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BLOCKCHAIN TECHNOLOGIES IN FINANCIAL MANAGEMENT: ENHANCING TRANSACTION TRANSPARENCY AND SECURITY

Summary. *Introduction. The article examines the application of blockchain technology in corporate financial management with a focus on increasing transaction transparency and security.*

Purpose. The purpose of this study is to analyze the application of blockchain technology as a means to enhance transparency and security in corporate financial management, with a specific emphasis on accounting, internal control, and auditing.

Materials and methods. The research is based on a review of previously published studies. The methodology includes comparative analysis, induction and deduction, logical reasoning, and other analytical approaches.

Results. The theoretical foundations of decentralized ledgers, their operating principles, and consensus mechanisms are analyzed, as well as their impact on the accuracy of accounting, the efficiency of internal controls, and auditing. Practical case studies of blockchain implementation in various sectors (banking, insurance, logistics, etc.) are presented, reflecting reductions in document processing time, minimization of fraud risks, and improvements in compliance procedures. The work also pays special attention to the technological and regulatory barriers that limit the widespread adoption of blockchain in corporate finance. In conclusion, the article formulates its findings. The information presented is of interest to scholars and practitioners in the fields of

financial management and information technology, particularly those specializing in the digital transformation of financial systems to enhance transaction transparency and security. Moreover, the material will be useful for specialists involved in the development of innovative strategies and regulatory mechanisms aiming to integrate blockchain technologies to optimize financial processes and ensure robust data protection in a dynamic digital economy.

Further research in this area. Future research in this field should focus on the integration of new adaptive consensus algorithms with artificial intelligence and dynamic smart contracts. This direction holds potential for enhancing the flexibility, efficiency, and security of blockchain-based financial systems.

Key words: *blockchain, corporate finance, accounting, internal control, auditing, transaction transparency, security, smart contracts, compliance, decentralization*

Statement of the problem. Modern financial management is undergoing a period of profound transformation, driven by digitalization and the increasing demands for transparency and security of operations [4]. Blockchain technologies, originally popularized through cryptocurrencies (Bitcoin, Ethereum, etc.), are gradually expanding beyond the purely "cryptocurrency" sphere to become an instrument for enhancing corporate finance.

Analysis of recent research and publications. Danju D. [1] examines innovative solutions in accounting, emphasizing that the use of distributed ledgers helps reduce operational risks and prevent fraud. Similarly, the study by Rane N., Choudhary S., and Rane J. [2] demonstrates the potential of integrating blockchain with artificial intelligence to create synergistic effects in financial flow management, which not only automates control processes but also enhances transaction reliability. Kukman T. and Gričar S. [3] in turn focus on improving the quality of financial systems, considering blockchain as a tool that contributes to process optimization and enhanced management efficiency, while Chang S. E.,

Luo H. L., and Chen Y. C. [8] emphasize the revolutionary changes in trade finance, where the application of the technology in the context of letters of credit enables a rethinking of traditional transaction methods.

Abdelhamid M. et al. [4] provide an analysis of the challenges of blockchain implementation, paying attention to existing barriers and prospective AI-based solutions, thereby considering blockchain not only as a technical innovation but also as a strategic instrument for enhancing financial transaction transparency. Kayani U. and Hasan F. [5] analyze the interrelationship between the dynamics of cryptocurrencies and the functioning of traditional financial institutions, emphasizing the need for an interdisciplinary approach and the sustainable development of the technology. The studies by Georgiou I. et al. [6] and Priom M. A. I. et al. [7] demonstrate how the use of blockchain technology contributes to increased accuracy in accounting, reduction of operational costs, and improved auditing procedures.

Upadhyay A. et al. [10] consider the impact of the technology on the formation of a circular economy, pointing to the possibility of a harmonious combination of economic efficiency with environmental and social priorities. The study by Liladhar Rane N. et al. [9] demonstrates the potential of an interdisciplinary approach, where digital technologies, including blockchain, serve as tools for analyzing socio-economic processes.

Bamakan S. M. H., Motavali A., and Bondarti A. B. [11] provide a detailed assessment of the performance criteria of various consensus algorithms, highlighting key parameters for enhancing the resilience and efficiency of distributed systems. A similar contribution was made by Wan S. et al. [12], who presented a comparative review of modern consensus protocols, thus offering a deeper understanding of the structural features of the technology in the face of growing demands for scalability and security.

Martinez D., Magdalena L., and Savitri A. N. [13] propose the integration of artificial intelligence with blockchain technology, which enhances the

processes of analyzing and monitoring financial operations. Adewale T. T., Olorunyomi T. D., and Odonkor T. N. [14] develop a conceptual model in which blockchain technology is used to strengthen reporting transparency and regulatory compliance. Complementing the aforementioned studies, Almadadha R. [3] focuses on the use of blockchain in financial accounting, paying attention not only to traditional aspects of security and transparency, but also to emerging trends related to ESG reporting.

