amazon platform it is a global marketplace for trading goods and services. Furthermore, the development of global financial technologies, such as blockchain and cryptocurrencies provides financial transactions without geographical restrictions. It contributes to the formation of a new global economic architecture [7].

Nationally, digitalisation has a significant impact on economic policy and governance. Government agencies use digital technologies to improve interaction with citizens and businesses, and increase transparency and efficiency of public administration. For instance, The Programme Digital Economy of the Russian Federation aims to establish the digital transformation of the economy through the development of infrastructure, digital technologies, and the legislative framework [9].

At the corporate level, digitalisation contributes to business efficiency through process automation, the use of big data, and the introduction of artificial intelligence. For instance, IBM and Google are actively using big data-based analytical systems and machine learning to optimise their business processes and improve customer service. The introduction of digital technologies also allows companies to design new products and services, use innovative business models (subscription, platform-based services, cloud technologies, etc.) [13].

Conclusion

The analysis of the phenomenon in the scientific literature demonstrates technological progress and significant development of the theoretical basis. At the initial stage (1960-1980s), digitalisation was mainly considered as a process of production processes automation aimed at reducing costs and increasing labour productivity. For instance, R. Solow and D. North possess digitalisation as a phenomenon limited to improving production performance through automation, whereas its possible social and economic effects had not yet been seriously studied. The views of scientists during this period were focused on an applied approach: digital technologies played the role of tools for local efficiency improvement and were not perceived as a fundamental factor in the transformation of the entire economic system.

The development of the Internet and the globalisation of digital technologies in the 1990s, the views of scientists have undergone significant changes. The emergence of the global Internet and telecommunication technologies has expanded the possibilities of communication and data exchange. It forms conditions for the integration of economic processes at the international level. Moreover, D. Tapscott, M. Castells, and N. Negroponte began to consider digitalisation as a multi-level process transforming production, communication, and consumption. Therefore, digitalisation became a phenomenon contributing to globalisation and the emergence of a new type of economy – information one. In this type of economy information and access are essential resources. Their works became the basis for the concept of the information society and the network

economy. They show an increasingly comprehensive view of the role of digitalisation in the economy and society.

The third stage 2000s and 2010s provided new opportunities for digital technologies development. During this period, digitalisation began to actively penetrate into everyday life and became an integral part of economic processes due to the development of mobile technologies, digital platforms, and a platform economy. For instance, T. Bresnahan focused on the importance of digital platforms as a new tool for doing business and interacting with consumers. In this context, digitalisation has become a technological tool, a framework for new business models and ways of economic interaction. James Moore's idea of digital ecosystems has been developed in the scientific literature. It emphasised the systemic and network nature of digitalisation as a structural element of the economy.

The modern stage of digitalisation began in the 2010s. It is characterised by a further evolution of this phenomenon. Nowadays, artificial intelligence, big data, IoT and blockchain effect on the digitalisation on social, managerial, and cultural aspects. Within the framework of the fourth industrial revolution concept proposed by Klaus Schwab, digitalisation is a deep transformation of all its components, blurring the boundaries between digital, physical, and biological systems. According to the modern authors, digitalisation improves economic performance, effects on sustainable development, employment and innovative ecosystems.

Indeed, the versatility and vastness of the concept provide key approaches to the modern understanding of the concept under study. The digitalisation of the economy is considered from various scientific positions, including efficiency, structural changes, processes and resources, level of communication, degree of motivation, platform potential, and instrumental component. The efficiency approach emphasises the impact of digitalisation on productivity improvement and cost reduction; the structural approach focuses on the transformation of economic structures and management models; the resource approach focuses on the role of information and knowledge as new economic resources. The process approach considers digitalisation as a process of technologies and digital resources integration. It effects on automation, changes the modern economy, consumption, and production. The communicative approach possesses digitalization a tool for global information exchange, expanding the possibilities of interaction between economic entities and forming new communication models. The motivational approach focuses on competition increase, as digitalisation facilitates marketing strategies, stimulates innovation, and improves the quality of goods and services. The intermediary-service (platform) approach considers digitalisation as the basis for a platform economy. Indeed, digital platforms act as intermediaries, connecting suppliers and consumers, increasing market transparency, and reducing transaction costs. The instrumental approach considers digitalisation as a key tool to increase the accessibility of remote and efficient public services. The management approach focuses on the use of digital technologies to optimise business processes and resource management. It is especially important for public administration and the corporate sector. The various approaches presented allow us to consider digitalisation as a multi-layered process involving technological, economic, social, managerial aspects, and emphasising its importance for formation of innovative and integrated economy. These approaches show the multilevel and complex nature of modern digitalisation.

Therefore, the development of scientific views on the digitalisation of the economy developed from a simple technological process to a complex multi-layered concept deeply integrated into economic and social structures. However, the initial stages emphasised automation and increasing production efficiency. Nowadays, the concept of digitalisation is the basis of a new economy: data and technology play a central role, and economic relations are transformed towards a global network structure based on interaction, innovation and access to information.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Elena E. Irodova – conceptualization; supervision.
Alexey M. Sokolov – writing – original draft.

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