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Lev Kloba,
Ph.D. in Economics, associate professor,
associate professor of the Department of Finance,
Accounting and Analysis, Institute of Entrepreneurship and
Advanced Technologies, Lviv Polytechnic National University
Lviv; ORCID ID 0000-0003-0223-6802
e-mail: lev@klioba.com

Taras Kloba,
Ph.D. in Economics Institute of Regional
Research named after M.I. Dolishniy
of the NAS of Ukraine, Ukraine
Lviv; ORCID ID 0000-0002-3354-3648
e-mail: taras@klioba.com

Solomiia Kloba,
Ph.D. in Economics Institute of Regional
Research named after M.I. Dolishniy
of the NAS of Ukraine, Ukraine
Lviv; ORCID ID 0000-0003-4697-4866
E-mail: solomiia@klioba.com

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BLOCKCHAIN TECHNOLOGY IN THE BANKING FIELD: FEATURES OF DEVELOPMENT AND POTENTIAL PROSPECTS

The banking industry worldwide has continued to evolve over the past decade due to many factors, including globalization, liberalization of financial markets, changes in banking regulation, and, of course, constant changes in the increasing demand of customers for high-quality banking services. Modern information technologies, especially Blockchain technologies, will fundamentally change the appearance of current financial and banking institutions. For the banking sector, the issue of innovative development and the development of types and mechanisms for ensuring a stable and effective process of creating and implementing Blockchain technologies is very relevant since the inconsistency of their work hinders the effective development of banking activities.

In the banking sector, Blockchain technology shows dynamic development and attracts attention. The novelty of this technology lies in the fact that information about transactions is not stored in a centralized database but is transferred to the computers of all network participants, who reserve the data locally.

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Keywords: Blockchain technology, information technology, transaction, services, calculations, payment innovations.

Лев Кльоба,
кандидат економічних наук,
доцент кафедри фінансів, обліку та аналізу,
Інституту підприємництва та перспективних технологій,
Національного університету «Львівська політехніка»,
м. Львів

Тарас Кльоба,
кандидат економічних наук,
ДУ «Інститут регіональних досліджень
ім. М. І. Долішнього НАН України»,
м. Львів

Соломія Кльоба,
кандидат економічних наук,
ДУ «Інститут регіональних досліджень
ім. М. І. Долішнього НАН України»,
м. Львів

БЛОКЧЕЙН ТЕХНОЛОГІЇ У СФЕРІ БАНКІВНИЦТВА: ОСОБЛИВОСТІ РОЗВИТКУ ТА ПОТЕНЦІЙНІ ПЕРСПЕКТИВИ

Банківська сфера в усьому світі продовжує розвиватися протягом останнього десятиліття завдяки багатьом факторам, включаючи процеси глобалізації, лібералізацію фінансових ринків, зміни у банківському регулюванні та, звичайно, постійні зміни у зростанні попиту вимог клієнтів на банківські послуги високої якості. Сучасні інформаційні технології, особливо Blockchain-технології, докорінно змінюють вигляд сучасних фінансово-банківських установ. Для банківської сфери дуже актуальним є питання інноваційного розвитку, розробки видів та механізмів забезпечення стабільного та ефективного процесу створення та впровадження Blockchain-технологій, оскільки невідповідність їх роботи перешкоджає ефективному розвитку банківської діяльності.

Ключові слова: Blockchain-технологія, інформаційні технології, транзакція, послуги, розрахунки, платіжні інновації.

Problem statement and its significance. Modern banking systems have many areas for improvement in the transfer of funds. First of all, it is related to ensuring this process's satisfactory level of security. Almost every day, their own (private) accounts are hacked. In addition, international transfers may take longer - from 3 to 7 banking days. Since money transactions are usually carried out through an intermediary structure or organization, most transfers require high commission costs. Therefore, improving your banking software to improve security and speed up transactions is essential.

With the help of Blockchain technology, the level of security of financial operations and transactions in the banking sector is increased from fraud, hacker attacks, and false information. In addition, an obvious advantage of using Blockchain technology in the banking sector is the acceleration of payments and the reduction of transaction costs for certain operations.

