

Review Paper

# Blockchain Technology and the Transformation of Financial Systems: From Decentralization to Innovative Solutions in the Global Economy

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## ABSTRACT

The article outlines the essence of blockchain and the peculiarities of its application in the financial sector of the global economy in the context of its innovative development. The authors determined the directions of blockchain application in the accounting and audit of fuel and energy companies. These directions include smart contracts, collateral management, the use of stablecoins, tokenization of real assets, invoice factoring, crypto staking, transactions in the virtual world and reward tokens, the support of new types of B2B networks, simplification and tracking of data flow in a financial institution, and the replacement of paper money. The risks of using blockchain technologies in the financial sector were systematized and grouped into the following areas: the lack of familiarization and standardization; the high energy intensity of the system, cybersecurity, and other technical issues; financial practice issues, and technological barriers.

## HIGHLIGHTS

- The study delves into diverse applications of blockchain technology in finance, encompassing cross-border payments, remittances, authentication, insurance, trade finance, smart contracts, auctions, and foreign exchange. It notes the technology's rapid growth in Western countries, emphasizing its key roles in digital asset registries, cryptocurrencies, and trading platforms.
- The research provides a nuanced analysis of blockchain's benefits and challenges, underscoring its potential to enhance transparency in financial services. While acknowledging its transformative impact, the study addresses obstacles, including the need for organizational changes in accounting, limitations in smart platform functionality, and concerns about security and associated risks.

**Keywords:** Blockchain, digitalization, financial services, innovations, global economy

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A blockchain is defined as a regularly growing set of data records or data recording technology that is a distributed database solution authorized by users participating in a network. Blockchain records and distributes transactions, agreements, sales, and contracts (Bonsón & Bednárová, 2019). It can be broadly defined as the technology behind the Bitcoin cryptocurrency. The reason for this is that blockchain technology first appeared in Bitcoin. Thanks to this technology, all data is created, authenticated, and cryptographically blocked. It prevents people from irreversibly decrypting the designed algorithms. In other words, with blockchain technology, all transactions are recorded and cannot be deleted, as they are created by adding the basic data of each block created. Blockchain technology also creates a secure, transparent, and accountable environment through a “trust protocol.” At the same time, the blockchain distributed ledger technology is a reliable and safe data transmission and cataloging method. It was created in the midst of the 2008 global financial crisis. Therefore, it is relevant to study the areas of its application in the financial sector.

## LITERATURE REVIEW

Blockchain technology has already been studied in numerous scientific papers. Among them are the following studies by I. Belova, O. Vakulchyk, K. Kraus, N. Kraus, O. Manzhura, O. Yaroshchuk, V. Paliwal, N. Elommal, R. Manita, Q., Wang, M. Su, E. Erturk, W. Yu and others.

In particular, V. Paliwal, S. Chandra, and S. Sharma note that real-time blockchain technology contributes to the formation of a transparent accounting and auditing system. The technology can also improve audit practices, thereby reducing transaction costs, speeding up transaction reconciliation, reducing the risk of fraud, improving the efficiency of surveillance and control over operations (Paliwal *et al.* 2020).

At the same time, according to N. Elommal and R. Manita, a blockchain is an electronic replication and distribution file. It records transactions using peer-to-peer protocols, high-speed digital communication, massive computing power, and the latest encryption technologies. For this purpose, separate computers are used, which are connected to the network via the Internet (Elommal & Manita, 2022).

O. Yaroshchuk and I. Belova believe that with blockchain technology, the process of creating records and recording the time of their creation will affect accounting. As a result, all events will be permanently stored and will not change. Documents cannot be changed throughout their life cycle (Yaroshchuk & Belova, 2020).

As noted by O. Vakulchyk and V. Brayko, the existence of significant differences between the basic philosophies of blockchain and audit does not negate the need for auditors to monitor new trends and developments in the field of blockchain. They are obliged to assess the potential impact of this technology on many aspects of their work (Vakulchyk & Brayko, 2021).

