

Digital Capital as a Basis for the Development of the Economy in Modern Time and Principles of the Digitalization

Magomedov M.D., Karabanova O.V. *, Dikikh V.A.

Moscow City University, Moscow 129226, Russia

**Corresponding author. Email: karabanovaov@mgpu.ru*

ABSTRACT

The article presents an analysis of economic processes at the present stage. The formation of economic structures has always been conditioned by some significant event, scientific discovery, catalyst of progress. Technological stages, formed since 1970, have already been formed by combining the material and non-material base: the invention of microprocessors and information services; the discovery of graphene and the formation of artificial intelligence, etc. The transition to the digital economy is due to the transition to a new basis - digital capital, which combines material and non-material components. The intangible component provides almost limitless opportunities in the formation of the competitiveness of an employee, an organization. However, the gap, the differentiation of countries in the availability of digital capital as a new resource, increases inequality in society. A greater effect and result from the work of digital capital is achieved by increasing accessibility to it; it grows in the interaction of people and in interaction with other forms of capital (human, social, political, communication, intellectual, etc.). Digital capital supposedly possesses a feature that puts the economy itself, with its resource-based nature, into new conditions.

Keywords: *digital capital, digital economy, technological order, digitalization*

1. INTRODUCTION

For a long time, the building of new economic processes, systems, communications, conditioned by the development of technologies, has been observed. This transformation is commonly referred to as the transition to the digital economy. However, in international practice, there is still no harmonized definition of the digital economy. At the same time, the digital economy is already considered as a driving force of economic growth, capable of leading to significant economic shifts and impacting entire areas of business, the labor market and people's lifestyles.

The digital economy not only opens up opportunities, but also creates threats. There are difficulties in using new opportunities, for example, due to low levels of digital skills and insufficient technology penetration both within and between countries. Some researchers reduce the understanding of the digital economy only to e-commerce, others see it as a connecting link for building communications, but we see a more complex concept that is associated with the development of the existing technological order that ensures the development of the economy based on the scientific and technical process. It is assumed that the availability of digital resources and educational environment influences the development of the digital economy and determines regional differentiation. At the same time, in the modern scientific literature, there is no clear understanding of the concept of the digital economy, which requires a detailed analysis.

2. RESEARCH METHODOLOGY

The methodological and informational base of the study was the work of researchers in the field of digital economy (Tapscott, Lane, Kling, Lamb, etc.), capital development (J. Coleman, P. Bourdieu, L. Bovenberg, M. Handel, N. Rimashevskaya, etc.), World Bank, OECD, etc., Internet information base.

We have studied a significant amount of scientific literature on the problem of the digital economy and digitalization, carried out a critical analysis of the existing points of view on the concept of the digital economy; the conceptual apparatus of the research has been clarified. Analysis, synthesis, modeling, analogy, generalization were chosen as research methods.

3. RESULTS OF THE STUDY

Let's consider the main approaches to understanding the digital economy over the past 25 years.

1996 - "digital economy" based on Internet technologies (Tapscott, 1996: *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*) [1]

1999 - the essence of the digital economy is in e-commerce (Lane, 1999: *Advancing the Digital Economy into the 21st Century* (Assistant to the US President for Science and Technology) [2]

2013 - Digital Economy - Economy Only Supported by Technology (British Computer Society). [3]

2014 - Digital Economy - Technology Providing Economy (The Economist) [4]

2016 - Digital Economy - Economy Based on Knowledge and Technology (World Bank) [5]

2017 - An integrated approach, focusing on economic activities and obtaining economic benefits (Strategy for the development of the information society of the Russian Federation for 2017-2030) [6]

2018 - Improvement of existing types of economic activity and the emergence of new types of economic activity (Bukht R., Hicks R. Definition, concept and measurement of the digital economy, 2018) [7]

2019 - Activity and Connections Created by Technology (Deloitte) [8]

The development of approaches to understanding the digital economy during the period under review demonstrates the increasing penetration of the digital sector into the traditional, real, non-networked economy. From understanding the digital economy as an auxiliary element, society has come to understand the transition to a new economic activity, which is characterized by a new basis, a source - digital capital, new types of money (electronic, digital money, bitcoins), new relationships that provide a tremendous speed of production, exchange, consumption.

The modern representation of the digital economy includes technologies, communications, the main types of IT activities ("digital sector") and examples of the extensive use of ICT in the economy. This includes such promising elements of the digital economy as the platform economy, the economy of "free earnings" ("gig-economy", gig-economy), the economy of "sharing-economy". All these elements arise precisely in the digital economy.

The core of the economy is capital as a necessary condition for the development of the dominant sphere of activity at the current stage (be it agriculture, industry, financial sphere, digital economy). Capital is a tool that allows you to multiply, increase, "capitalize" future goods. That is why understanding and characterizing digital capital as a new factor of production, a source of wealth at a new round of economic development will help to effectively carry out economic activities at the present stage.

The evolution of the economy at the present stage, in conjunction with the economic basis that determines the stage of economic development, its way, since the 1960s, is determined by the following basis:

1. Labor capital, capital of education (G. Becker [9], T. Schultz [10]);
2. Health capital, migration, search for information on prices and incomes (P. Bourdieu [11], V. Inozemtsev [12], B. Leontiev [13])
3. Cultural and moral capital, organizational and entrepreneurial capital, intellectual capital (J. Coleman [14], P. Bourdieu, L. Bovenberg, M. Handel, N. Rimashevskaya [15])

4. Social capital, communication capital, client capital (brand capital), structural capital, organizational capital, symbolic capital

5. Digital capital (J. Buin, J. Maniyka (McKensey) [16])

4. DISCUSSION OF RESULTS

Digital capital is a collection of tangible and intangible capital. Digital capital is the result of previous production, accumulation of knowledge, a source of increased productivity, profit and strategic advantages. Moreover, its material part provides only access to these resources. However, the gap, the differentiation of countries in the availability of this resource, increases inequality in society. Digital capital supposedly possesses a feature that puts the economy itself, with its resource-based nature, into new conditions. A greater effect and result from the work of digital capital is achieved by increasing accessibility to it; it grows in the interaction of people and in interaction with other forms of capital (human, social, political, communication, intellectual, etc.). At the same time, the isolated existence of digital capital is impossible.