In addition, in the war situation in Ukraine, the question of the effective implementation of banking operations arose, which gave an additional impetus to the widespread use of the Blockchain system in the banking sector.

Blockchain technology opens up opportunities for the financial industry with the potential to change the traditional business models of banking institutions [1].

In the early 90s, many compared the disruptive potential of Blockchain technology to the Internet. The transformation of banks into infrastructure and technology providers can be significantly accelerated, for example, in areas such as securities operations and corporate financing. Syndicated loans and bond issues may be spotlighted in the next few years.

Blockchain technology can fundamentally change the main processes of the banking sector and facilitate the management of the entire bank's operations. Although research on Blockchain technology and its application in the banking sector providing financial services is still in its infancy, many professionals need to be more familiar with how Blockchain technology works.

Shortly, optimists suggest that soon Blockchain technology will rid the world of bureaucracy, corruption, unfair elections, online fraud, and non-fulfillment of contractual obligations.

At the moment, only one thing is known, Blockchain is a revolutionary, radically different way of storing and transmitting information in the network with many possibilities for practical application.

The aim of the study. Мета дослідження.

The study aims to identify the peculiarities and potential prospects of the broad application of Blockchain technology in the banking sector. In the course of the study, a complex of general scientific methods of scientific knowledge (systemic analysis, logical generalization, analogy, comparative analysis) was used, which allowed the authors to understand the integrity of scientific research.

Analysis of recent research and articles. The foundations for studying Blockchain technology methods were formed by such scientists as J. Dai, M. Andersen, D. Drescher, L. Lelu, and D. Chaum.

In addition, the study of the theoretical and methodological foundations of the use of Blockchain technologies in the field of banking is highlighted in the works of such domestic and foreign scientists as S. Brens, V. Mogayar, L. Pavchuk, T. Zhelyuk, L. Kuznetsova, M. Van Rymenam, H. Kryvoruchko, Yu. Popivniak, N. Yushchenko, L. Kuznetsova and others.

Results of research. The rapid development of innovative technologies helps to exchange information, ensure the reliability and security of transactions, and create effective business processes. Blockchain technology creates new creative opportunities because, according to experts, it will have the most significant impact on economic and social processes in the future.

Thus, it is appropriate to introduce innovative services, namely Blockchain technologies, which meet the needs of modern times and will allow banking institutions to reduce management costs. So, let's consider the definition of Blockchain and its prospects and features in the banking sector.

"What is Blockchain?". Today, more and more people are interested in this issue. Since its creation in 2009, Blockchain technologies have been gaining more and more popularity. Blockchain technology is expected to create new business models and transaction flows.

Blockchain technology is a continuous chain of blocks, undoubtedly invented by a person (a group of people), containing information created according to specific rules. Blockchain is a permanent digital distributed ledger of economic transactions programmed to record all values, not just financial transactions, such as cryptocurrencies.

Many technological solutions can revolutionize the financial system, especially for settlements between individuals and legal entities, international arbitration, and insurance. For example, global payment systems MasterCard, SWIFT, and VISA have repeatedly announced plans for future development and use of this technology. Another success story is the payment platform of the JPMorgan Data financial holding's interbank initiative based on the Ethereum blockchain platform. The project was tested in 2017 and currently covers over 340 banks worldwide [2].

Yu. M. Popivnyak understands Blockchain technology to be a distributed database technology. The latter is stored on computer devices like an accounting book, where information about all transactions is stored [3]. Prostobank specialists understand blockchain as the technology of processing, storing data, and identifying clients [4]. We also observe that the World Economic Forum interprets the blockchain system as a technological protocol that allows direct data exchange between different parties within the network without intermediaries [5].

Scientists and practitioners offer different interpretations of Blockchain technology. Thus, scholars Zhao J., Fan S., and Yan J. believe that blockchain technology is a chain of blocks of information that records Bitcoin transactions [6]. M. Swan understands blockchain technology as a multi-functional and multi-level information technology that provides reliable accounting of various assets [7]. Along with this, M. Van Rymenam believes that blockchain technology is a distributed ledger or a set of data recorded in this ledger that is immutable, verifiable, and traceable [8].

