



Blockchain Technology for Enhancing the Reliability of Accounting Records

YUSRA HADI IBRAHIM¹, HANAN SALIH JABUR²
Administrative Technical Institute, Southern Technical University, Iraq
Yusra.ibraheem@stu.edu.iq, hanan.jabur@stu.edu.iq

Abstract. This study examines the role of blockchain technology in enhancing the reliability of accounting records and improving the quality of accounting information. This research addresses the challenges of data manipulation, information inaccuracy, and limited transparency in traditional accounting systems, with the aim of assessing how blockchain technology can enhance trust in financial information and improve auditing processes. The study adopts an analytical approach to examine the characteristics and applications of blockchain technology in accounting. Blockchain technology works through a decentralized and distributed ledger that securely records transactions using encryption techniques, ensuring data integrity, transparency, and immutability. These features greatly reduce the risk of unauthorized alterations, enhance the reliability of accounting records, facilitate real-time transaction processing, and reduce reliance on intermediaries. The results indicate that the adoption of blockchain technology improves the quality and reliability of financial reporting, reduces accounting errors and fraud risks, enhances transparency and audit efficiency, and strengthens stakeholder confidence in financial information. Consequently, blockchain represents a transformative technology capable of supporting the modernization and efficiency of contemporary accounting systems and the accounting profession.

Keywords: Blockchain Technology; Accounting Records; Financial Reporting Quality; Audit Efficiency; Data Integrity; Transparency.

1. Introduction

Research Problem: Despite the development of various technologies to improve the accuracy and security of accounting systems, challenges related to

data manipulation, fraud, human error, and limited transparency continue to affect the reliability of accounting records. Blockchain technology has emerged as an innovative solution capable of enhancing data integrity, transparency, and trust in financial information. However, its adoption in accounting systems raises important questions about its effectiveness and application.

Accordingly, this study seeks to answer the following research questions:

1. How can blockchain technology improve the reliability and integrity of accounting records?
2. What are the main challenges associated with implementing blockchain technology in accounting systems?
3. To what extent does the adoption of blockchain technology improve the efficiency and effectiveness of auditing processes?

Research Importance: The rapid development of blockchain technology and the expansion of its applications have increased its importance in various industries, especially in the financial and accounting sectors. Thanks to its decentralized structure, cryptographic security, and immutability of data, blockchain technology has the potential to improve the reliability, transparency, and efficiency of accounting systems. The importance of this study can be summarized as follows:

Enhancing the reliability of accounting records through the immutability of blockchain technology.

Blockchain technology provides a secure and immutable distributed ledger that prevents unauthorized modification of accounting records. By ensuring data integrity and traceability, this enhances the credibility of financial information and strengthens stakeholder

confidence in accounting records. This study provides a conceptual framework that can help organizations adopt blockchain technology to improve the reliability and security of their accounting systems.

Improving the efficiency of accounting and auditing through automation and smart contracts

Blockchain technology, along with smart contracts, enables the automation of accounting transactions and auditing procedures, reducing human error, minimizing fraud risks, and improving operational efficiency. Furthermore, this technology enhances transparency by creating verifiable and tamper-proof records, which facilitates auditing activities and supports regulatory compliance. The results of this study may also provide useful insights for policymakers and regulatory authorities in developing governance frameworks and standards for adopting blockchain technology in financial reporting and auditing.

Research Objectives: This study aims to examine the role of blockchain technology in enhancing the reliability of accounting records and improving the quality of financial information. Specifically, the study seeks to:

Analyzing the relationship between the adoption of blockchain technology and the reliability of accounting records.

Study how the immutability of blockchain technology can reduce accounting manipulation, fraud, and human error.

Evaluating the contribution of blockchain technology to improving the efficiency and effectiveness of auditing processes.

Assessing the potential of blockchain technology to enhance transparency, data integrity, and stakeholder confidence in financial reporting.

Research Hypotheses: Based on the research objectives, the study proposes the following hypotheses:

Hypothesis 1 (H1): There is a statistically significant positive relationship between the adoption of blockchain technology and the reliability of accounting records by reducing accounting manipulation, fraud, and human error.

