

Analysis of blockchain technology as a tool for enhancing audit quality

María Teresa Cuenca Jiménez¹ , Alvarado Esperanza¹ , Isabel Valdés¹ 

¹ Private Technical University of Loja, Ecuador

Corresponding author: María Teresa Cuenca Jiménez | mtcuenca@utpl.edu.ec

ORCID: <https://orcid.org/0000-0001-9683-6299>

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ABSTRACT

Auditing plays an indispensable role in ensuring the sustainable and proper functioning of organizations. Recent evidence suggests that blockchain technology can significantly contribute to overcoming current limitations associated with low audit quality. As a technology centered on data security and trust, blockchain offers a reliable environment for recording and verifying financial information, positioning it as a valuable resource for strengthening quality control in auditing processes. This study aims to conduct a bibliometric and systematic analysis of the scientific literature addressing terms such as blockchain and audit quality, based on publications indexed in the Web of Science database. The research addresses theoretical and methodological aspects, focusing on identifying countries with the highest scientific output, influential authors, leading journals, and the most used keywords. The results indicate that the most productive countries are the United States and China. The journals with the highest number of publications include IEEE Access, Electronics, IEEE Internet of Things Journal, and the International Journal of Accounting Information Systems. The analysis revealed five major trends demonstrating that blockchain enhances audit quality by improving security and privacy, facilitating regulatory compliance, increasing efficiency and effectiveness, strengthening IT competencies, and promoting sustainability, thus redefining the assurance paradigm.

Keywords: Blockchain, auditing, audit quality, smart contracts

INTRODUCTION

The field of auditing is currently undergoing profound technological transformations, which demand the adaptation of processes to a new digital era that can respond swiftly and securely to organizational objectives. Among the most promising technologies is blockchain, which has the potential to improve audit quality (Fedyk et al., 2022; Corradini et al., 2022) due to its focus on data security and its ability to ensure high levels of data reliability (Wang, 2022). In fact, blockchain technology provides continuous support to auditors by offering a degree of assurance about events occurring simultaneously with, or shortly after, the disclosure of financial information (Corradini et al., 2022). Blockchain acts as a type of smart contract that integrates consensus protocols, mathematical models, and the secure exchange of audit data (Wang et al., 2022). The existing literature on blockchain and auditing remains limited and is primarily centered on the experiences of audit firms, information technology (IT), and their influence on audit quality (Rahman & Ziru, 2022). It also explores the growing expectation that blockchain will transform the accounting profession and, consequently, the quality of audits (Tan & Low, 2019).

Blockchain is designed to establish secure access control strategies for audit transaction recording (Wu et al., 2022). For instance, it can help auditors save time on repetitive tasks such as confirming and verifying balances, allowing them to focus on higher-order functions like designing preventive procedures and performing intelligent data analysis (Elommal & Manita, 2021). In fact, blockchain is recognized for enhancing audit information security and

can potentially improve audit quality by up to 20% (Wang, 2022). Preliminary studies on blockchain and audit quality were conducted by Wang (2022) and Albitar et al. (2020), while other comparative research has investigated the use of big data in auditing, the impact of internet-related technologies on continuous auditing, and how these technologies affect audit quality and efficiency (Mugwira, 2022).

Some studies suggest that blockchain will improve the quality of audit-related information (Spanò, 2022). Others argue that data stored in the cloud can be securely audited using blockchain networks, which enhance security and privacy properties (Wang et al., 2022). A recent study highlights blockchain as a revolutionary solution for auditing, proposing that its features represent a redefinition of Internet 3.0, a new type of decentralized infrastructure or “network of networks” (Mijoska & Ristevski, 2021). Based on these premises, researchers have concluded that auditors’ perceptions of blockchain implementation have a significant positive effect on audit quality (Sujanto et al., 2021). Furthermore, blockchain is expected to impact auditing in ways that will reshape the profession (Demirkan et al., 2020).

Previous studies have examined blockchain and auditing from different perspectives. A systematic literature review analysed the contributions of artificial intelligence, blockchain, deep learning, and machine learning to financial auditing (Huson et al., 2024). Other research explored information technologies, including blockchain, within the auditing profession (Mugwira, 2022), while additional studies focused on the intellectual structure of expanded audit reporting (EAR) (Mashayekhi et al., 2024). However, no prior research has specifically analysed blockchain in relation to audit quality.

