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**BLOCKCHAIN AS A DRIVER OF DIGITALIZATION:  
ESSENCE, COMPETITIVE ADVANTAGES  
AND APPROACHES TO REGULATION IN THE WORLD  
AND UKRAINE**

The modern world is already digital, and this trend will continue to spread. Of course, the digital economy is a data economy. And it is a blockchain technology as a new concept that changes the order of transmission, processing, and protection of data of consumers and organizations, and is part of the digitalization process. This technology is as revolutionary as the Internet, which has moved us from regular mail to e-mail. In the coming decades, the blockchain will change its approach to logistics chain management, commercial operations, and the exchange of financial assets. That is blockchain technology as a new model of collecting, storing and processing information is one of the key elements of modern economic development in the face of globalization challenges.

Blockchain technologies are transforming economic, managerial, financial, and other spheres and have a huge potential, requiring further study. Using a blockchain is an opportunity to reduce the cost of transactions, increase transparency and trust in the system, as well as reduce the cost of processes [1].

Technological issues and concepts of blockchain application were covered in the works of M. Swan, W. Moghair, A. Tapscott and D. Tapscott, S. Raval, L. Lela, M. Casey, and P. Vinha. Also, some aspects of the development of the blockchain technology market were studied in the works of I. Dronin, O. Makovoz, T. Perederiy, G. Pochechuk, S. Khoruzh, L. Nosach, and K. Velychko, Y. Popyvnyak, L. Hidong, R. Radeiko, N. Yushchenko and others.

Today digitalization determines the trajectory of modern business and it is a logical stage in the development of society, which in the field of economic relations is manifested in the concept of Industry 4.0. The growth of data, the dynamization, and transformation of its payment, the issue of cybersecurity accelerates and enhances the impact of digital technologies, which causes changes in the business models of companies. Digitalization processes are becoming identical to strategic advantages. For companies, as subjects of market relations, gaining a competitive advantage is the most important point in achieving a stable competitive position on the market. The mechanism of competitive advantages formation is based on effective interaction of conditions of the enterprise functioning and the factors forming its resource potential (intellectual capital of the enterprise, experience, and knowledge, unique skills, competitive opportunities, market achievements, etc.). Of course, competition in the market is strong, so the introduction of new technologies will contribute to the formation of the company strategic advantage. Such technologies include blockchain (distribution registry technology).

Blockchain is an innovative concept, a transparent and secure platform for secure storage, transmission, and processing of confidential and valuable data. It is a kind of digital accounting book, which is replenishing gradually with new records. This "book" is decentralized and protected by encryption. The data is transmitted on a large-scale distributed computer network, not exposed to the human factor, and the backup data can be interacted with in real-time without

intermediaries. The blockchain network does not use traditional IT infrastructures – they are closed and have low manageability.

The founder of blockchain technology is the inventor of bitcoin – Satoshi Nakamoto. Blockchain comes from two English words – block and chain and is a kind of chain of blocks, a database consisting of blocks. A distinctive feature of the blockchain is the decentralization of stored information, and this fact has led to the rapid development of this technology.

Blockchain is not just a technology for storing and exchanging data, but a real revolutionary technological breakthrough. It is known that bitcoin and all other cryptocurrencies are built on blockchain technology. The practical application of the blockchain is much broader than financial transactions. In the blocks that make up the blockchain, you can write various information that is stored in paper form (property rights, land cadastres, credit histories, medical data about patients, etc.).

In 2015 the following definition was proposed at the World Economic Forum: blockchain – a new technology that eliminates the need for third parties to ensure confidence in financial, contractual, and elective actions [4]. Because it is a technical process, there are technocratic definitions, namely: "a blockchain is a consistent database of information that is protected by cryptographic proof methods and offers an alternative to classic financial books" [10]. Or "blockchain – a public database of all transactions of various types within a single system, which are lined up in a certain way and from them a chain of blocks is formed" [1]. Blockchain can be used in various areas, such as money transfers, micropayments, smart contracts, identification of physical objects and assets, public administration, defense and security, international activities, etc. Therefore, blockchain technology can be a driver of systemic change in a wide range of industries, business models, social and operational processes.