Hypothesis 2 (H2): There is a statistically significant positive relationship between the adoption of blockchain technology and the efficiency and effectiveness of accounting audits.

First Section

1.1 Blockchain Technology: Concept and Definition

Blockchain technology is a decentralized, distributed ledger system that enables the secure recording, verification, and storage of transactions across a network of interconnected computers (nodes). Unlike traditional centralized databases, blockchain relies on cryptographic techniques and consensus mechanisms to validate transactions before permanently recording them. Once verified, transactions are grouped into chronologically linked blocks, creating an immutable chain of records that cannot be altered without the consent of network participants.

From an accounting perspective, blockchain technology acts as a transparent and secure digital ledger that records financial transactions, contractual agreements, ownership rights and other business events in a verifiable and traceable manner. Because the registry is shared among authorized participants rather than being controlled by a single entity, it promotes transparency, accountability, and trust while reducing the risk of unauthorized alterations and fraud.

Therefore, blockchain technology can be considered an advanced accounting information system that facilitates the secure management of financial data on a global scale. Its decentralized structure, along with cryptographic security and data immutability, enhances the reliability, integrity, and credibility of accounting records, while supporting more efficient auditing and financial reporting processes.

Accordingly, blockchain technology represents one of the most important technological innovations in modern accounting, as it provides a secure, transparent, and tamper-proof environment for recording and verifying financial transactions, thereby improving the quality and reliability of accounting information.

1.2 The Concept and Evolution of Blockchain Technology

Blockchain technology was introduced in 2008 by an anonymous individual or group known as Satoshi Nakamoto through the publication of the Bitcoin white paper, titled "Bitcoin: A Peer-to-Peer Electronic Cash System." The primary objective was to address the "double-spending" problem in digital currencies by enabling secure peer-to-peer transactions without relying on trusted third-party intermediaries. To achieve this, Nakamoto proposed a decentralized, distributed

ledger that records transactions transparently, securely, and permanently, thereby creating an immutable audit trail.

Although blockchain technology gained global recognition with the emergence of Bitcoin in 2008, its basic concepts originated much earlier. The foundations of blockchain technology can be traced back to 1991, when Stuart Haber and W. Scott Stornetta developed encryption methods to secure digital documents against tampering. In 1998, Nick Szabo proposed the concept of Bit Gold, a decentralized digital currency that incorporated many of the principles later adopted by blockchain systems. These pioneering contributions culminated in Nakamoto's implementation of the first operational blockchain network in 2009 as a public ledger supporting Bitcoin transactions.

Blockchain technology has since evolved beyond cryptocurrencies to become a versatile technology with applications in finance, accounting, supply chain management, healthcare, and public administration. According to the Oxford Dictionary, blockchain technology is a system that records transactions related to Bitcoin and other cryptocurrencies across multiple computers connected through a peer-to-peer network. Wang Weiyuan (2018) defines blockchain technology as a continuously growing chain of cryptographically secure blocks, which ensures data integrity, transparency, and resistance to unauthorized modification.

From a business and accounting perspective, blockchain technology can be described as a decentralized platform that enables reliable transactions without the need for a central authority. Each transaction is recorded in a block, and each verified block is permanently linked to the previous block, forming an immutable chain that is repeated across all participating nodes. This distributed architecture enhances transparency, strengthens data security, improves auditability, and increases the reliability of accounting records.

1.3 Core Components of Blockchain Architecture

Blockchain architecture relies on several interconnected components that collectively ensure the security, transparency, and integrity of recorded transactions. Key components include the block, transaction data, cryptographic hashing, and the timestamp.

The block

The block is the basic unit for storing data in blockchain

technology. It contains a set of validated transactions that are grouped together before being permanently added to the distributed ledger. Once a block is validated by the network's consensus mechanism, it is linked to the previous block, forming an immutable time series of records.

Transaction data

Transaction data represents the information stored within each block. Depending on the application, this data may include financial transactions, property records, contractual agreements, or other digital events. Each transaction is verified before it is recorded, ensuring the accuracy and integrity of the information stored on the blockchain.