Given the growing relevance of blockchain’s contribution to audit quality, the topic has gained increased research interest among professionals and academics over the past decade. This study seeks to contribute to this evolving field by addressing the following questions: Who are the most influential authors, journals, and countries in the literature? In which directions is the research on this topic currently heading? And what are the predominant research themes over the past seven years concerning the application of blockchain in auditing?

Accordingly, the objective of this research is to conduct a bibliometric and systematic analysis of the scientific literature, addressing the relationship between audit quality and blockchain. To this end, 446 articles published between 2017 and March 2025 were analyzed, focusing on the intersection of blockchain and audit quality. The methodological approach combines bibliometric and systematic analysis techniques, enabling a comprehensive examination of the academic production related to this topic. The data source employed was the Web of Science database, selected for its recognized quality and international scope.

Finally, this study contributes to the existing body of literature by providing a structured overview of current trends, research gaps, and emerging opportunities in the study of audit quality within the context of blockchain adoption. It also offers practical guidance for emerging researchers by identifying key elements and priority areas for future high-impact investigations.

METHODOLOGY

The methodology adopted for this study follows a bibliometric approach, which is a widely accepted and rigorous method used to explore and analyse large volumes of scientific data. This method has been extensively applied in bibliometric research to support the systematic evaluations of scholarly output (Donthu et al., 2021; Brito-Sánchez et al., 2022).

The data were collected from the Web of Science (WoS) database, which is recognized as one of the most important and comprehensive repositories for scientific publications. WoS is especially relevant in the field of Business, Management, and Accounting, and offers powerful tools for tracking, analysing, and visualizing scientific research (Mongeon & Paul-Hus, 2016). Because this study aims to understand a relatively recent phenomenon, no fixed time window was imposed at the outset. Instead, the period of analysis was determined based on the emergence of relevant publications. While the term “blockchain” and its initial applications appeared around 2008, academic articles linking blockchain specifically to audit quality began appearing in 2017. Therefore, the bibliographic search and analysis cover the period from 2017 to March 2025.

The search was limited to peer-reviewed journal articles published in English. Books and conference proceedings were excluded to maintain consistency and academic relevance. A keyword filtering strategy was employed to retrieve the most relevant publications, using the following search combinations: **blockchain** (Topic) and **"audit quality"** (Topic); **blockchain** (Topic) and **auditing** (Topic); **"Financial audit"** (Title) and **blockchain** (Title); **"Smart contracts"** (Title) and **blockchain** (Title) and **audit** (Title).

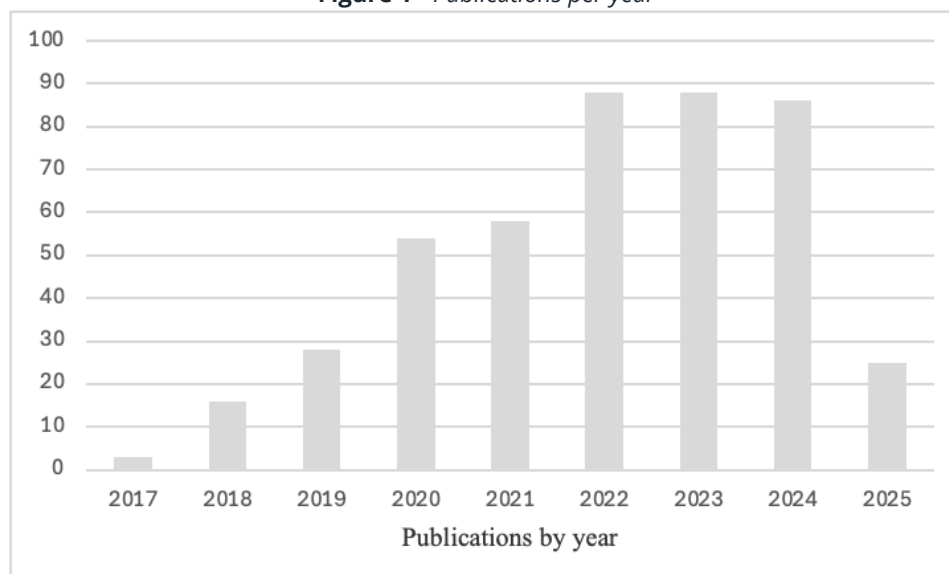
Based on the research objectives and relevance to the field, 1,331 articles were initially identified. After title screening, 585 records were excluded. Abstract review led to the removal of an additional 300 documents, resulting in a final sample of 446 scientific articles. These were organized into a data matrix to extract two key indicators: a quantitative indicator (number of publications) and a qualitative indicator (academic impact measured by citations) (Martínez-Climent et al., 2018).