Anyone with a computer can join the blockchain system. All users have the same rights, which significantly distinguishes the system from those already existing in the monetary and financial sector.

This system is designed in such a way that provides only two groups of participants: simple and complex. Schematically, their essence is shown in Figure 1.

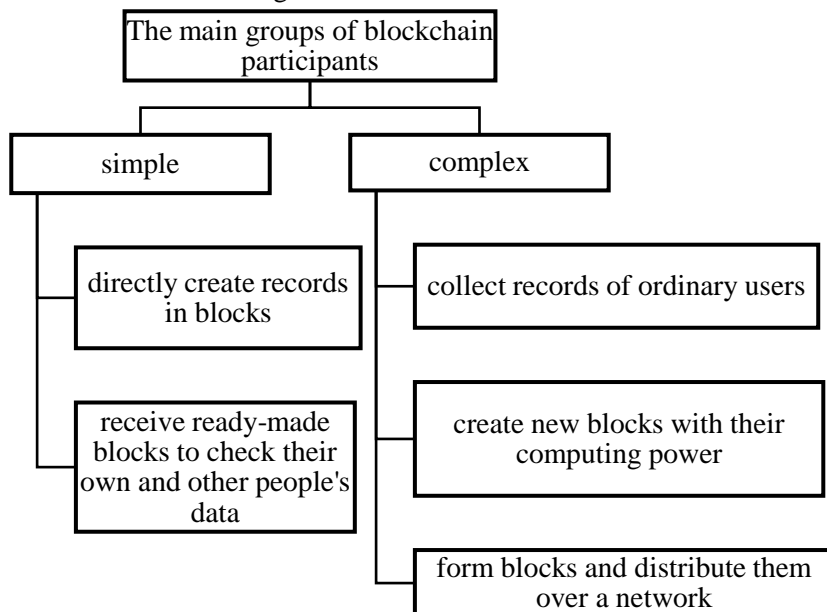


Figure 1. The main groups of blockchain participants

In modern conditions, three main areas of blockchain implementation have been formed:

- cryptocurrency (used in various areas related to money, such as digital transfer and payment systems. As of March 1, 2019, 2097 cryptocurrencies were registered in the world, and their total capitalization amounted to 130 billion USD. Bitcoin retains the first position – more than 52% of the total capitalization, and in the second place is etherium, with a share of 11% [3];

- smart contracts (whole classes of economic, market, and financial transactions based on blockchain technology, work with different types of financial instruments – stocks, futures, bonds, mortgages, legal titles, "smart" assets, and "smart" contracts);

- IT applications (digital platforms) are technologies whose scope goes beyond cash, finance, and markets. They apply to the

spheres of public administration, health care, science, education, cultural, and artistic spheres (Figure 2).

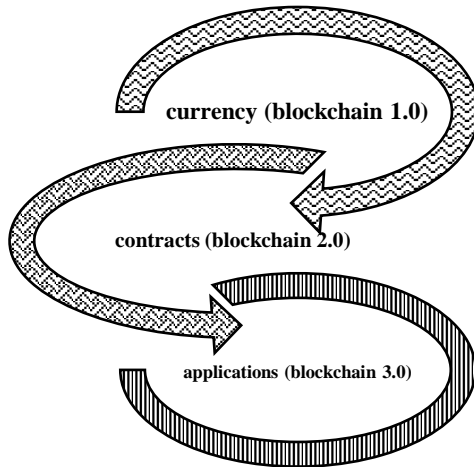


Figure 2. The main directions of blockchain implementation

There are the five main blockchain platforms [2].

The EmcSSH platform is key management. It allows you to store, process, protect and give access to a database of keys (passwords) by a specific user.

The EmcSSL platform is an extension of the SSL protocol. This platform stores digital fingerprints of individual users or entire organizations.

The Emc InfoCard platform uses a system of business (electronic) cards that are associated with SSL certificates. The main distinguishing feature of such a system is that the information stored in it can be edited.

EmcTTS is a system that allows you to record the time, date (imprint) of any posted documents at the time of publication. This technology allows you to solve many issues related to the authenticity of the document, contract, and patents.