Cryptographic hash

A cryptographic hash is a unique digital identifier that is created from the contents of a block using a cryptographic hashing algorithm. Each block contains its own hash in addition to the hash of the previous block, creating a secure connection between successive blocks. Any attempt to alter data within a block changes its hash value, immediately revealing unauthorized modifications and maintaining the immutability of the blockchain.

Timestamp

The timestamp records the exact date and time at which a block was created and added to the blockchain. This system establishes the chronological order of transactions and contributes to maintaining a transparent, traceable, and verifiable record of all activities recorded in the distributed ledger.

Together, these components form a secure and decentralized registry that protects accounting records from unauthorized alteration, enhances data integrity, and provides a reliable path for auditing financial transactions.

1.4 Key characteristics of blockchain technology

Blockchain technology has many distinctive characteristics that have made it one of the most influential innovations in modern information systems, especially in accounting and financial reporting. These characteristics contribute to enhancing the reliability, security, and efficiency of accounting information.

Transparency: Blockchain technology provides a

transparent environment in which authorized participants can access a shared and synchronized copy of the distributed ledger. Every verified transaction is permanently recorded and traceable throughout its lifecycle, improving accountability, increasing confidence in financial information, and facilitating audit procedures.

Efficiency and speed: Blockchain technology simplifies transaction processing by automating verification procedures and reducing reliance on intermediaries. In many business applications, this leads to faster transaction processing, lower administrative costs, and improved operational efficiency, especially when combined with smart contracts.

Security: Blockchain technology achieves a high level of security through cryptographic encryption, distributed data storage, and consensus mechanisms. Each transaction must be verified before it is recorded, and each block is linked to the previous block via encryption techniques; As a result, unauthorized modifications become extremely difficult, greatly reducing the risk of fraud and cyberattacks.

Decentralization: Unlike traditional centralized systems that rely on a single trusted authority, blockchain technology operates through a decentralized network where transactions are collectively validated by network participants using consensus mechanisms. This design reduces reliance on intermediaries, improves system flexibility, and lowers operating costs.

Immutability: One of the defining features of blockchain technology is the immutability of the recorded data. Once transactions are validated and added to the blockchain, they cannot be modified or deleted without invalidating the entire chain. This feature maintains data integrity, enhances the reliability of accounting records, and provides a permanent and verifiable audit trail.

Anonymity and privacy: Blockchain technology allows users to conduct transactions through encrypted digital addresses instead of directly revealing their personal identities. This approach, which uses pseudonyms, enhances user privacy while maintaining transaction traceability and accountability within the network, in accordance with the governance model of the blockchain platform.

Collectively, these characteristics make blockchain technology a reliable technological infrastructure for accounting systems by promoting transparency, security, efficiency, data integrity, and confidence in financial reporting.

Section Two

2.1 Blockchain technology applications in accounting and its importance

Blockchain technology was initially developed to support cryptocurrency transactions, especially Bitcoin. However, its applications have expanded significantly and it is now widely adopted in various industries, including accounting, auditing, finance, supply chain management and corporate governance. In the accounting profession, blockchain technology has introduced new methods for recording, verifying, and managing financial transactions, leading to improved quality, reliability, and transparency of the accounting information system.

The adoption of blockchain technology has changed traditional accounting practices through the application of distributed ledger technology (DLT). Unlike traditional centralized accounting systems, a distributed ledger stores identical copies of transactions that have been verified across multiple participants in the network. Once transactions are verified through consensus mechanisms and recorded on the blockchain, they become immutable, meaning they cannot be modified or deleted without compromising the integrity of the entire record. This feature greatly improves data integrity, transparency, and auditability.

Furthermore, blockchain technology enables the instant verification and recording of accounting transactions, allowing organizations to maintain accurate and up-to-date financial information. As a result, financial statements can be prepared with greater reliability, transparency, and timeliness, while reducing the risks of human error, fraud, and unauthorized data manipulation.