Harvard Business School experts interpret the definition of Blockchain technology excitingly. According to them, the Blockchain system is not disruptive, the technology cannot disrupt the traditional business model using a profitable method, but it is a critical technology that can create new foundations in the current economic and social systems. But despite the expected short-term impact of Blockchain technology, experts believe that it will take ten years to integrate the technology into the existing economic and social infrastructure. This will require overcoming many technical, managerial, organizational, and social obstacles. Therefore, the process of adaptation is not sudden but gradual and stable as the wave of technological and institutional changes grows [2].

Blockchain technology is based on the essential tools of cryptography and data security regarding transaction verification. In addition, the Blockchain concept makes it inaccessible to outsiders, thereby increasing resistance to hacker attacks. Blockchain can be abstractly thought of as an immutable ledger where records of transactions between nodes are kept [9].

Blockchain technology is a major technological innovation because it contains information about all transactions [10]. Blockchain technology is currently under-implemented in the banking sector but has the potential to expand by implementing a decentralized transaction system.

There are two types of Blockchain technology chains shown in Figure 1.

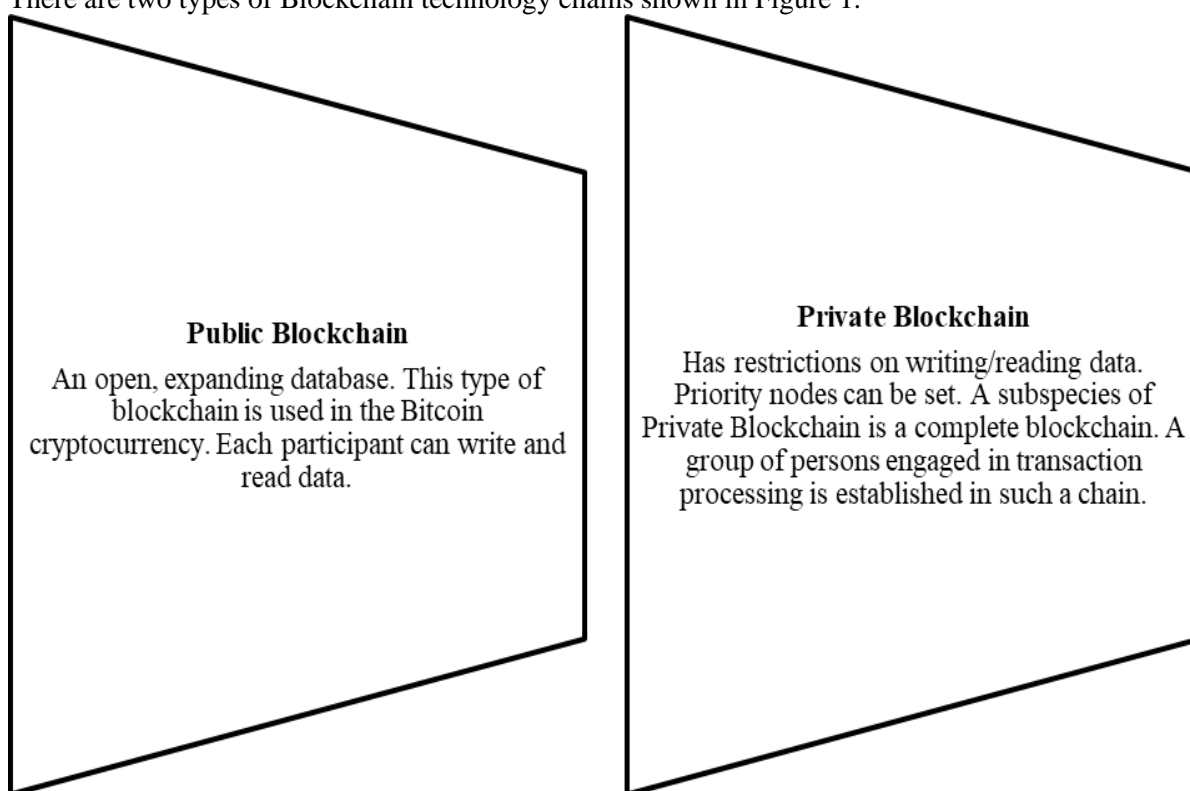


Fig. 1. *Types of the Blockchain technology chain*

Source: compiled by the author based on [11]

Blockchain technologies of two types (public and private Blockchain) consist of blocks that place information, while each subsequent block is directly related to the previous one.