The Emc DPO system can confirm to the user based on numbers, characteristics that are presented in physical or intellectual form, ownership of land, programs, cars, and so on.

Emc Atom – a system that allows you to enter transactions without the participation of third parties and intermediaries. That is, there is a technology that allows you to not go to a notary, law firm, bank, or other organization.

Thus, we can distinguish 5 large groups of blockchain use in production (Table 1).

Table 1. Enlarged blockchain groups

Group	Remarks	Current status
1	2	3
Network administration	Responsible for security	Used by a small number of organizations
Storage of digital certificates	Responsible for certificate protection	There exist several platforms
Proof of property rights	Responsible for the transfer of property rights	Used by most companies
Creating a DNS system	Responsible for confidentiality and secure access to the database	Actively used abroad
Identification and confirmation of access rights	Responsible for domain names	There exist working technologies

Compiled based on [2,5]

Blockchain allows getting access to certain data from a large database collected by the Internet of Things, which will be available to a particular user. No node or computer will be able to change the information contained in the database. Each node can only check the records. All these processes occur automatically, i.e., without human intervention.

According to experts, the cost of the blockchain will only increase and in 2023 will amount to 14.4 billion USD. In addition, most experts attribute the growth of GDP to the introduction of innovations, namely in the use of blockchain technology. In Sweden,

GDP growth due to the blockchain may reach 3% by 2030, in Luxembourg – 2.6%, in Germany – 2.4% [3].

The well-known company Pricewaterhouse Coopers (PwC), which specializes in professional services in the field of consulting and auditing, conducted analytical research and concluded that blockchain technology can ensure global GDP growth of 1.76 trillion USD in the next 10 years [10].

According to PwC's conclusions, presented in the report "Time for trust: The trillion-dollar reason to rethink blockchain", five key areas of application of blockchain technology were analyzed, which were presented based on the possibilities of economic benefits in the modern period (from the largest to the smallest) [6]:

1. Tracking and monitoring of goods and services, which have become a new priority for most companies in the management of supply chains during the COVID-19 pandemic, have the greatest economic potential (962 billion USD). Blockchain technologies have a wide range of applications. They can be applied to companies in a variety of industries, from heavy industry to the fashion industry, in response to increased public and investor attention to issues of social and environmental responsibility and the ethics of supplier selection.

2. It is possible to use blockchain technology to make payments and provide financial services, including using digital currency, or to expand access to financial services through cross-border payments and transfers (433 billion USD).

3. Blockchain technologies can also be used to manage identification information (224 billion USD), including personal identifiers, professional qualifications, and certificates, to prevent fraud.

4. Blockchain technologies can be used to contract and resolve disputes (73 billion USD), as well as to attract customers (54 billion USD). Also, the use of blockchain in loyalty programs expands its capabilities for use in the public and private sectors.

In addition, the report notes that Asia is likely to reap the greatest economic benefits from blockchain technology. And the maximum potential net profit from the blockchain can get China (440 billion USD) and the United States (407 billion USD). Other countries, including Germany, Japan, the United Kingdom, India, and France, could also generate a net income of more than 50 billion USD [6].

The practice of using blockchain makes it possible to identify the main advantages of blockchain technologies (Figure 3).

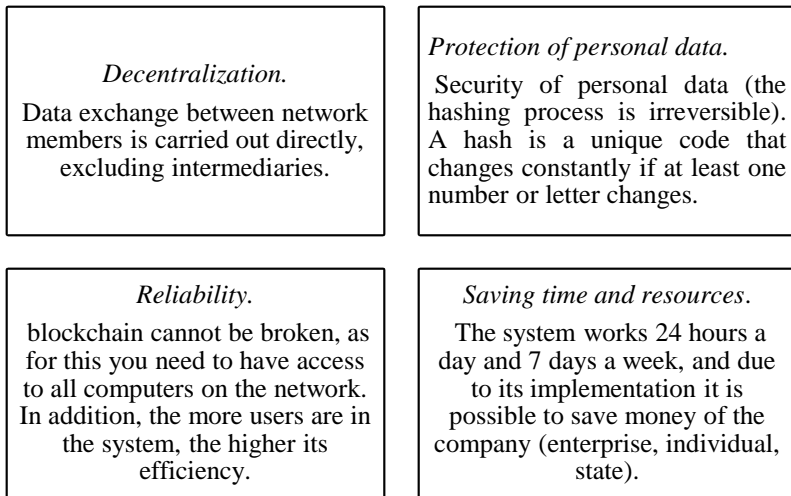


Figure 3. The main advantages of using blockchain technologies [5;9]

