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BASIC DIRECTIONS OF DEVELOPMENT OF DIGITAL ECONOMY AT THE MESO-LEVEL

N. V. Apatova (a), O. L. Korolev (b)*
*Corresponding author

(a) Crimean Federal University V. I. Vernadskiy, ul. Sevastopolskaya, 21/4, Simferopol, Russia, apatova@list.ru
(b) Crimean Federal University V. I. Vernadskiy, ul. Sevastopolskaya, ul. Sevastopolskaya, 21/4, Simferopol, Russia, alekking@gmail.com

Abstract

The article discusses the impact of digitalization on the development of the economy at the meso-level. The development of digital economy has become a prerequisite for the competitiveness of a region of any size, from an association of states to a small rural territory. Digitalization issues have gained significant influence on economic development at the global- and meso-levels, and have become the focus of attention of individual governments and international associations. This paper discusses the main trends in the impact of digitalization on development, argues that digitalization processes are universal in nature and affect not only the economy, but also all social development, including such areas as labor market, sustainable nature management and institutional trust. We consider the thesis that digitalization processes are fractal in nature with respect to the magnitude of the impact, which is manifested in the fact that digitalization trends in the global context persist both at the meso-level and at the regional level. However, an important difference is that, despite the persistence of general trends of influence on the areas of social development, digital transformations at the meso-level have their own characteristics. These features are determined by the local context of the implementation of digitalization at the regional level. An important aspect of digitalization is the transformation of institutional trust in private and public organizations. The reason for this is the formation of new business models and confidence building systems that are distributed in nature and are not controlled by a single hierarchical center.

Keywords: Digital economy, digital transformation, meso-economy, regional development.

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1. Introduction

The development of digital economy has become a prerequisite for the competitiveness of a region of any size, from a large state or an association of states, such as, for example, the European Union, to a small rural territory. In this regard, the analysis of the formation or improvement of the digital economy in all spheres of economic activity and in society is an urgent problem, the solution of which will reveal the mechanisms and tools that allow for a comprehensive evolutionary movement along the triple spiral of innovative development.

It is necessary to cover all the areas that digitalization affects in its regional implementation to get the most complete picture of universal digitalization that has been going on since the first computer appeared and has not yet reached its peak.

The basis of digital economy, its driving force, is information and communication technologies, the interaction of economic agents of any scale using the Internet. The study of key technologies that make it possible to implement the Program "Digital Economy of the Russian Federation", adopted in 2017 is important. All the basic technologies of digital economy are important for territorial development, which include communications, collection and processing of big data, use of cyberphysical systems, cloud and fog computing. However, for regional development, the main attention should be paid to the Internet of things, on the basis of which smart homes, smart enterprises, smart cities and, ultimately, smart territories are built. The second section of the monograph is devoted to the listed problems and the ways to solve them.

The term Digital Economy was introduced in 1995 by Nicholas Negroponte, a professor at the University of Massachusetts. According to this term, the following is understood (Negroponte, 1999).

Firstly, the processes of production, distribution, exchange and consumption are carried out on the basis of the use of powerful information systems called digital platforms, which enter into communication with each other on data transfer for making management decisions (Panshin, 2016).

Secondly, models of real economic processes, objects, projects and business environment, production and management environment, which are used by computers in the form of algorithms and programs to coordinate their interaction are developed and implemented. This means that digital economy is based on the technology of constructing, analyzing and applying digital models of economic, social, engineering, technological and environmental systems (Alekseev, 2016).

Thirdly, the wide coverage by the digital economy of all spheres of human life requires the concentration in the implemented models of knowledge about a person, nature and society.

2. Problem Statement

In the 1970s of the twentieth century, for the first time, the contribution of the service to the GDP of developed countries exceeded other areas of activity and reached more than 50%. From that time the era of post-industrial economy began, which in Western countries was already called digital or information (Apatova, 2005).

The information society was declared in 2003, its fundamental documents were adopted, which determined the leading role of information and communication technologies (then they were called

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information and computer technologies) in the world socio-economic development at the summit of 176 countries in Geneva. The principles of information society were also formulated, which noted the humanistic and productive orientation of the use of ICTs, their purpose in improving the quality of life of a person and society as a whole (see Table 01).