As is known, a number of banking institutions are switching to Blockchain technology, which can be used for the purpose of management in all directions, for example, management of the center of the banking institution (core banking system), activities with clients [12].

It is common knowledge that banks provide primary services, as shown in Figure 2.

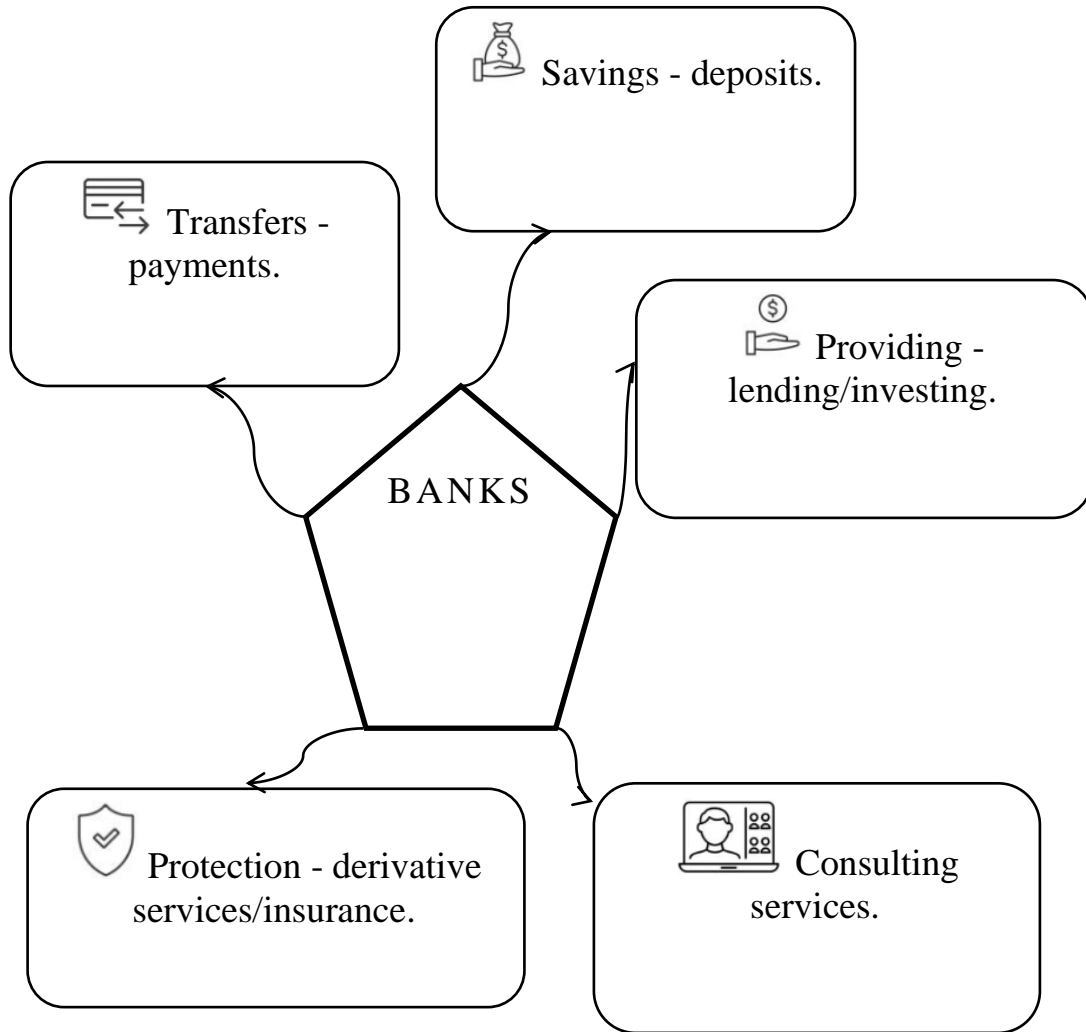


Fig. 2. Primary services provided by banks

Source: compiled by the author based on [13]

Implementation of bank transactions is carried out with the help of bank operations. The scheme of calculations of bank operations and the corresponding systems of their support are generally shown in Figure 3.