According to S. Shapovalova and O. Hulak, blockchain technology allows banking sector users to ensure the security of all financial transactions. This approach significantly reduces commission costs and avoids security vulnerabilities. The security power of the blockchain is constantly growing exponentially. In fact, since more and more blocks are mined and stored in the network, it becomes almost impossible to change transactions (Shapovalova & Hulak, 2022).

K. Kraus, N. Kraus, and O. Manzhura point out that the use of blockchain technology has great potential in terms of simplification and efficiency in various fields of activity. It can be implemented in the financial sector by creating a fundamentally new financial services infrastructure. However, the transition to this new technology will not be as fast as it could be for several reasons. First and foremost, it is due to uncertainty in the regulatory environment. In addition, the large-scale implementation of blockchain will require significant investment and efforts in terms of standardization and unification. It is necessary to create a multi-level blockchain infrastructure to build trust in the technology among consumers and regulators (Kraus *et al.* 2022). Thus, based on the results of the above-mentioned scientific research, the identification of blockchain technology’s innovative features in the global financial sphere remains relevant.

## METHODS

The study aims to investigate and identify the peculiarities of blockchain technology applications

in the financial sector in the context of the global economy's development.

The research procedure includes the following stages:

1. Collection of materials from scientific, periodical, and statistical sources of information related to a specified research topic.
2. Formulation of the peculiarities of the blockchain technology application through scientific interpretation of the scientists' viewpoints.
3. Identification of areas of blockchain technology application in the financial sector.
4. Systematization of innovative solutions for applying blockchain technology in the financial sector.
5. Identification of the risks of using blockchain technology in the financial sector.

The methods of analysis and synthesis were used to determine the features of the blockchain technology application in the financial sector. The monographic method was used for a detailed study of innovative solutions for applying blockchain technology in the financial sphere. The complex method was

used to systematize the risks of using blockchain technology.

## RESULTS

Blockchain is a technology that allows data to be processed without intermediaries (third parties). In other words, blockchain technology is a high-value database designed to solve the third-party issues demanded by traditional systems.

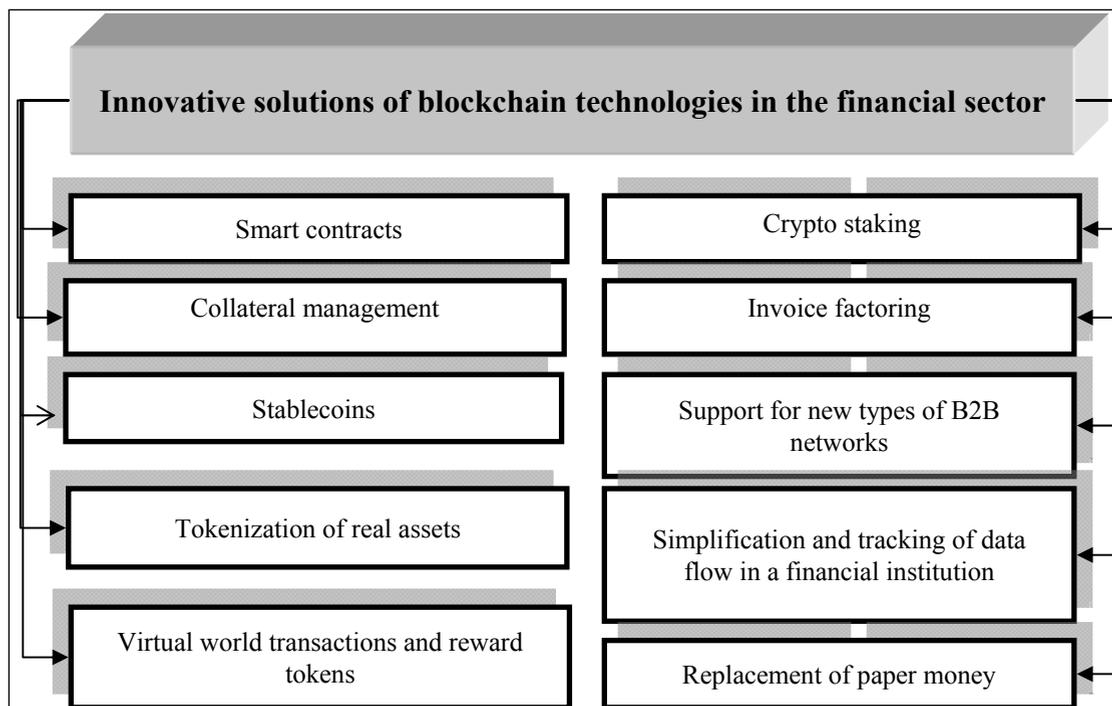
Blockchain is a decentralized, electronic, replicable, distributed file that records transactions using the following tools:

