



Prerequisites for the Phenomenon of Global Digitalization and its Features in Russia

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Abstract: The article is devoted to the digitalization of the economy, which inevitably follows from the analysis of the evolution and complexity of the technosphere, leading to a qualitative change in commodity production and the transition to information product as the main product of the modern era. The role of the discovery of innovative blockchain technology, which is gradually changing the traditional world state, financial, economic structures and communications, is considered in detail. Particular attention is paid to the features of the introduction of digital technologies in the Russian Federation. Summarizing the study, the authors list a number of problems, the features of overcoming them and formulate conclusions about the lack of alternatives to the introduction of digital technologies in the Russian Federation. The article ends with the statement that the well-being and security of Russia directly depend on the pace of digitalization of the economy and public administration.

Keywords: Blockchain Technology, Digitalization of Economy, Commodity Production Evolution, Information Product, Information Technology.

1. INTRODUCTION

The changing conditions of the growing technosphere expand opportunities and dictate new conditions for the interaction of human society with the outside world and renew social, economic and cultural relations within society.

It is advisable to divide the development of modern society into three fundamental stages, which made it possible to form a modern information society, to make information the main subject of labor and the information product the most important useful product:

- exploration of near-earth space with the possibility of instant transmission of information via communication satellites;
- creation of a global information environment based on Internet technologies;
- opening the possibilities of blockchain technologies.

The development of near-Earth space made it possible with the help of a system of communication satellites to create a global information environment and with the help of Internet to ensure its availability for every inhabitant of the planet.

Ensuring accessibility did not solve the most important task of information: its reliability. Ensuring the security, reliability and integrity of information with its universal accessibility has become the most important problem in all areas of activity: fundamental factor in the qualitative development of almost any economic system at the macro and micro levels.

The discovery of blockchain technologies made it possible to solve this problem, launch global digitalization and begin the transformation of the global financial and economic system.

It should be noted that the possibilities of blockchain technology in ensuring cybersecurity are limitless thanks to such unique properties as reliability, general availability, high adaptability, cost-effectiveness and profitability.

Blockchain technology was discovered in October 2008 by Satoshi Nakamoto when creating the first cryptocurrency, bitcoin, and is a kind of distributed ledger that operates through millions of users around the world connected to the same network. Moreover, this distributed ledger processes data in a new and very original way.

Information is stored throughout the network in the form of data blocks that are protected using cryptography. Each block receives information as a result of complex calculated hash operations, as a result of which, in

addition to information, it receives and stores its own hash sum and the hash sum of the previous block. An attempt to change an operation in one of the distributed blocks changes its hash sum and, consequently, the hash sum of the subsequent block, which is immediately detected, since the previous hash sums are unchanged and this operation will not pass verification in the registry and will be rejected.

Despite the fact that blockchain technology was discovered quite recently, over the past ten years it has already spread around the world and is being used in all areas of activity where digital cloud technologies are being introduced, and of course, in the field of cybersecurity.

GuardTime today is already successfully using technology for security information. Moreover, the company does not use keys to verify information. Instead, they distribute fragments of data among network nodes.

To substantiate the prerequisites for obvious future changes in the development of modern society, and, in particular, in Russia, it is advisable to conduct a general analysis of the changes that have taken place in the last century and evaluate them.

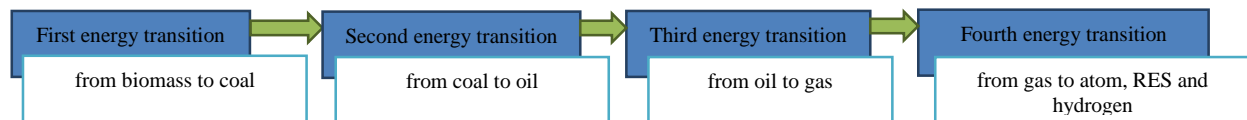


Figure 1. Energy transitions in the evolution of the world energy system

As we can see from the energy transition chain shown in the figure, the environmental friendliness of each of the subsequent types of energy carriers is constantly increasing. On the example of the fourth energy transition, we see the cleanest energy sources: energy of matter, hydrogen and renewable energy sources (RES).

It should be noted that in the case of RES, there is an exception to the general rule of the growing energy demand of society with its growing industrial production and improvement of scientific and technical potential.