Instead of replacing the traditional double-entry bookkeeping system, blockchain technology complements it with the concept of triple-entry bookkeeping. In addition to the traditional debit and credit entries, a third entry is created that is cryptographically verified and stored in the shared blockchain ledger. This independently verifiable record enhances trust among stakeholders, improves audit efficiency, and provides a permanent and tamper-proof record of financial transactions.

In general, integrating blockchain technology into accounting information systems contributes to improving transaction security, the quality of financial reports, regulatory compliance, and the overall

effectiveness of accounting and auditing practices.

2.2 The impact of blockchain technology on the availability and accessibility of accounting and financial information

Blockchain technology has fundamentally transformed the way accounting and financial information is recorded, stored, accessed, and verified. By providing a decentralized and distributed ledger, blockchain technology enables authorized participants to access reliable and up-to-date financial information while maintaining high standards of security, transparency, and data integrity. These capabilities have made blockchain technology one of the most influential technological innovations in modern accounting information systems.

One of the key advantages of blockchain technology is its ability to enhance the accuracy, integrity, and transparency of accounting records throughout their lifecycle. Every verified transaction is permanently recorded in chronological order and cryptographically linked to previous records, creating a complete and tamper-proof audit record. This structure facilitates the efficient retrieval, verification, and analysis of historical accounting information.

Blockchain technology also reduces the need for manual matching and repeated verification procedures by providing a common and reliable source of financial data. Therefore, organizations can reduce administrative costs, minimize human errors, improve operational efficiency, and speed up financial reporting and auditing processes.

Furthermore, the transparency and traceability provided by blockchain technology enhances regulatory compliance, supports corporate governance, and improves stakeholder confidence in financial information. This technology also facilitates the secure exchange of data between institutions, auditors, regulators and other authorized parties, through a distributed infrastructure that simplifies transaction settlement and verification processes.

In general, blockchain technology positively impacts the qualitative characteristics of accounting information by enhancing reliability, transparency, timeliness, verifiability, and accessibility. These improvements contribute to better decision-making, increased audit

effectiveness, and higher quality financial reporting, making blockchain technology a valuable technical foundation for modern accounting systems.

Practical Aspect

Field Study and Statistical Analysis

This chapter presents the experimental component of the study and provides a statistical analysis of the data collected. The field study was conducted to examine the perceptions of accounting professionals regarding the role of blockchain technology in enhancing the reliability of accounting records and improving the quality of accounting information.

The chapter begins by describing the research methodology, the research instrument, and the characteristics of the research sample. It then presents the procedures used for data collection and statistical analysis, including descriptive and inferential statistical methods. Finally, the results are analyzed and interpreted to evaluate the proposed research hypotheses and determine the extent to which blockchain technology contributes to improving the reliability, transparency, and integrity of accounting records.

First: Study Instrument: The questionnaire was used as the primary tool for collecting the data required for this study. It was developed based on the theoretical framework and relevant previous studies to ensure that its elements adequately reflect the research objectives and hypotheses. The questionnaire consists of two main sections.

The first section: The demographic and professional characteristics of the respondents were collected, including job title, educational qualification and years of professional experience.

The second section: The study included 13 questionnaire items designed to measure study variables related to the role of blockchain technology in enhancing the reliability of accounting records.

Responses were measured using a five-point Likert scale, with the following response categories: strongly agree, agree, neutral, disagree, strongly disagree.

Second: Research Sample

Responses were measured using a five-point Likert scale, with the following response categories: strongly agree, agree, neutral, disagree, strongly disagree.

Table 1: Demographic Characteristics of the Study Sample

Variable	Category	Frequency	Percentage
Job Title	Finance Officer	21	42%
	Information Technology Officer	17	34%
	Internal Auditor	12	24%
Educational Qualification	Diploma	16	32%
	Bachelor's Degree	22	44%
	Master's Degree	8	16%
	PhD	4	8%
Years of Experience	Less than 5 years	19	38%
	5–10 years	13	26%
	More than 10 years	18	36%

The demographic distribution indicates that the respondents represent diverse professional backgrounds and educational levels, providing a suitable basis for assessing the role of blockchain technology in enhancing the reliability of accounting records.