Finally, a systematic analysis was conducted on a selection of key articles through a close reading of the full texts. The systematic analysis approach refers to the researcher's interpretive evaluation of a segment of the literature to identify theoretical foundations, methodological trends, gaps in existing research, and opportunities for advancing scientific contributions in the field.

RESULTS

This section presents the findings from the bibliometric and systematic analysis of scientific literature on blockchain technology and audit quality (see Figure 1).

Figure 1 - Publications per year



The data reveal a growing trend in the annual number of publications addressing the relationship between blockchain technology and audit quality. Interest in this topic began to emerge in 2017, with the most significant growth recorded in 2022. Since then, the volume of publications has remained relatively stable through 2024. It is important to note that the apparent decline in 2025 is due to the data collection cut-off in February and therefore does not represent the full year.

Table 1 - Number of publications by country

Countries	N° publications	% of 446
China	204	45,74%
Usa	75	16,82%
Australia	38	8,52%
India	36	8,07%
England	29	6,50%
Japan	15	3,36%
Canada	13	2,92%
Italy	12	2,69%
Saudi Arabia	12	2,69%
Taiwan	12	2,69%

As shown in Table 1, China and the United States are the most productive countries, followed at a considerable distance by Australia and India. These results highlight the leading contribution of these nations to research on blockchain technology and audit quality.

Figure 2 - Number of publications per journal

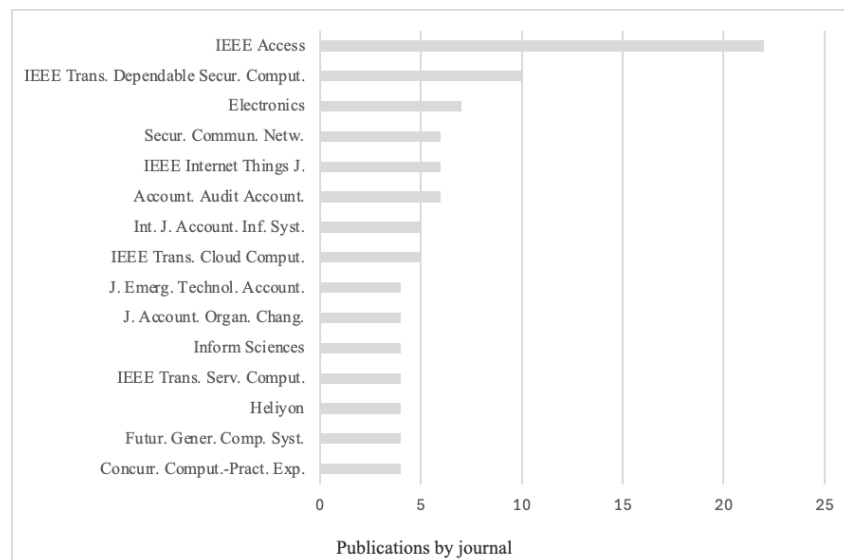
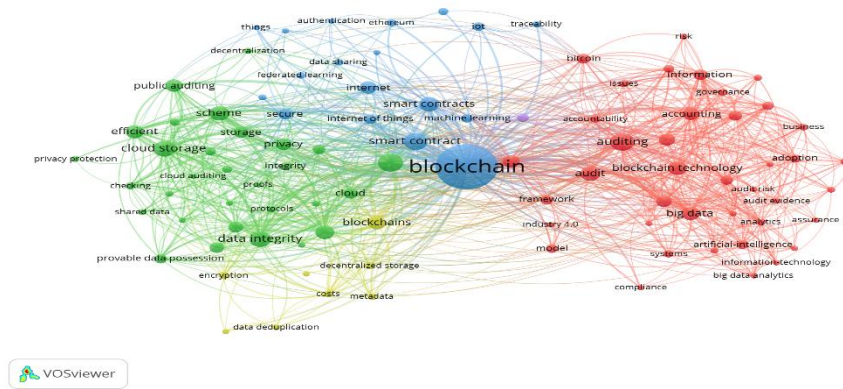


Figure 2 displays the journals with the highest number of publications in the selected dataset. Leading the list is IEEE Access, with an SJR Impact factor of 0.849 (Q1). It is followed by IEEE Transactions on Dependable and Secure Computing, with an SJR of 1.755 (Q1), and Electronics, with an impact factor of 0.615 (Q2). These results highlight the prominence of