The environmental safety of RES clearly prevails over their energy saturation. Here we can see not only the growing concern of the world community associated with the growth of environmental pollution and the growing negative phenomena of the global environmental crisis,

To substantiate the prerequisites for the phenomenon of global digitalization and its development in Russia, it is advisable to conduct a general analysis of the changes taking place in the last century in the development of society and the technosphere created by it, and evaluate them.

2. THEORETICAL BASIS

One of the properties of a person that distinguishes him from all the creatures inhabiting the planet is the constant search for additional sources of energy that increase his power in transforming the material world.

The problem of increasing the transformative power of impact on the natural environment began to change over time. The change in energy carrier was determining not only by the greater power of energy intensity, but also by enabling efficient logistics and reducing waste while generating clean energy.

Thus, each energy transition was driven not only by an increase in energy intensity, but also by the need to take into account the associated environmental risks when extracting energy (Figure 1).

but also the prerequisites for updating their interactions with the surrounding material world.

If we study the change in proportions in the well-known scheme of interaction between society and the environment in the production of a useful product, we can trace the following trend, conditionally depicted in the Figure 2.

The amount of matter and energy decreases over time, due to resource and energy savings within the framework of sustainable development, while the volume of information grows at the same time. With the growth of information volumes, accordingly, technological processes of production change, become more complex and more clean and efficient, and waste, as a rule, is recycled and returned to production cycles for the reuse of resources.

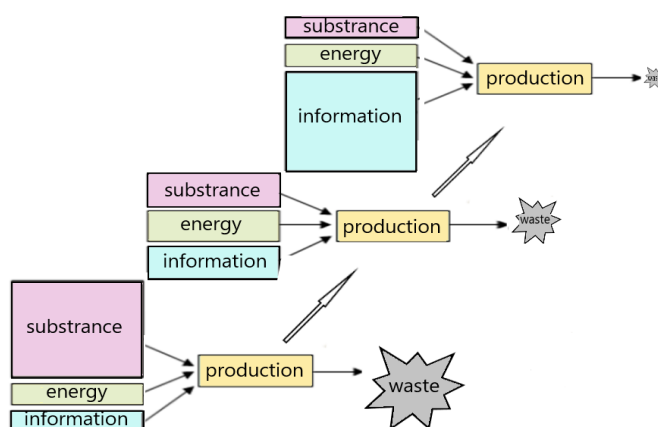


Figure 2. Conditional scheme of changing proportions in production over time

From this conditional scheme, we can conclude that over time, the volumes of information accumulate and its role increases, and production processes become more complicated and improved.

3. METHODOLOGY

In order to analyze these prerequisites and evaluate the ongoing changes in the interaction of mankind with the surrounding material universe, we consider in more detail the stage of development of society, which is associated with the exit of man beyond the biosphere. This stage of development cannot be overestimated in terms of its significance, influence on the formation of modern society and its further development.

For this purpose, we will consider such basic and inalienable concepts that demonstrate the interaction of society with the surrounding material world, as an object and means of labor or means of production. We give the broadest definitions of these concepts, which contain an idea of the concepts under study.

The object of labor is something that a person influences in the labor process with the help of means of production.

Means of labor is a set of means of production, with the help of which people influence the objects of labor, modifying them in accordance with their goals and needs.

The emergence of a global information system can be called an accomplished information revolution that directed scientific thought to the field of creating new technologies for processing, transmitting and storing information.

It should be recognized that the focus was the values of the two main criteria for these scientific developments: speed and volume of processed information.

With the increase in volumes and the increase in the complexity of the technosphere, the property of emergence manifested, which is a property characteristic of complex systems. The tendencies of commodity production have changed revolutionary: the object of labor has begun to change in the direction of the dominant increase in its intangible part. This instantly led to a change in the means of labor, which, in connection with the needs of society in new information technologies, were implemented in innovative means of production.

Humanity has entered the era of the information society. Information has become the main subject of labor, and new computer technologies for processing information have become the means of labor (Figure 3).



Figure 3. Energy transitions in the evolution of the world energy system

4. RESULTS

Since then, information products have become the main products of society, demonstrating its degree of development and dominant advantage.

The undoubted turning point that determined the special role of information in the life of society was the great discovery of the XX century: Internet, which combined computer networks into a single system based on the use of IP protocol and data packet routing. The spread of Internet, which allows performing various functions and operations, happened almost instantly.

According to a study by the American Department of Commerce, it took radio 30 years to reach 50 million users, for television it was 13 years, and Internet took about 4 years [1].

Internet has many social and cultural facets. It is a versatile medium for communication, entertainment and learning. It has become possible to make purchases and pay for services on Internet. For many people, Internet is a job and a source of livelihood. In general, Internet is a reflection of modern society and modern worldview.