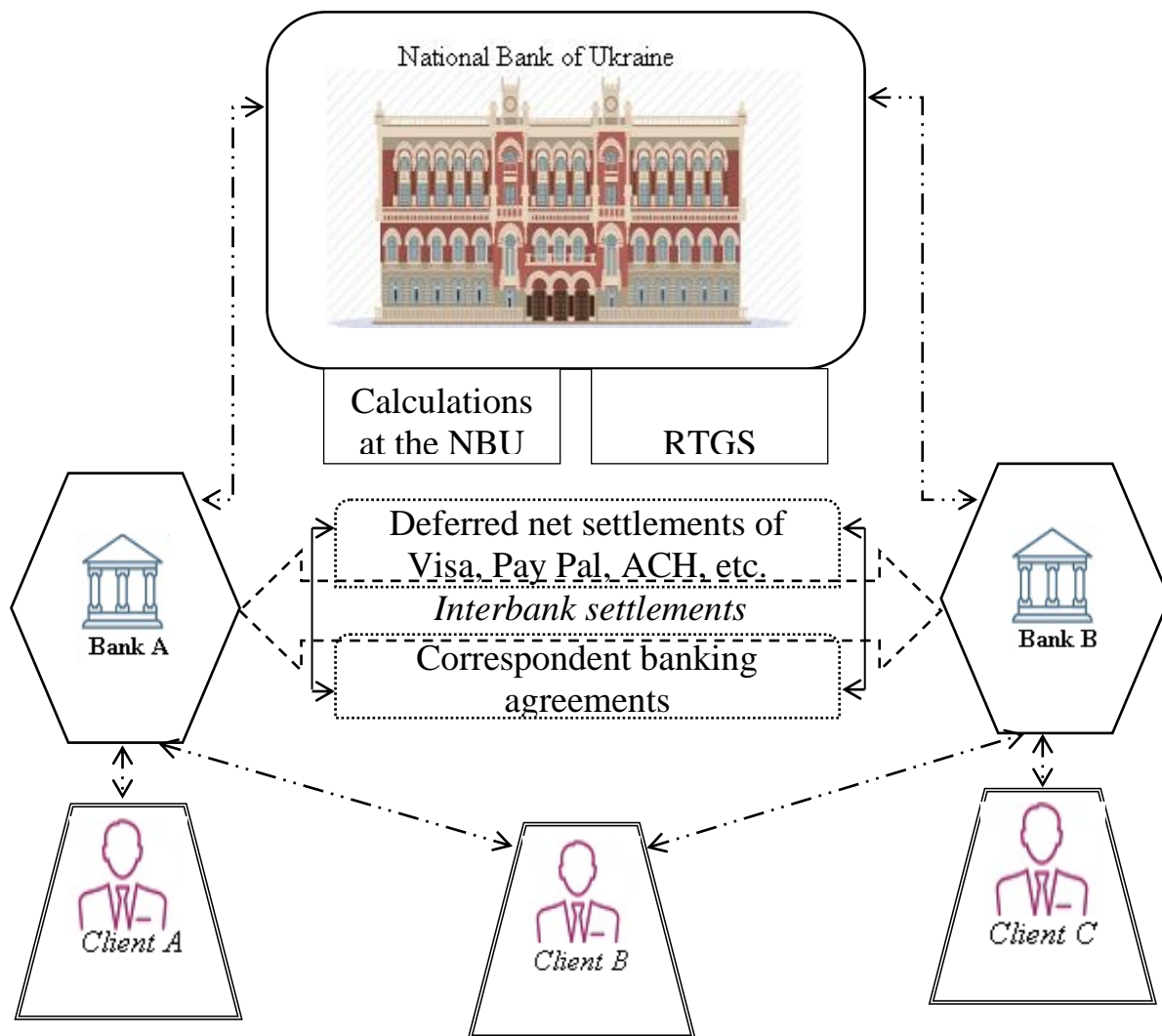


Fig. 3. Scheme of the interaction of calculations of banking operations of the NBU and clients of various banks

Source: development of the author

In Figure 3 shows the principal money transfer systems of the interaction of banking operations of the NBU and clients of various banks, in addition to the SWIFT payment system.