Thus, the literature review demonstrates the multifaceted nature of research in the application of blockchain in financial management. On one hand, publications focused on the practical application of the technology to enhance transaction transparency and security emphasize the possibilities of integration with artificial intelligence and innovative methods in trade finance. On the other hand, theoretical studies in accounting and auditing reveal the fundamental principles of distributed ledgers and confirm their potential for optimizing the control of financial processes.

The purpose. Based on the identified gap, the aim of this work is to analyze the application of blockchain technology for enhancing transaction transparency and security in the field of corporate financial management, with a focus on accounting, internal control, and auditing.

The scientific novelty lies in proposing a new integrative approach to the use of blockchain technology for improving the transparency and security of corporate transactions, achieved through a systematic analysis of the theoretical foundations of distributed ledgers, a comparative study of consensus algorithms, and an empirical evaluation of implementation case studies that optimize accounting, internal control, and auditing processes.

The author's hypothesis is that the use of blockchain can not only increase transparency and reduce fraud risks in financial operations but also improve the quality of financial accounting through immutable records and reduced reliance on manual verification.

Materials and methods. This work is based on a review and analysis of scientific publications on blockchain and its role in financial management.

Presentation of the main material of the research.

Theoretical foundations for the application of blockchain in financial management. Blockchain technology is based on a decentralized ledger, where each transaction is grouped into a block and confirmed by a network of nodes using cryptographic methods [4]. Each node in the network maintains a complete copy of the ledger. When a new transaction occurs, network participants must confirm its validity, which prevents abuse and targeted attacks on a single server. Blockchain utilizes encryption with hash functions; data in each block are linked to the previous block via a unique hash. Any attempt to alter data in a block results in a discrepancy throughout the entire chain [5]. The most widely adopted consensus mechanisms are Proof of Work (PoW) and Proof of Stake (PoS). PoW requires solving complex computational puzzles, making the network resilient to external attacks but energy-intensive. PoS, based on "stake," reduces energy consumption and increases speed, but demands high standards for the fair distribution of tokens [6].

One of blockchain's advantages in the corporate sector is the assurance of transparency and verifiability of operations [7]. In financial systems, the approval chain is often complex and opaque, which increases fraud risk. Blockchain enables every operation to be recorded in a single ledger accessible to all network participants:

- Transaction traceability.
- Forgery resistance.
- Audit automation [1; 3].

Thus, blockchain transparency optimizes interactions between financial departments, external auditors, and regulators, creating a trustworthy environment. For instance, Ethereum-based solutions (following its transition to

PoS) have significantly accelerated operations in decentralized finance (DeFi) applications and enhanced their reliability [2; 9]. Figure 1 below summarizes the elements that make it possible to achieve increased security in financial transactions through the application of the blockchain network.

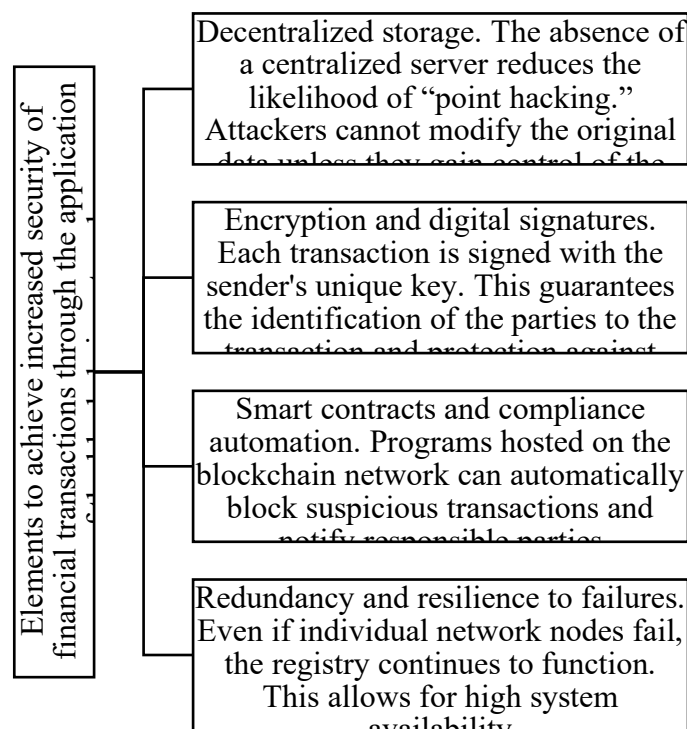


Fig. 1. Elements that enable increased security of financial transactions through the use of the blockchain network

Source: generalized by the author based on [2; 3; 9]

As a result, blockchain creates an environment where each transaction maintains cryptographic integrity, and the risk of fraud is reduced due to transparency and decentralization.

Blockchain in accounting, internal control, and auditing. The use of distributed ledgers in accounting enhances the accuracy and timeliness of recording financial transactions. In traditional accounting models, most processes rely on documents and databases stored in centralized systems [4]. With blockchain implementation, each transaction (for example, an entry for invoice payment) is verified by network nodes and recorded in a distributed ledger,

ensuring an immutable history. Certain operations—such as document compliance checks, reconciliations, and balance confirmations—can be performed automatically using smart contracts [7; 11].