Table 01. Principles of Information Society

№	Principle
1	Everyone can take advantage of the opportunities that ICT can provide
2	Information and communication infrastructure is a necessary foundation for an open information society
3	Access to information and knowledge
4	Capacity building
5	Building confidence and security in the use of ICTs
6	Favorable environment
7	ICT applications: benefits in all aspects of life
8	Cultural diversity and identity, linguistic diversity and local content
9	Mass media
10	Ethical aspects of information society
11	International and regional cooperation

The Declaration of Principles "Building an Information Society is a Global Challenge in the New Millennium", paragraph 9, says: "We are aware that ICTs should be seen as a tool and not as an end in themselves. Under favorable conditions, these technologies can become a powerful tool for increasing productivity, economic growth, creating new jobs and expanding employment opportunities, as well as the quality of life for all. They can also facilitate dialogue among peoples, countries and civilizations" (Principles declaration, 2017).

The principles proclaimed in 2003 are currently being developed in the practical implementation of the Digital Economy of the Russian Federation Program, adopted in July 2017 (Program "Digital economy of Russian Federation", 2017).

The seventh principle, concerning ICT-based applications, contains the foundations of the digital economy as the technological base of the information society and the conditions for its development and economic growth. Paragraph 51, revealing the meaning of this principle, reads as follows: "The use and deployment of ICTs should be aimed at creating benefits in all aspects of our daily lives. ICT-based applications are potentially important for the activities of government and the health services they provide and information on health, education and training, employment, job creation, entrepreneurship, agriculture, transport, environmental protection and the rational use of natural resources, prevention of disasters, for the development of culture, as well as for the eradication of poverty and the achievement of other agreed development goals. In addition, ICTs should contribute to the sustainability of production and consumption patterns and to overcoming traditional barriers, thereby giving everyone the opportunity to access local and global markets on a more equitable basis. ICT applications must be user-friendly, available, affordable, relevant to local needs through adaptation to local languages and culture, and supported by sustainable development. Local authorities must play an important role in the provision of ICT services for the benefit of their citizens" (Principles declaration, 2017).

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3. Research Questions

In the framework of this study, the authors examined issues related to determining the main directions of digitalization of the economy in the context of regional development. The universal context of the changes brought about by digital transformations also affects the regional or meso-level of the economy. As a scientific hypothesis, the thesis is put forward that digital transformations at the meso-level have their own characteristics and, although they reflect fractally general trends in digitalization, they have specific forms of implementation at the meso-level of the economy.

3.1. Analysis of the main trends in digitalization as a global process

At the beginning of the study, an analysis of global digitalization trends is carried out, which serves as the basis for the comparison and analysis of digitalization at the meso-level. In the global context, the impact of digital transformations on economic development is analyzed in the context of 11 major sectors of the global economy. Further, the issue of the impact of digitalization on development is considered from a more general position, from the position of influence on the development of society as a whole, and not just the economic sphere. Indeed, as shown below, digitalization processes affect not only the economic sphere, but also related areas: the labor market, the environmental sustainability of the development of society, and institutional trust.

3.2. Digital transformations at the meso-level of Economics

The fractality of digital transformations and their impact on the development of society is reflected in the economy and related fields and at the meso-level. So the issues of development at the meso-level should be considered under the influence of digitalization in the context of the impact on the labor market, the environment and the formation of trust. In the field of the labor market, it is necessary to analyze the changes in the context of three types of jobs: those that will disappear, which complement digital technologies and arise for the first time in history under the influence of digitalization.

4. Purpose of the Study

The purpose of this study is to identify the main directions of development of the digital economy at the meso-level. The study is built on the basis of fractal hypothesis of the processes of digital transformation of the economy and related areas in the global and regional context. However, the hypothesis that the forms of implementation of the directions of development of digital economy at the meso-level have their own characteristics in comparison with the global process is worth considering.

5. Research Methods

Digital transformation is generating intense debate between politicians, economists, and industry leaders about its social impact. As digitalization changes society more and more deeply, there is growing concern about how this affects issues such as jobs, wages, economic inequality, health, resource efficiency and security.

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A detailed quantitative analysis of the values affected by digital transformations was conducted in 11 major industries (World Economic Forum, 2015b) to help start a new, evidence-based discussion on the future impact of digital transformation. In each case, forecasts were made of the potential value of digitalization for the industry itself and new sources of value for related areas. Over time, this approach can be expanded and refined.

The main question can be formulated as follows: how can digital transformation make a positive contribution to society? This should be addressed in three key areas:

1. Employment and skills. Current estimates of global job losses due to digitalization range from 2 million to 2 billion by 2030. There is great uncertainty about the impact of digital transformations on wages and working conditions in general with a negative outlook.