Internet has influenced the development of many digital technologies. Society has become closer, and Internet has erased the distances and borders of states. By providing unprecedented opportunities for the transmission and publication of information, Internet has made a new round of technological and social revolution.

Internet in Russia (Runet) began to function in 1990, and by 2000 the audience of the Russian Internet was, according to the maximum estimates, 12.8 million people (8.7% of the population).

According to Roskomnadzor, by 2021 the number of Internet users in Russia has reached 124 million people (85% of the population). By the number of Internet users, Russia is in the top twenty in the world [2, 3].

The rapid exchange of information entailed the acceleration of all types of communications and processes that drive society. The pace of updating production technologies has increased dramatically, timing of the introduction of innovations in production cycles has decreased, and new ways of communicating and managing processes have emerged.

Banking operations, trade, education, management of science-intensive technologies and industries, certain types of culture and art are increasingly moving into the digital information space.

The modern layman will not be surprised by digital virtual tourism, Internet cinema, gaming environment using virtual space emulators, etc.

Many previously unknown concepts related to digital technologies have arisen and become a familiar attribute of the life of modern educated person: Internet of Thing (IoT), e-commerce, electronic transactions, outsourcing, outstaffing, carsharing, etc.

However, the most revolutionary was the discovery at the turn of the XXI century of a new Blockchain technology that has no analogues in the pre-digital world.

According to the Deputy Minister of Economic Development of the Russian Federation, Chairman of Vnesheconombank and Deputy Chairman of the Board of Sberbank. S. N. Gorkova: "Blockchain is more important discovery than Internet!" [4].

The possibilities of distributed computing technology and decentralized storage were known back in the 1990s, but the term "blockchain" appeared at the beginning of the XXI century thanks to Satoshi Nakamoto, who showed the possibility of distributed technologies to use the digital financial system and digital currency bitcoin [5].

The unprecedented security of using the technology is guaranteed by special cryptographic methods of data hashing and decryption via remote servers. Blockchain systems are closed, open and combined. The most common are combined systems with RSA and ECDSA encryption. This type of digital signature is the most common, as it allows the recipient to have a very high degree of confidence that the message was created by a known sender (authenticity) and that the message has not been altered in transit (integrity) [6].

Cryptocurrency and the very concept of the Ethereum platform as a single decentralized virtual machine was presented by the founder of Bitcoin Magazine V.D. Buterin at the end of 2013 (Figure 4) [<https://vkoshelek.com/kriptovalyuta-ethereum/>].



Figure 4. Vitalik Buterin who believes that the Russian crypto community will take a leading position in the world

Ethereum was implemented and first launched on July 30, 2015.

From that moment, the development of relevant applications and the introduction of blockchain

technologies around the world began. Moreover, the hype that began with the acquisition of cryptocurrency was replaced by the interest of growing structures of interaction within society, covering almost all types of human activity, from the financial sector and transactions, real estate registers, industrial innovative production, field of information and state security and ending patenting and copyright protection [7].

5. DISCUSSION

Comprehension of the fullness of the huge potential and prospects of Blockchain technology is still ahead of modern humanity. However, already at the moment it can be argued that Blockchain is an unprecedented basis for the future economy, politics and most areas of the economic and social life of human society (Figure 5) [8, 9, 10, 11, 12].

The ongoing changes in the field of digital technologies in the world community can be called the digital revolution.

Russia is especially interesting for consideration in this regard, since the Government of the Russian Federation has officially announced a course towards a complete reform of the state apparatus and a reorientation of the priority tasks of the country's development towards the digital economy.



Figure 5. Blockchain technology is a new, unprecedented basis for most existing and future areas of public life [13]

The year 2016 can rightly be called the beginning of the active promotion of blockchain technology in the Russian Federation. In January, at a business meeting with the President V.V. Putin, G. Gref, the Chairman of the Management of Sberbank of Russia, made a statement according to which the blockchain can significantly update the mechanisms of state regulation and schemes financial management [14].

After this statement, the Central Bank formed a working group to study blockchain technology. In 2017, Sberbank carried out the first cash transaction using blockchain based on the IBM Blockchain platform based on the Hyper Ledger Fabric architecture. The credit institution uses distribution registers to exchange documentation with the Federal Antimonopoly Service of Russia. At the same time, the technology was tested on projects without the participation of real money.