VISA and MasterCard cannot provide the full range of conveniences and services banking institutions use for the many transactions processed every second. Therefore, banking institutions are looking for convenient solutions that will allow them to provide high bandwidth and high throughput at scale and high speed.

Thanks to Blockchain technology, banking institutions can conduct financial transactions in a decentralized manner without the intervention of third parties or central authorities for accounting purposes. The scheme of conducting transactions in banking institutions based on Blockchain technology is shown in Figure 4.

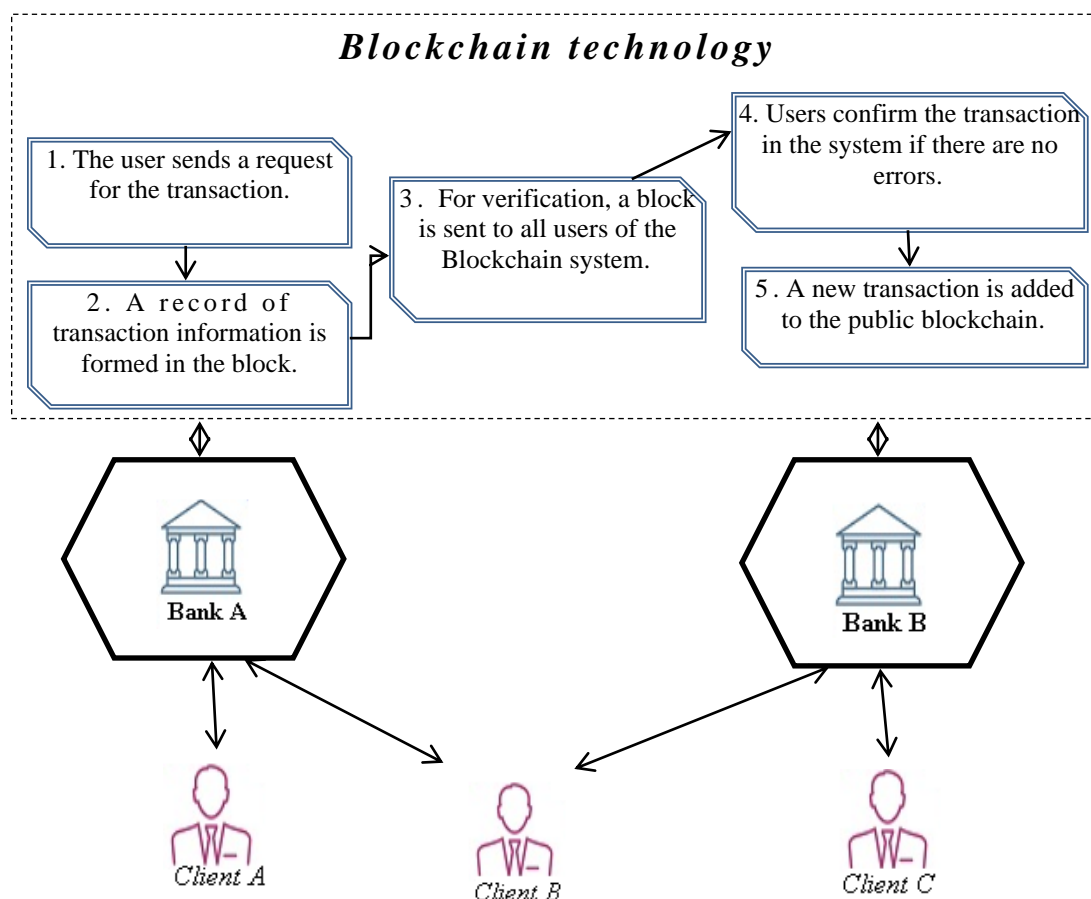


Fig. 4. Scheme of conducting transactions based on blockchain technology

Source: compiled by the author based on [14; 15]

Blockchain is an appropriate database to record and control transactions. Users will be divided into simple ones, which fund modern records of the execution of individual operations, and miners, who accumulate and control records, form and forward blocks over the network. Transaction information cannot be cut or corrected, which protects against risks. In addition, using Blockchain technology provides an opportunity to apply progressive caching and encryption when all data resides in many entities of network participants. Approximately every computer in this network has a copy of all blocks, which makes the technology of many one of the most secure in the world [16].