- ◆ Peer-to-peer protocols.
- ◆ High-speed digital communication.
- ◆ Huge computing power.
- ◆ State-of-the-art encryption technology.

For this purpose, separate computers are used, which are interconnected via the Internet (Upadhyay *et al.* 2021; Levytska *et al.* 2022).

The key areas for applying blockchain technology in the financial sector are described in Fig. 1.

Financial sector companies are finding a growing number of ways of using blockchain to support



Source: Compiled by the authors based on (Abreu *et al.* 2018; Bonsón *et al.* 2019; Gokoglan *et al.* 2022; Lardo *et al.* 2022).

Fig. 1: Innovative solutions of blockchain technologies in the financial sector

existing products and services, as well as to create new ones.

Below, we will take a closer look at innovative blockchain solutions in the financial sector. They demonstrate the prospects and potential of this technology.

### **1. Faster, cheaper, and safer financial services on a larger scale, smart contracts**

Since blockchain allows for efficient and immutable transactions in a real time, experts believe that it offers a faster, more secure, and more scalable way to process almost all traditional services provided in the banking and financial sectors. These include money transfers, peer-to-peer payments, and trade financing.

### **2. Collateral management**

Blockchain has proven to be useful for collateral management as well as for tracking goods. For example, a lending company that arranges a large loan for a corporate client with numerous assets can more easily collect and manage the assets used as a security and do it in a real time. Companies can also use blockchain to track and even trade goods in the supply chain. They can also track the chain of custody of insured goods. This is especially useful in insurance claims to obtain information on when and where the loss occurred.

### **3. Stablecoin**

The launch of stablecoins is another area of interest among financial institutions. A stablecoin is a type of cryptocurrency, a class of encrypted digital currencies such as Bitcoin. Unlike other cryptocurrencies, the value of a stablecoin is pegged to another currency, product, or financial instrument. It aims to provide a more stable assessment for investors than other types of cryptocurrencies, which have historically been volatile.

### **4. Tokenization of real assets**

The blockchain also allows for the tokenization of real assets. This, in turn, enables the fractionation of properties. Tokenization makes it easier for owners to sell or exchange their fractionalized assets or use them as collateral for loans.

### **5. Transactions in the virtual world and reward tokens**

The blockchain is expected to become an essential component of the virtual world of meta-space. In fact, it can enable digital financial transactions to take place in the virtual world. Blockchain also allows participants to use participation and reward tokens on the meta-network and its platforms. As a result, companies can issue tokens to visitors of their virtual locations for participating in events. They can also use them as rewards that can be exchanged, such as cash rewards from retail loyalty programs and credit cards.

### **6. Crypto staking**

Crypto staking is another new financial instrument created based on the blockchain. In this case, crypto asset holders agree to lock their assets for a while, keeping the blockchain running. They can then pledge some of their assets and be able to confirm new transactions on the blockchain, as well as add new blocks. When they confirm legitimate transactions, they gain more crypto assets. They lose some or all of their assets if they verify any fraudulent transactions.