Third: Data Analysis and Results

The data collected were analyzed using appropriate descriptive and inferential statistical techniques. Descriptive statistics, including arithmetic mean, standard deviation and relative weight, were used to summarize and describe respondents' perceptions regarding the study variables. Inferential statistics were then applied using a t-test to evaluate the proposed research hypotheses and determine the statistical significance of the observed relationships.

The statistical analysis was performed using an appropriate statistical software package to ensure the accuracy and reliability of the results. The following section provides a comprehensive descriptive analysis of all questionnaire items, followed by the results of the hypothesis testing and their interpretation.

Item No.	Questionnaire Item	Mean	Standard Deviation	Relative Weight (%)	Rank
12	Blockchain technology contributes to standardizing accounting practices when dealing with international companies.	4.76	0.54	95.2	1
4	Blockchain technology helps in detecting financial fraud in its early stages.	4.64	0.52	92.8	2
6	Smart contracts ensure automatic transaction recording without human intervention.	4.62	0.64	92.4	3
8	Blockchain technology prevents manipulation because accounting records cannot be altered or deleted.	4.62	0.69	92.4	4
11	Blockchain technology contributes to increasing the speed of financial settlement between parties.	4.58	0.67	91.6	5
3	The high cost of implementation limits the adoption of blockchain technology in small and medium-sized enterprises.	4.52	0.64	90.4	6
5	Blockchain technology makes the work of external auditors easier by enabling them to trace the origin of every financial transaction.	4.46	0.78	89.2	7
2	The accounting profession requires new legal regulations to recognize accounting records based on blockchain technology.	4.38	0.66	87.6	8
1	A lack of technical expertise reduces the ability of accountants to benefit from blockchain technology.	4.30	0.54	86.0	9
10	Blockchain technology contributes to standardizing accounting across the organization's branches.	4.26	0.80	85.2	10
13	Implementing blockchain technology requires updating international accounting standards to accommodate digital record keeping.	4.18	0.85	83.6	11
7	Blockchain technology eliminates the need to wait for bank account matching processes because transactions are processed in real time.	4.12	0.75	82.4	12
9	Distributing identical copies of accounting records among multiple authorized parties contributes to enhancing data security.	3.82	0.98	76.4	13

Detailed Analysis of the Results

1. Detection and Control Efficiency

The results show a high level of agreement among respondents regarding the contribution of blockchain technology to enhancing accounting control and improving the reliability of accounting records. Item (4), "Blockchain technology helps detect financial fraud in its early stages," ranked second with an average score of 4.64, indicating that respondents see blockchain as an effective mechanism to enhance fraud detection and reduce opportunities for financial manipulation. Similarly, clause (8), which states that blockchain records cannot be altered or deleted, achieved a relative weight of 92.4%, reflecting strong confidence in the immutability of blockchain records as a key factor in maintaining data integrity and supporting reliable auditing procedures.

2. Automation and Reduction of Human Error

The results also indicate strong support for the automation capabilities provided by blockchain technology. Item (6), which relates to the role of smart contracts in automatically recording transactions, received an average score of 4.62, indicating that respondents believe that automation can reduce human intervention and improve the accuracy of accounting processes. Similarly, item (11), relating to the speed of financial settlement, achieved a relative weight of 91.6%, while item (7), relating to reducing delays associated with traditional bank settlements, recorded an average score of 4.12. These results indicate that blockchain technology has the potential to improve operational efficiency, speed up transaction processing, and reduce human errors in accounting activities.

3. Challenges to Blockchain Adoption

Despite the positive perceptions of blockchain technology, participants also identified several challenges that could hinder its implementation. The high cost of adopting blockchain technology ranked among the most significant obstacles, with an average score of 4.52. In addition, participants emphasized the need to update the legal and regulatory frameworks for the recognition of blockchain-based accounting records, as evidenced by item (2), which achieved an average score of 4.38. Furthermore, the lack of technical expertise among accounting professionals, with an average score of 4.30, highlights the importance of professional training and capacity building. These results indicate that the successful implementation of blockchain technology depends not only on technological progress, but also on supportive legislation, appropriate regulatory policies, and qualified human

resources.