2. Environmental sustainability. A historical trend shows that CO2 emissions increased by about 0.5% and resource consumption intensified by 0.4% for every 1% of global GDP growth (GeSI, 2014). Current practice of organizing the global economy will contribute to a global deficit of 8 billion tons between the demand and supply of natural resources by 2030, which will lead to a decrease in economic growth by $ 4.5 trillion by 2030 (Lacy & Rutqvist, 2015).

3. Trust. Social media, Radio-frequency identification (RFID) tags, and user-created websites, such as TripAdvisor, have helped to increase transparency and overcome information asymmetries. However, according to the Edelmann Trust Barometer (2015), trust in all technology-based sectors declined in 2015 due to the dangers of data privacy and security as a major factor. More complex ethical questions about how organizations use digital technology also threaten to undermine their credibility (Edelmann Trust Barometer, 2015).

Although these tasks are complex, analysis shows that digital transformation can make a positive contribution.

1. Creation of labor force in the era of machines. Digitalization can create up to 6 million jobs worldwide between 2016 and 2025 in logistics and electric power industry. However, in other areas, automation will crowd out many people. The ability of enterprises in the near future to professionally orient employees and form a new generation of specialists in the age of machines is crucial for both winners and losers in the process of digital transformation.

2. Formation of a sustainable world. Digital initiatives in the industries in question can prevent an estimated 26 billion tons of CO_2 emissions from 2016 to 2025. This is almost equivalent to CO_2 emissions throughout Europe over this period of time. Ensuring that these potential benefits can be realized and scaled up involves overcoming the obstacles associated with adopting new closed business models, incorporating customers into the process and the environmental impact of digital technology itself.

3. Building confidence in the digital economy. Usage-based insurance (UBI) in combination with assisted vehicle management technologies can reduce the projected annual loss from traffic accidents by more than 2 million or 10% by 2025. However, digitalization raises concerns about data privacy, security and ethical use of data. Establishing new standards of ethical behavior using digital technology and achieving a higher level of customer confidence will be critical to a successful digital transformation.

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4. Creating labor force in the age of machines. Digital revolution has created new specialties and areas of professional activity, for example, search engine optimization managers and social media managers, new types of organizations, for example, cloud computing providers and social networking agencies, and even new sectors of the economy, such as digital security and data science. The impact of digitization has also become a catalyst for employment growth in the wider economy. For example, in India, it is estimated that three to four jobs have been created for each working in outsourcing of business processes and IT services.

However, the current question is whether the technology creates new or destroys existing jobs.

It can be assumed that there will be three types of jobs categorized by the number of classified tasks in this area:

1. Those that will disappear (lost the competition against cars). For example, clerks and administrative staff, or truck drivers.

2. Those that are in collaboration with machines/algorithms (run with the machine). For example, those professions that rely on cognitive and social opportunities, such as doctors/surgeons.

3. Those jobs that are completely new or largely untouched, for example, those are faster than a machine or work in other non-automated areas. For example, professions in the creative arts are unlikely to be automated, as well as new specialties related to data and machine management.

In this context, analysis shows that digital transformation can create a significant number of jobs. For example, it was discovered that digitalization could create about 6 million jobs only in the electricity and logistics sectors by 2025 (World Economic Forum, 2015a).

Digital technologies fundamentally transform organizations, and the pace of technological change exacerbates this problem. Organizations should have a coherent strategy that includes a staff redeployment plan. While previous technological revolutions (primarily the industrial revolution) have played a decisive role over a relatively long period of time, the speed of digital transformation is such that enterprises need to quickly adapt to changes.

The issue is also relevant for governments. Potential wage inequality and deflation or even social unrest requires urgent action to prepare the workforce for a digital future.

6. Findings

The World Economic Forum has already launched a number of programs, such as cybersecurity (“Enhancing Cyber Resilience”), digital integration (“Access for All”) (“Employment, Skills and Human Capital”), as well as the impact of the increased impact of digital platforms and content on people (“Digital Media and Society”) to understand the future implications of digital technology for various aspects of society. In this context, Digital Transformation of Industries 2015 makes unique contribution to provide evidence-based perspectives on how digital initiatives in the industry contribute, to a small extent, to the ability of business leaders and politicians to tackle wider social issues. In 2015, three issues were analyzed, in particular:

1. Creating a workforce in the digital age. Current estimates of job losses due to digitization exceed 2 billion worldwide by 2030. However, there are significant differences in these forecasts. For example, as McKinsey (2018) points out, the United States estimates 22.7 million jobs by 2025 to 80

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million over the next several decades. Concerns about job loss from automation went into the mainstream, with headlines citing "robot growth" and even the BBC's online tool, which lets users know about the likelihood of their work disappearing. At the same time, many commentators claim that such forecasts are overblown and that the actual impact of automation will be much less dramatic. Indeed, a common feature of most of the commentary on this topic is the integration of task automation with the tasks of entire professions. A McKinsey study (McKinsey, 2018) indicates that very few activities will be fully automated in the short to medium term (less than 5%).