Within a financial group or holding, data from subsidiary units can be consolidated into a single ledger, simplifying the preparation of consolidated reports. This is particularly relevant when diverse ERP systems are used within the holding [3, 10]. Internal control is aimed at the timely detection and prevention of anomalies, errors, and fraudulent activities. In the context of blockchain, the internal control system gains several advantages:

- Automated anomaly monitoring.
- High traceability.
- Support for KYC/AML Procedures [3; 9].
- A unified, verifiable ledger for compliance and security departments [2; 15].

Below, Table 1 summarizes the main effects achieved by companies when implementing blockchain in internal control and compliance processes, as well as possible limitations.

Table 1

The effects that companies achieve when implementing blockchain in internal control and compliance processes, as well as possible limitations

Effect of implementation	Description of the effect	Possible limitations
Immutability and audit transparency	Blockchain creates an immutable ledger of transactions, enabling the formation of a detailed, transparent log of operations. This significantly reduces the risk of forgery, enhances data reliability, and improves audit quality through retrospective analysis.	No possibility of correcting data entry errors, necessitating additional procedures for detection and recording; challenges balancing transparency with the confidentiality of critical information.

Effect of implementation	Description of the effect	Possible limitations
Decentralization and distributed control	The distributed nature of blockchain eliminates the need for a single control point by distributing authority among multiple participants. This enhances system resilience, minimizes internal abuse, and creates a more flexible corporate governance model.	Coordination difficulties among independent network participants may slow system responsiveness; integration challenges with existing centralized IT structures and potential issues in consortium management.

Source: generalized by the author based on [2; 3; 5; 6]

Thus, blockchain in accounting, internal control, and auditing opens opportunities for automation, enhanced transparency, and data protection. However, technological, legal, and organizational aspects associated with overhauling traditional methods must be taken into account. The following sections will review practical experiences in integrating blockchain into corporate finance and its future prospects.

Practical application in corporate finance: cases and prospects. One of the most promising areas for blockchain implementation in corporate finance is the creation and dissemination of financial reporting. Traditional reporting processes are often prone to errors and delays due to multi-step document verification. With blockchain, every operation affecting financial results is recorded in a distributed ledger and becomes available to interested parties in real time [6].

One of the main advantages of blockchain in corporate finance is the reduction of fraud risks and the optimization of compliance procedures. Thanks to the immutability of the ledger and cryptographic protection methods, every transaction is recorded in a manner that makes forgery extremely difficult [8; 14].

In practice, the challenge of aligning public blockchains with regulatory norms still arises: in some jurisdictions, it is necessary to restrict access to certain information or provide a "right to be forgotten" for personal data (as required by

GDPR in the EU) [7]. Consequently, most cases are currently being deployed in "private" or "consortium" networks, where the circle of validators is limited [3].

For a clear assessment of examples of blockchain use in the corporate sector and the key results of their implementation, Table 2 is presented below.

Table 2

Evaluation of examples of blockchain use in the corporate sector and the results of their implementation

Sector / type	Companies	Description / application	Key advantages / features
International banks	HSBC, Santander	Use of distributed ledgers for documentary operations and trade finance.	Reduction in document processing time; decreased risk of forgery.
Insurance companies	Etherisc, Blue Cross	Testing smart contracts for automatic payouts with the uploading of supporting documents (including medical certificates).	Automation of payout processes; minimization of errors.
Logistics corporations	Maersk and others	Development of platforms for real-time cargo tracking and settlements, where documents (invoices, statements, waybills) are created and signed on blockchain.	Enhanced transparency; optimization of document workflows; reduced operational risks.

Source: generalized by the author based on [1-3; 8]

Overall, despite existing limitations, market dynamics and successful pilot projects confirm that blockchain technology is being actively integrated into corporate finance.

Conclusions of this research and prospects for further research in this area. The study analyzed the mechanisms by which blockchain technology ensures transparency, protection, and verification of financial transactions in the corporate sector.

There is a need to develop an interdisciplinary model that combines blockchain technologies, artificial intelligence, and big data processing algorithms for the automated analysis of financial transactions. Within this model, it is proposed to design intelligent smart contracts capable of identifying anomalies and potential fraudulent schemes in real time through the integration of machine learning methods with advanced consensus algorithms (such as adaptive versions of PoS or hybrid solutions). This approach would not only accelerate audit processes by automating routine checks, but also improve the accuracy of accounting and internal control by reducing dependence on manual data verification and minimizing operational risks.

In addition, it is essential to establish a unified regulatory and technological standard for the integration of blockchain technologies into corporate financial management. A comparative analysis of existing regulatory frameworks across different jurisdictions is recommended in order to identify optimal solutions and develop policy guidelines for governments and the corporate sector.

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