After the first attempt, implemented by Sberbank, similar developments, together with Russian banks, were undertaken by large Russian companies and industry ministries: M.video, S7 Airlines, Megafon, QIWI, Ministry of Economic Development, Ministry of Health, Ministry of Education and Science, etc. [15].

In June 2017, in the St. Petersburg International Economic Forum (SPIEF), the Russian president met with the creator of Ethereum, V. Buterin. The detailed content of the conversation was not disclosed, however, after the meeting, V.V. Putin announced the state's full support for blockchain technology. The head of state also noted that only the development of its own platform would make the use of the new technology completely safe [15].

The beginning of the creation of the Russian blockchain platform was initiated by the Central Bank of the Russian Federation in the fall of 2016, which was registered as a trademark "MasterChain" six months later by the association "FinTech" [16, 17].

On the way of digitalization of Russia at that time there were three serious obstacles that needed to be eliminated in the near future:

- lack of qualified personnel in the field of blockchain technologies and relevant educational programs for the training of such personnel in higher educational institutions;
- lack of a legislative framework and legal support for regulating relations in the field of blockchain technologies;
- lack of earmarked funding for the development of expensive programs for the implementation of distributed resources.

The problems of training qualified personnel began to be solved simultaneously in several directions:

- on December 5, 2017, the grand opening of the Blockchain Competence Center took place in Moscow;
- from 2018 to present in Russia there are expanding education programs for blockchain technologies in universities with an emphasis on the use of future specialists in specialized industries;
- since September 27, 2017, Moscow State Institute of International Relations has been training lawyers in the field of blockchain as a part of the educational process.

By 2018, FinTech association, embodying the ideas of the first legally clean blockchain in the Russian Federation, included more than 20 giants of the Russian financial market to solve the problem of investing in new projects.

In the same year, the preparation of the necessary legislative initiatives for state support for the digitalization of the Russian economy began to actively develop.

Work has begun on the legitimization of a number of bills submitted for discussion in the State Duma [14, 18-20]:

1. On January 25, 2018, the Ministry of Finance of the Russian Federation published the draft law "On Digital Financial Assets" and the draft law "On the Distributed National Mining System", proposing the introduction of a digital financial asset called "cryptorable" into circulation as a legal tender in Russia.
2. On April 19, 2018, the Ministry of Justice of the Russian Federation submitted a draft law "On Amendments to Parts One, Two and Four of the Civil Code of the Russian Federation", which regulates the concepts of "tokens", "blockchain", "cryptocurrency", etc.
3. On July 31, 2017 by the Government of the Russian Federation the national program "Digital Economy" was approved. The implementation of the program is designed for the period up to 2024.

As with the implementation of any innovations and innovations, the implementation of blockchain technologies, along with undoubted advantages, also has a number of possible risks that can not only complicate the implementation in practice or significantly reduce the attractiveness of these advantages, but even devalue them.

Management of these risks is decided, as a rule, only at the state level. We should note the difficulty of preventing the risks of implementing innovations: few countries have been able to adapt their laws to the realities of new digital technologies.

Here there are just some of the significant problems that arise during the implementation of blockchain technologies in the Russian Federation and require a speedy solution:

- there is no legal basis for the collection and processing of personal data;
- conditions of anonymity of users are not defined;
- there is no single position on the use of electronic documents as an evidence base;
- constantly updated software products are required to ensure the information security of transactions within the framework of blockchain technologies [21, 22].

V.V. Putin compared the digitalization of Russia with electrification in the XX century and called for the use of all available resources for a breakthrough in the development of the digital economy [23].

At a meeting of the Council for Strategic Development and Priority Projects in July 2017, V.V. Putin emphasized that the formation of the digital economy is a matter of national security and independence of Russia, which ensures the competitiveness of Russian companies.

The growth of internal costs for the development of digital technologies in Russia was planned for the period up to 2014. If in 2017 the costs of developing the digital economy amounted to only 1.7% of the market value of all goods and services produced in the country (GDP), then in 2021 the costs approached 3.0% of GDP, and by 2024 it was planned that they will reach 5.1%.

The graph of the planned growth of internal costs for the development of the digital economy according to the Institute for Statistical Research and the Economics of Knowledge of the National Research University Higher School of Economics is shown in the Figure 6 [24].