It is worth noting that blockchain technology has disadvantages, the main of which is the high cost at the implementation stage. Therefore, the issue of regulating and supporting the implementation of blockchain technologies is important. The world experience of blockchain technology regulation shows the following: some countries have remained in the existing legal field, regulating only certain specific problems of the blockchain, others have developed or are developing special legislation for the blockchain.

An example of state regulation of the blockchain according to certain rules of law is demonstrated by China. Under such conditions, special laws and regulations are developed to regulate blockchain technologies. At the same time, state regulation of blockchain technologies is implemented at the federal level – the government and ministries (macro-level) and the regional level – government bodies of the provinces of China. The State Council of the People’s Republic



of China (PRC) has adopted China's National Information Development Plan (13th Five-Year Plan), which focuses on the development of blockchain technologies and the blockchain industry. The Ministry of Industry and Information Technology of the PRC issued a so-called "White Paper" on the blockchain industry in 2018, which contains an in-depth analysis of the current state of China's blockchain industry, forecast trends in this area, and standards for blockchain technology. The White Paper states that the blockchain is a leading area of global technological development, will continue to be widely used in the Chinese economy and will be the main support for building a digital China [8].

The United States follows the second model in matters of state regulation of the blockchain. Blockchain technology is regulated in the country at the macro level by the federal government and federal agencies, and at the micro-level by state governments directly. Uniform standards for regulating the development of blockchain technologies in the United States have not been approved yet, so state regulation is implemented at the level of US federal agencies within their competence. However, US authorities also adopt local regulations and rules for the application of the blockchain. The main vector of regulation of blockchain technologies here is the integration of this regulation into the already existing system of securities regulation, as well as money circulation and taxation.

Singapore is actively supporting the development of the cryptocurrency market and blockchain projects. Special regulation on cryptocurrencies has not yet been adopted in the country, but a bill on payment services has been developed to regulate the infrastructure related to the issuance and exchange of cryptocurrencies (to be adopted by parliament). The cryptocurrencies field is controlled by the explanations of the regulator. The requirements of the legislation on investment services and securities apply to the issuance and circulation of certain cryptographic tokens if they meet the definition of securities. Cryptocurrency – tokens used as a means of exchange or payment for tax purposes – belongs to the group of services, which leads to the collection of VAT when conducting transactions with cryptocurrency. The Monetary Authority of Singapore requires cryptocurrency exchanges to comply with the basic requirements of

anti-money laundering legislation (customer identification, reporting of suspicious transactions, etc.).

The experience of Estonia as a one of leaders in the application of blockchain technologies, where the e-Estonia program works, is worth regarding as well. Blockchain here is completely legal. In particular, the blockchain is used in the system of personal identification of citizens. Through this technology, Estonian elections to the government are held and there exists a possibility to pay taxes and register businesses.

In Ukraine the Ministry of Digital Transformation operates, which stressed that the implementation of blockchain technologies and their application in public administration and the development of virtual assets are urgent. Also, Ukraine is among the top 14 countries in the world in terms of the introduction of blockchain technologies, while cryptocurrencies make up 2.5% of GDP (2.5 billion USD) [7]. Of course, today the state must actively participate in the transformation process by forming effective mechanisms of state regulation of the blockchain industry.

The digital transformation of key business operations and processes is one of the priorities for most businesses in the face of globalization challenges. For example, the COVID-19 pandemic has further shaped the demand from the state and business for new technological solutions. Blockchain can bring the activities of a business and a state system to a qualitatively new level. The advantage of blockchain is that this technology increases the security of basic data, which, in turn, allows companies to avoid violating data protection laws. Thus, the blockchain opens the possibility for a paradigm shift in terms of storage and use of personal data, which can eliminate the central points of failure and give people the opportunity to control and monetize their data.

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