### **7. Invoice factoring**

Another financial service provided by the blockchain is invoice factoring. Factoring allows companies to borrow against due invoices and is often used when organizations need to raise money quickly. Companies can use regular channels to lend against their accounts receivable, such as unpaid customer invoices. However, the effort involved in these transactions can be expensive and time-consuming. After all, much of the work is focused on verifying the legitimacy of the account receivables and calculating the value of each transaction. The blockchain's proponents argue that it can lower costs and reduce the possibility of fraud. Thus, it potentially makes this financing option more profitable for the stakeholders involved.

### **8. Support for new types of B2B networks**

Since blockchain establishes trust between multiple parties, it can be used to extend ERP functions, which include inventory tracking and financial calculations, beyond individual organizations in

a new type of business network called network resource planners. Everest Group described NRP as “a blockchain-based software system that helps to manage data and processes between different stakeholders within a business network” and enables companies to provide a more cohesive customer experience.

### 9. Simplification and tracking of data flow in a financial institution

While blockchain is often promoted as a means to create trust between different organizations, financial institutions have started to use it to create trust between internal departments. Blockchain leaders note that there has been an increase in the internal use of blockchain. As a result, it offers companies benefits for moving intercompany data, as well as for protecting customer data and complying with regulatory requirements. For example, some companies use blockchain to simplify intercompany payments, moving financial information from one ledger to another. In addition, the technology provides greater transparency of capital and liquidity.

Additionally, some companies are considering using blockchain for customer research to ensure that customer data is accurate and relevant within the company. It is crucial when financial institutions use customer data to make decisions about what risks they take. For example, central banks often have multiple systems for customer records - sometimes two or more dozen. The distribution of customer records across different systems increases the likelihood of distortion of information and incorrect data with a negative impact on the business (Nikonenko *et al.* 2022).

The use of blockchain technology can minimize the consequences of such difficulties through the setup of constant updating of accounting system data and the formation of appropriate audit evidence. Financial institutions can also use blockchain to monitor their own data in the context of generating audit evidence.

### 10. Replacement of paper money

According to researchers, financial institutions have expressed a high interest in using blockchain for such purposes. Thought leaders in the financial sector

believe that this step will increase transparency. This, in turn, will lead to faster transactions, greater cost savings, greater security, and a reduction in financial crime. For example, the results of Deloitte’s research, “Adoption of digital currency payments by trading companies in 2022.” 85% of surveyed organizations stated that digital currency payments will become commonplace in their industry within five years, and an equal percentage expect their suppliers to accept stablecoins and cryptocurrencies. Additionally, 64% reported significant customer interest in digital currency, with another 32% expressing moderate interest. According to the research report, “While digital currency payments may not yet be an everyday occurrence for the average customer, the overall interest in digital solutions is significant, especially among the younger generation.”

Although blockchains have many advantages, they also have some drawbacks. Below, we systematize the main risks of using blockchain in the financial sector of the global economy:

1. High power consumption of the system (requires significant investments)
2. Lack of familiarization and standardization.
3. Cybersecurity and other technical issues.

Financial and practical issues (e.g., lack of sufficient evidence about the transaction, assurance about the classification of the transaction in the financial statements of the companies, and estimated value of the transaction) (Mia *et al.* 2022).

Technical barriers (huge computing power to verify transactions, large amounts of memory to store the history of transactions).

## DISCUSSION

At the same time, it is should to compare our research findings with the views of other scholars.

Thus, we agree with the opinion of Weerawarna, R. and others (2023), blockchain technology is experiencing rapid growth in use in the financial sector, including cross-border payments, remittances, authentication, insurance, trade finance, smart contracts, auctions, and foreign exchange. Western countries (e.g., the United States, Canada, Australia, South Korea, and Israel) are pursuing policies to motivate investment in

developing blockchain-oriented applications. The three main areas of blockchain application in the financial sector include digital asset registries and their management, cryptocurrencies, and trading platforms for cryptocurrency trading cross-border payments (Weerawarna *et al.* 2023; Kovalko *et al.* 2022).