Increasing cashless circulation thanks to Blockchain technology increases the transparency of a single transaction. After the appearance of bank payment cards, it became clear where the money was and for what purpose it was withdrawn from the account. When using Blockchain technology, the protocol clearly shows how the client spends money. In addition, all stores store and create all records related to customer purchases. This approach enables the transition to the digital technology of "big data," collecting, storing, processing, and using large amounts of information.

Since 2015, JSC CB Privatbank has opened 1.5 million bitcoin wallets for clients, using blockchain technology to encrypt traffic in the Privat 24 and sender applications and electronically sign operations. In addition, JSC KB "Privatbank" is testing the modern ad generation service [17].

Several domestic banking institutions are also predicting a connection to Ripple technology. Ripple technology is aimed at banks and is already actively used by three foreign banks. Ripple technology is both a payment system and a currency exchange. The use of Ripple technology will enable banking institutions to transfer money in the world quickly and virtually free of charge. Payment innovations can significantly

facilitate payments for goods and money transfers, positively affecting the image of the bank and its users [18].

An attractive point is the combination of Blockchain technology with the innovative technology in the banking industry - biometrics. These modern technologies function in one direction - the security of banking operations in cyberspace. In addition, introducing biometrics technology will provide an opportunity to increase the level of information protection from the client's side [19 p. 72-73].

So, the central common characteristics of Blockchain technology are a specific sequence of information that can be stored, processed, and identified; the data set can be checked; it does not belong to any of the participants; no intermediaries are needed.

In addition, the implementation of Blockchain technologies is a complex process. On the one hand, the idea of Blockchain technology is simple: a distributed ledger or database running on several (perhaps millions) nodes, shared by various organizations and users worldwide. This is a list of blocks containing all the information about the records. Each block has its basket, which can be compared to a fingerprint.

However, on the other hand, unlike other databases, information cannot be changed or deleted. Only new ones can be added. The peculiarity is that each block is unique. Therefore, it cannot be copied or forged. Furthermore, all computers are core and non-core, meaning they do not have a central computer and are connected via the World Wide Web.

Modern projects allow banking institutions to significantly reduce transaction costs for interbank payments, clearing, and settlement of financial instruments. Blockchain technologies have the following advantages, which are shown in Figure 5.

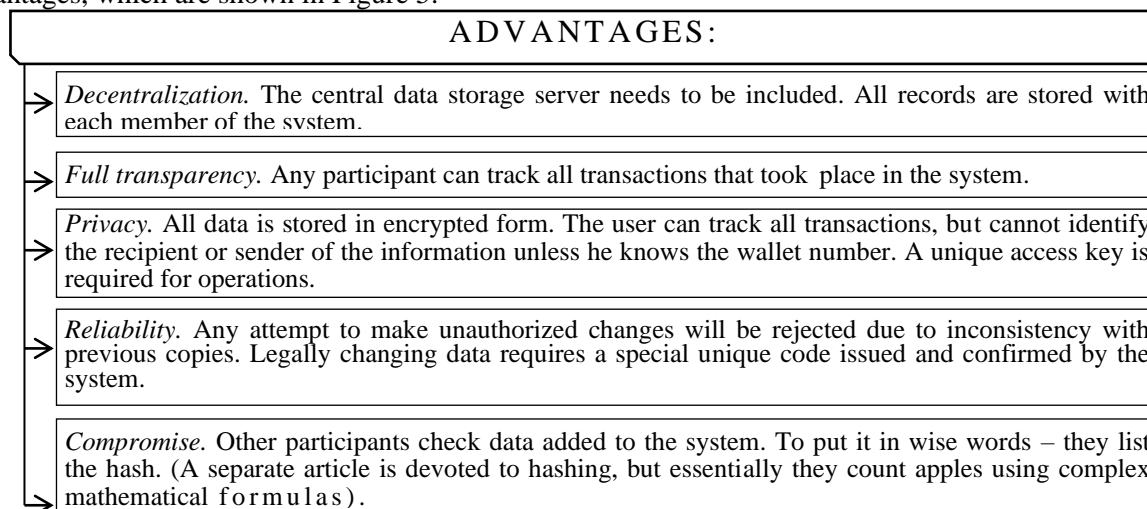


Fig. 5. Advantages of Blockchain technology in the banking system

Source: compiled by the author based on [21; 11; 20]

Despite all its positive aspects, Blockchain technology has many disadvantages (Figure 6).