4. International Standardization and Transparency

The highest-rated statement was item (12), "Blockchain technology contributes to harmonizing accounting standards when dealing with international companies," with an average score of 4.76. This result reflects respondents' strong belief that blockchain technology can facilitate the harmonization of accounting practices in international business environments by providing transparent, consistent, and verifiable financial records. Item (13), which relates to the need to update international accounting standards to accommodate digital record keeping, also received a high level of approval, with an average score of 4.18. Taken together, these results suggest that the increasing use of blockchain technology may require the continued development of accounting standards and regulatory frameworks to support digital financial reporting and improve the comparability and reliability of accounting information.

Conclusions

The results indicate that blockchain technology has great potential to enhance the reliability, integrity, and transparency of accounting records by providing a secure and immutable environment for recording financial transactions.

The experimental results show a high level of agreement among participants regarding the role of blockchain technology and smart contracts in reducing human error, improving transaction accuracy, and increasing the efficiency of accounting and auditing processes.

The study confirms that the successful adoption of blockchain technology requires the development of appropriate legal and regulatory frameworks capable of recognizing blockchain-based digital records and supporting their integration into accounting and financial reporting systems.

The results also reveal that insufficient technical knowledge and professional experience among accounting practitioners constitute major obstacles to the effective implementation of blockchain technology. Therefore, ongoing professional training and educational programs are essential to maximizing the benefits of blockchain-based accounting systems.

The participants agreed that blockchain technology

contributes to improving transparency, facilitating the standardization of accounting practices, and enhancing stakeholder confidence in financial information, thus supporting the development of modern accounting information systems.

Overall, the study concluded that blockchain technology represents a promising technological innovation capable of improving the quality, reliability, and credibility of accounting information, while supporting more efficient accounting and auditing practices.

Recommendations

Based on the results of this study, the following recommendations are proposed:

Legislative and regulatory framework: Regulatory authorities should develop and update accounting, financial and commercial legislation to recognize digital records based on blockchain technology, and provide an appropriate legal framework for their use in accounting, auditing and financial reporting.

Institutional adoption: Public and private institutions should gradually adopt accounting information systems based on blockchain and distributed ledger technology (DLT) to improve the reliability, transparency, and security of accounting records while reducing reliance on manual procedures.

Professional training and capacity building: Professional accounting bodies, universities, and training institutions should provide specialized educational programs and continuing professional development programs on blockchain technology, smart contracts, and their applications in accounting and auditing to enhance the technical competencies of professional accountants.

Technological development and pilot projects: Organizations are encouraged to implement blockchain technology pilot projects within their accounting information systems to assess its effectiveness, identify implementation challenges, and develop best practices before widespread deployment.

Accounting standards and academic research: Accounting standard-setting bodies should assess the impact of blockchain technology on financial reporting and auditing standards, while universities and research institutions should encourage more empirical studies on the impact of blockchain technology on the quality of accounting information, audit efficiency, and the reliability of financial reporting.

References

- Al-Qaisi, R. T. I. (2021). *The impact of using blockchain technology on financial statements in Jordanian commercial banks* (Master's thesis, Middle East University, Jordan).
- Association of Chartered Certified Accountants (ACCA). (2017). *Blockchain and the Future of Accountancy*.
- Ben Moussa, K. E., & Taybi, A. L. (2024). [Title of the article]. *Al-Mudall Al-Iqtisadi* (The Economic Model Journal), University of El Oued, June, 741–760.
- Blockchain Revolution. (2016). *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World*. Portfolio.
- Deloitte. (2018). *Blockchain Technology and Its Potential in Accounting and Auditing*.
- Institute of Chartered Accountants in England and Wales (ICAEW). (2018). *Blockchain and the Future of Accounting*.
- Satoshi Nakamoto. (2008). *Bitcoin: A Peer-to-Peer Electronic Cash System*.
- Taroubia, N. (2020). Blockchain technology and its impact on the digital future of economic transactions: Opportunities and challenges. *Journal of Contemporary Economic Research*, 3(1), 98–109.