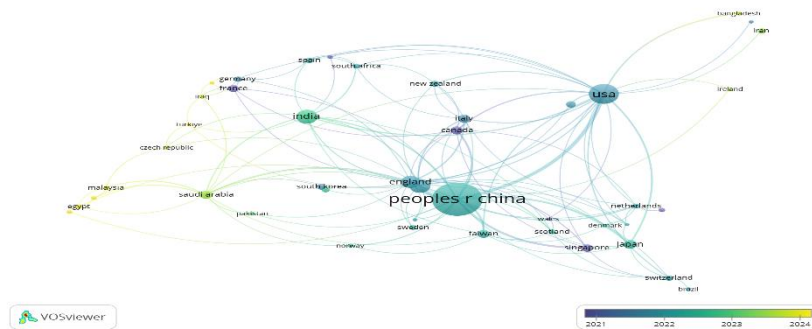
journals in the fields of engineering, cybersecurity, and information systems in publishing research on this topic.

Figure 3 - Keyword Analysis



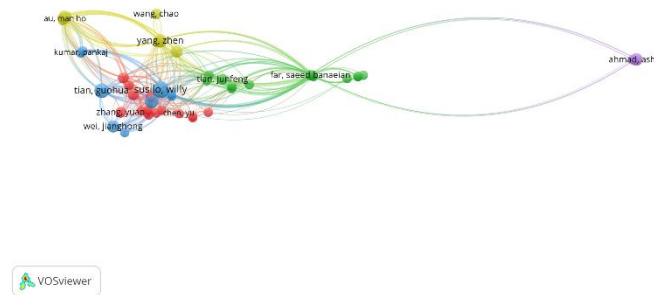
As shown in Figure 3, the most frequently occurring keywords in the analysed articles include: "blockchain technology", "blockchain," "auditing," "audit evidence," "smart contracts," and "cloud auditing." These terms demonstrate a strong thematic coherence, pointing to a growing research trend focused on the analysis of audit evidence in the context of emerging technologies, particularly those linked to artificial intelligence.

Figure 4 - Co-authorship by country



As shown in Figure 4, the analysis reveals that the United States and China are the most active contributors to the research on blockchain and audit quality. However, in recent years, there has been a notable increase in international collaboration, evidenced by rising co-authorship between researchers from these leading countries and scholars from Saudi Arabia, Malaysia, Iraq, Egypt, and the Czech Republic. This trend suggests a strengthening of global scientific networks, particularly in areas involving emerging technologies in auditing.

Figure 5 - Co-citation analysis



As shown in Figure 5, the co-citation analysis identifies Susilo Willy as the most highly cited author in the dataset, with 9 publications and the highest number of total citations. Other prominent authors include Tiah Huohua (7 publications), Yang Zhen (6), and Yu Shui (5). These authors are recognized as a prominent contributor to the research at the intersection of blockchain technology and auditing.

Table 2 - Most cited articles

Author(s)	Title	Journal	Citations	Year
Elnahass, M; Jia, XR; Crawford, L	Disruptive technology and audit risks: Evidence from FTSE 100 companies	Emerging markets review	143	2024
Bakhshi, T; Ghita, B; Kuzminykh, I	A Review of IoT Firmware Vulnerabilities and Auditing Techniques	Sensors	151	2024
Pratama, A	Quality of Accounting Knowledge and Its Impact on Profession	Quality-access to success	155	2024
Sheela, S; Alsmady, AA; Tanaraj, K; Izani, I	Navigating the Future: Blockchain's Impact on Accounting and Auditing Practices	Sustainability	137	2023
Varma, IM; Kumar, N	A comprehensive survey on SDN and blockchain-based secure vehicular networks	Vehicular Communications	218	2023
Hakami, T; Sabri, O; Al-Shargabi, B; Rahmat, MM; Attia, ON	A critical review of auditing at the time of blockchain technology - a bibliometric analysis	Euromed Journal of Business	131	2024
Mashayekhi, B; Dolatzarei, E; Faraji, O; Rezaee, Z	Mapping the state of expanded audit reporting: a bibliometric view	Meditari Accountancy Research	173	2024
Fotoh, LE; Lorentzon, JI	Audit Digitalization and Its Consequences on the Audit Expectation Gap: A Critical Perspective	Accounting Horizons	173	2023
Singh, M; Joshi, M; Sharma, S; Rana, T	How Blockchain Is Transforming Accounting, Auditing and Finance: A Systematic Review	Handbook of big data and analytics in accounting and auditing	151	2023
Zidi, C; Sondi, P; Mitton, N; Wahl, M; Meddahi, A	Review and Perspectives on the Audit of Vehicle-to-Everything Communications	IEEE Access	146	2023