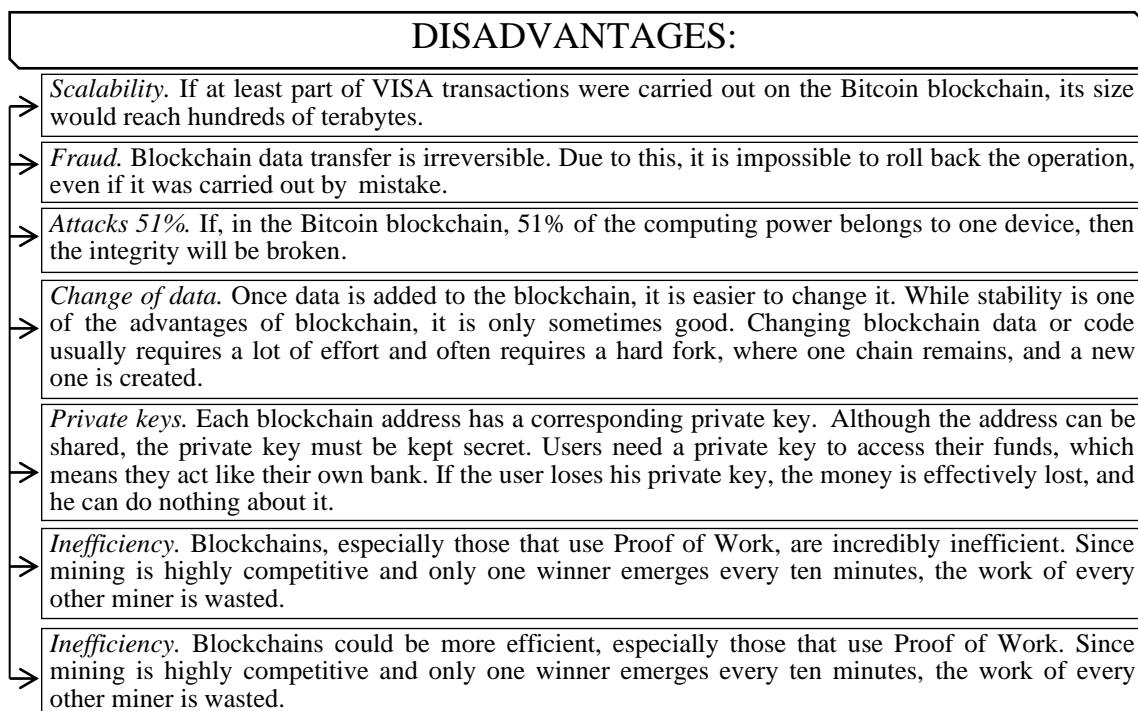


Fig. 6. *Disadvantages of Blockchain technologies in the banking system*

Source: compiled by the author based on [21; 11; 20]

So, Blockchain technology has enough economic and technical advantages. However, there are certain disadvantages associated with using this technology due to the lack of practical skills, lack of innovation, the emergence of cryptographic code-breaking methods, and the misuse of the technology due to the counterfeiting of decentralized systems. In addition, there are disadvantages to using Blockchain technology due to the lack of experience in using this technology, the lack of a cyber security development base for the technology, the inability to cancel a transaction after its confirmation, as well as the difficulty of adapting to other system payments.

Conclusion

Therefore, the application of Blockchain technology in the banking sector is becoming more and more relevant today, as military actions in the state require the creation of a basis for the recovery of the future economy by introducing a digital economy.

There is an increase in interest in Blockchain technology in the banking sector, which can solve some problems.

The development of Blockchain technologies in the banking sector is closely related to the main categories of financial and banking activities. It will speed up the creation of innovative contract systems to protect bank customers from fraud, increase trust in banks, store information about customer's credit history and accounts, speed up document circulation, expand the range of banking services, and reduce collection costs.

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