Thus, it was concluded that higher results in the use of digital capital are achieved by young people with a higher level of education and income, living in large cities (Ragnedda, Ruiu, Addeo, 2019) [17].

The concept of "Digital Capital" was introduced in 2013 by McKensey researchers.

Let us define digital capital for further use as a set of physical digital equipment and intangible digital assets used in the economic activities of economic entities that contribute to profit and social development. Income for digital capital can be new opportunities provided by technologies such as Big Data, monetization of business activity on the Internet, including monetization of data on consumer behavior, income from patents and licenses for digital intangible assets.

Digital capital does not replace the previous forms of capital, but appears in addition to them, development, acting as a derived form.

According to the formation theory, the model of world history, humanity is moving from one stage to another at an ever faster pace. Modern changes can also be built into the understanding of technological order (J. Schumpeter, N. Kondratyev, G. Mensch, T. Kuchinsky, K. Freeman, K. Peres, D. S. Lvov, S. Yu. Glazyev). According to K. Perez, the technical and economic paradigm is the sphere of production and economic relations with all its inherent phenomena (distribution of income, technologies, organizational and managerial methods). It is believed that five technological orders have been passed in the world, at the moment the Sixth technological order is coming. Russian researchers V. E. Lepskiy and I. A. Prokhorov [19] also try to predict the main features of the Seventh technological order (Table 1)

Table 1 Periodization of economy orders

| No. of the order | Name | Year of the beginning | Significant start event |
|------------------|---|-----------------------|---|
| I | The beginning of the first industrial revolution | 1770-1830 | Invention of the spinning machine and construction of a manufactory, water engine |
| II | The era of steam | 1830-1880 | Invention of the steam engine, construction of the railway, invention of machine tools |
| III | The era of Steel (Second Industrial Revolution) | 1880-1930 | Invention of the Bessemer process, heavy engineering, electric motor |
| IV | The era of oil | 1930-1970 | Introduction of a belt conveyor, start of mass production of cars, synthetic materials, production of durable goods, oil refining |
| V | The era of computers and telecommunications (Scientific and technological revolution) | 1970-2010 | Introduction of the first microprocessor, electronics industry, software, robotics, gas production and processing + information services |
| VI | The era of nanotechnology | 2010-2060 (?) | Obtaining graphene (2004) - a monolayer of carbon atoms, nanotechnology, cell technologies, design of materials with predetermined properties + weak, surface artificial intelligence (narrow) (machine learning) |
| VII | The era of metacognitive technologies, new anthropology (?) | 2060 (?) - 2100 (?) | Technical background (?) + Strong artificial intelligence (true, general) (fully self-learning artificial intelligence) |

Source: compiled on the basis of [18]

At the same time, the spread of structures, their penetration is uneven across countries.

Table 2 The share of the formation of the technological order in the economy of the United States and Russia, 2010 [20]

| Country | III order | IV order | V order | VI order |
|---------|-----------|----------|---------|----------|
| USA | - | 20 % | 60 % | 5 % |
| Russia | 30 % | 50 % | 10 % | - |

Thus, at present, there is a mixing of technological orders. The fifth order, which gave the starting point for the digital economy, is still relevant and has not received proper development in many countries, but it can give undeniable multiplier effects and become the key to further social development.

The seventh technological order is expected to be much earlier than 2060 and will be associated with the emergence of real (true) artificial intelligence.

Many people equate technological orders with industrial revolutions. Mainly because the energy source is becoming the main driving force behind the transformation of the economy. However, we can observe another transformation in our day. Let us give the stages of industrial revolutions in relation to the types of the society being formed (Table 3).

Table 3 Four industrial revolutions [21]

| Type of the industrial revolution | Time | Source | Typical characteristics | Type of the society |
|-----------------------------------|-----------|-----------------------------|---|---------------------|
| First | 1780-1850 | Steam engine | Factory production | Agrarian |
| Second | 1880-1930 | Electricity, assembly line | Mass production | Industrial |
| Third | 1970-... | Automation, computerization | Flexible specialization, service sector, high-precision manufacturing | Postindustrial |
| Fourth (Industry 4.0) | ? | Internet of things | Fully automated, customized products | Superindustrial |

The third revolution is called digital. The fourth industrial revolution is the improvement of the digital revolution, the digitalized economy.

5. CONCLUSIONS

Among the principles that ensure the successful development of the digital economy in Russia are the following:

- ensuring access to active participation in the digital economy of households, computerization and the availability of broadband Internet;
- automation and restructuring of business processes, the use of advanced digital technologies by business structures;
- ensuring the digital development of the public sector;

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- introduction of knowledge management systems, technologies and competencies ("Industry 4.0");
- introduction of technologies of computer engineering and virtual modeling, additive technologies, industrial Internet, mechatronics and robotics in production;
- the introduction of digital technologies in the social sphere;
- development of an institutional environment that ensures systemic management of the digitalized economy;
- stimulating the development and production of domestic digital technologies.
- Thus, the basic principles and their implementation will ensure the stimulation of demand and investment in the digital economy, ensure balanced system management of processes, and customize all processes.
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