Similar views are held by Singh, A. and others (2023). When blockchain technology is applied in sectors that require data transparency, it contributes to ensuring data transparency. Therefore, blockchain technology has the potential for application in the financial services sector (Singh *et al.* 2023).

However, according to A. Lardo, K. Corsi, A. Varma, and D. Mancini, the implementation of blockchain in accounting requires a transformation of organizational structure and fundamental corporate culture principles within companies, as well as changes in business models (Lardo *et al.* 2022).

Y. Chen & C. Bellavitis also point problems of functioning of smart platforms based on the use of blockchain technology applications, including offline support, limited speed, high installation and maintenance costs, high transaction costs, and the need for testing in the future (Chen & Bellavitis, 2020).

As S. Ahluwalia, R. Mahto, and others mention, private blockchain networks of companies include limited access to company data and appropriate data authorization. Private and cooperative blockchains reflect the possibilities of using the privacy function in public blockchains (Ahluwalia *et al.* 2019; Petrenko *et al.* 2022).

Using smart contracts, as A. Miglani, N. Kumar, and others suggest, blockchain technology provides data exchange through automated operations, demand management, P2P trading, complex transactions, etc. At the same time, the blockchain will play a key role in the development of the IoT market, as intelligent networks are deployed and utilized (Miglani *et al.* 2020; Ganushchak-Efimenko *et al.* 2018).

Also, it's worth noting the research results by the Faculty of Information Technology of the Institute of Chartered Accountants in England and Wales (ICAEW). Researchers have highlighted some vital statistical data from Bitcoin calculations published

on the blockchain.info website. The transaction fee in the blockchain averages from 5 to 8 USD. These costs are not borne by business participants (clients or customers) (Tarasenko, 2019; Bielialov, 2022). There is a slight delay in initiating each transaction, averaging from four to five minutes per transaction during peak periods. There is a limit to the maximum transaction throughput - 7 transactions per second for small transaction amounts and approximately 3 transactions per second for medium transaction amounts. By the way, VISA can process 10,000 transactions per second (Abreu *et al.* 2018; Bayev *et al.* 2022).

S. Babinska points out that blockchain technology has several drawbacks. Due to the high risks associated with the use of such technology, older accounting and auditing technologies are currently considered safer (Babinska, 2022; Slobodianyuk *et al.* 2022).

Thus, the innovative application of blockchain in the financial sector has both its advantages and shortcomings.

## CONCLUSION

Blockchain is a complex technology that may not be suitable for every business. However, it offers several advantages to financial and accounting companies that can mitigate their drawbacks. Blockchain systems are not constantly at risk of hacking or interception. Currently, there is no ultimate financial blockchain, such as an ERP system. These technologies are still being developed and can coexist with many other industries. With more users adopting blockchain, the network effect of the blockchain system will strengthen.

Blockchain technologies, despite their shortcomings, are unique, so they can qualitatively change everyday life, address the issues of security, reliability and transparency of transactions, and influence the development of its most important aspects. In particular, the greatest prospects for their use can be predicted in the IT industry, financial system, accounting and auditing, marketing and document management.

The main advantage of Blockchain technology from an economic point of view is that it is a transparent, fast, cheap and secure way to conduct transactions with electronic money. The most promising area of

Blockchain implementation is financial. The use of Blockchain as a technological innovation will help build efficient and transparent systems for tracking and recording financial transactions, as well as improve the efficiency of the financial sector, as these technologies allow working without third-party intermediation and high risks.

Blockchain can be useful both for ordinary users or entrepreneurs and for international companies and corporations. The key to the further development of blockchain and related technologies is their state recognition and legalisation, the availability of a regulatory framework to ensure control of crypto assets, transfer of funds and regulation of crypto exchanges, as well as a systematic approach to the security of blockchain applications in the course of financial activities of the enterprise.

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