2. Transition to a sustainable world. The global economy is built on volatile funds. Current business practices will contribute to a global 8 billion-ton gap between supply and demand for natural resources by 2030, leading to a $ 4.5 trillion loss in economic growth by 2030 (McKinsey, 2018). Energy is a major part of the problem, with 75% of the world currently dependent on non-renewable sources such as coal, oil and natural gas (IEA, 2017). With increasing pressure on global resources and the urgent need to reduce emissions, digitalization plays an important role. But the digital transformation itself also has significant environmental costs. Industry must act to tackle the rapidly growing environmental impact of digital technology. Growing mountains of electronic waste (e-waste) pose a threat to human health and the environment, and increased energy use by data centers contributes to pollution and emissions. E-waste is one of the fastest growing waste streams, of which 40 million tons were disposed of only in 2014 (Baldé, Wang, Kuehr, & Huisman, 2015). Only a small percentage is recycled, and only, for example, 29% of e-waste recycled in the United States in 2012 (Environmental Protection Agency, 2014).

At the same time, data center energy consumption is growing rapidly at about 12% per year (IEA, 2017). Currently, data centers consume between 1.5% and 2% of global electricity and rarely receive electricity from clean renewable energy sources (Greenpeace report, 2017).

3. Building confidence in the digital economy. The digitalization of economics and business models, in particular, has undermined confidence in organizations, both public and private. The rapid expansion of the data economy raises important questions about data privacy and security, especially regarding the use of personal data. Business models created entirely around the value of the data of individuals are perhaps one of the most important features of the digital revolution. The size and importance of this personal data economy is neatly illustrated by the Facebook user base (1.5 billion people worldwide), with the current value (about 245 billion US dollars) (CNN Money, 2015) and revenue growth, for example, by 41% in the third quarter of 2015 alone (Facebook Reports Third Quarter 2015 Results, 2015). Although business models built on personal data are not in themselves problematic, there is growing concern among individuals around data-sharing activities, with 60 to 90% of people concerned about using their data on the Internet.

At the same time, other events undermine confidence. Cybercrime is a growing threat that cost the global economy $ 575 billion in 2014, according to a rough estimate by McAfee (2014). Concerns also arise from the possible negative impact of digital technology on health and well-being, digital addiction. Many of these issues remain unresolved, further undermining trust. The 2015 TrustedTrustTrust Barometer (Edelmann Trust Barometer, 2015) found significant levels of distrust in technology, and 51% of people thought that the pace of change in business and industry was too fast.

The described trends are reflected in issues that arise regarding the prospects of digitalization with an assessment of the positive and negative sides of this process. The ever-growing power of digital technology is changing the lives of many people around the world. At an individual level, technological advances provide many of us with convenient access to an unprecedented wealth of services, products and information. But, in parallel with these significant benefits, the impact on society of this digital transformation engenders fierce debate between politicians, economists and industry leaders.

7. Conclusion

The study allows us to draw the following conclusions and summarize the analyzed material. General remarks include the fact that digitalization processes influence development processes not only in the economy, but also on the development of society as a whole, affecting such related areas as labor, sustainable environmental development and institutional trust.

7.1. The main directions of the development of digitalization at the global level.

The digitalization process is general in nature, which affects not only the economy, but also related areas of social development. In the global economy, studies show that digital transformations affect all aspects of economic activity, which can be grouped into 11 major industries, including manufacturing, finance, insurance, logistics, trade, etc. However, the impact of digitalization is not limited only to the economy. Digital transformation processes also capture related areas, such as the labor market, sustainable environmental development and the development of digital institutional trust. In all these areas of social development, digital transformations have a significant impact, changing both the structure and content of the designated areas.

7.2. The impact of digitalization on the development of the economy at the meso-level

Trends in the impact of digitalization on social development, which are characteristic of the global context, persist at the meso-level. However, they take on special forms, which are determined by the local context of a particular territory where the digital transformation process is implemented.

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