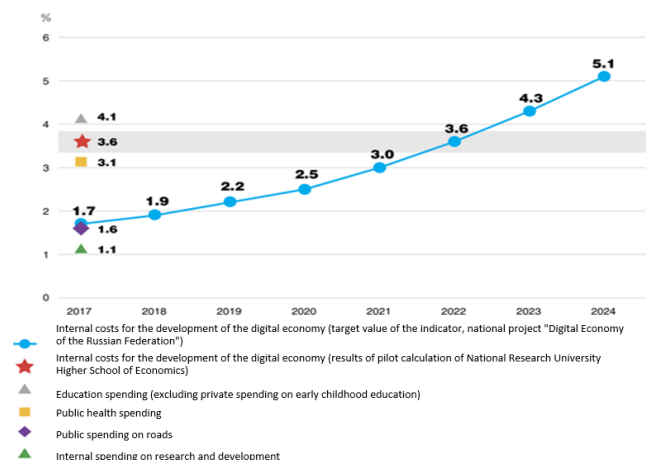


Figure 6. Costs for the development of the digital economy in Russia as a percentage of GDP (Egorova, 2017)



However, in fairness, it should be noted that the actual growth of Russian costs for the formation of the digital economy began to slow down, starting from 2020, in which the program budget was implemented by 97%.

This is caused, in addition to the above problems, by force majeure circumstances of recent years.

Since 2020, the coronavirus pandemic has had unforeseen negative impacts on the economies of all countries of the world community, which has also made certain adjustments to the pace of implementation of national projects.

At the same time, in addition to the economic downturn caused by the global pandemic, new unexpected circumstances have arisen that hinder the implementation of the digital economy national project and its effective monitoring, due to the complexity of the global government program and many related documents and programs.

One of these reasons was named by the auditor of the Accounts Chamber D. Shilkov. This reason is the introduction of too many changes into the passport of the national program and the federal programs included in it. "So, since mid-2019, 94 changes have been made to the national program, and about twice as many to federal projects. Such a multitude of changes makes it difficult to effectively monitor the implementation of the national program", the auditor explained [25].

There is no doubt that the task of restoring the coordination of all elements of the national program will be restored as soon as possible, when the pandemic ends and many restrictions that slow down economic processes in society are removed. It should be especially noted that the timing of the implementation of the national program "Digital Economy" that is of great importance.

6. CONCLUSION

Analyzing the prerequisites and revolutionary discoveries that led to the dominant role of information in modern society, we can conclude that the further development of information technology and large-scale digitalization of all spheres of human society.

With the development of near-Earth space, the creation of a global information environment and the unlimited availability of information, the tendencies of interaction with the outside world have changed dramatically in society.

Being a special resource and factor of social development, information has become the main product with all the attributes inherent in this product. The transition from an industrial economy to an information-based economy uses new information technologies as a set of information technology processes.

Thus, we can conclude that the "information society" has given rise to a special space-time phenomenon, which is an unprecedented information infrastructure called the "infosphere".

The emergence of a global information system can be called an accomplished information revolution that directed scientific thought to the field of creating new technologies for processing, transmitting and storing information.

The concept of "cloud technologies" is directly related to the multidimensional and diverse nature of information, forms and methods of its production, encoding, storage, processing and transmission, as well as to the definition of the role and place of a person in this infrastructure.

Today, the Russian information market is diverse and dynamic. Actively using the most advanced technologies, it expands in connection with the formation of new social needs and begins to dominate the Russian economy along with the energy market.

Summing up, it should be noted that the indisputable need for blockchain technology for the development of competitiveness of Russia in the world market, where they are actively being used in various fields of activity, giving undeniable advantages.

For Russia, these technologies should become a real opportunity to accelerate economic development and prevent corruption at all levels of government.

In addition, the use of blockchain technology in electoral companies will increase public confidence in the voting procedure.

Understanding the undoubted advantages of introducing blockchain technologies in various areas of Russian public administration, economy, financial system, education and healthcare, it is necessary to skillfully manage possible risks.

For the successful digitalization of the Russian Federation and effective risk management of the global modernization of public administration of the economy, it is necessary to solve two difficult tasks in the near future:

- to form and legally approve the necessary legal support for the collection and processing of personal data;
- to create effective and constantly improving technical means of ensuring information security.

From the speedy successful solution of these problems, all the most important spheres of state administration and the provision of the life of Russian society, its economy, welfare and further development will envy in the future.

After analyzing the prerequisites for the inevitability of the phenomenon of global digitalization of all spheres of life of modern society and its sustainable development, it is necessary to state that there is no alternative to the speedy introduction of the latest digital technologies in the Russian Federation, the pace of development of which depends on the well-being and security of Russia.

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