Han, HD; Shiwakoti, RK; Jarvis, R; Mordi, C; Botchie, D	Accounting and auditing with blockchain technology and artificial Intelligence: A literature review	International journal of accounting information systems	137	2023
Abu Salim, T; El Barachi, M; Mohamed, AAD; Halstead, S; Babreak, N	The mediator and moderator roles of perceived cost on the relationship between organizational readiness and the intention to adopt blockchain technology	Technology in society	144	2022
Jayasuriya, DD; Sims, A	From the abacus to enterprise resource planning: is blockchain the next big accounting tool?	Accounting auditing & accountability journal	204	2023
Otia, JE; Bracci, E	Digital transformation and the public sector auditing: The SAI's perspective	Financial accountability & management	137	2022
Secinaro, S; Dal Mas, F; Brescia, V; Calandra, D	Blockchain in the accounting, auditing and accountability fields: a bibliometric and coding analysis	Accounting auditing & accountability journal	133	2021

DISCUSSION

This study shows that incorporating blockchain technology into auditing processes redefines the traditional parameters of audit quality by strengthening the reliability of audit evidence, transparency, and the traceability of accounting information. Several researchers have emphasized the potential of blockchain applications in the field of auditing, especially considering the emerging innovations and challenges faced by organizations and professionals (Lombardi et al., 2021). This technology acts as a catalyst that expands the classic determinants of quality independence, professional competence, and sufficient and appropriate evidence toward a more comprehensive model based on digital security, operational efficiency, technological knowledge, and sustainability.

SECURITY AND PRIVACY

The security and privacy dimension constitutes an essential pillar of trust in audited information. The immutability and cryptographic verifiability of blockchain records mitigate manipulation risks and strengthen audit evidence. Blockchain has the capacity to integrate and interoperate with the Internet of Things (IoT), artificial intelligence (AI), and other emerging technologies to provide higher-quality services to society at large (Demirkan et al., 2020). For this reason, blockchain technology is expected to have a substantial impact on the field of auditing due to its high level of security. By leveraging cybersecurity principles such as confidentiality, integrity, and availability, along with the “three A’s” of authentication, authorization, and auditing, blockchain enhances the transparency of a company’s financial systems.

On the other hand, audit records are often vulnerable to security risks, which can limit transparency (Ahmad et al., 2019). In this context, blockchain is anticipated to naturally bridge the gap in meeting security requirements for audit record management, including assurance of data security, provenance, and transparency. This perspective gives rise to a new paradigm in auditing, composed of two core components: (1) the physical world, which reflects business activities and conditions; and (2) the virtual world, which includes three layers – blockchain, smart control, and payment systems that work together to ensure the security of information (Dai & Vasarhelyi, 2017).

Therefore, blockchain technology may contribute to the prevention of earnings manipulation and the assurance of information and data integrity, while also offering other advantages such as reducing repetitive tasks, eliminating the need for reconciliation, enabling

continuous auditing, allowing for the testing of complete datasets instead of samples, and minimizing manual errors all while addressing the critical needs of confidentiality and transparency. Although blockchain may not fully replace the roles of auditors and assurance providers, it could play a relatively central role in the context of accounting and social and environmental reporting. In doing so, blockchain may help resolve data privacy concerns and enable the simplification and acceleration of business processes, enhance cybersecurity protection, and reduce or eliminate the need for intermediaries (Bellucci et al., 2022).

In this context, blockchain enhances the integrity and permanence of information through technical methods based on cryptography and consensus, which make it difficult to alter historical data. However, this does not eliminate all risks associated with the source of data. Research has shown quantifiable impacts in reducing accounting manipulations when blockchain is applied to recording procedures. From the perspective of technical immutability, supported by hashing and consensus mechanisms, confidence is strengthened that records remain unaltered after their inclusion (Hamzah et al., 2024; Alagha & Özçelik, 2025). Regarding the effect on manipulation, evidence indicates that the adoption of blockchain is associated with a significant reduction in discretionary accruals among publicly listed firms, particularly in environments characterized by higher operational risk (Fahdil et al., 2024). Nevertheless, the GIGO ("Garbage In, Garbage Out") limitation remains, as technology cannot correct inaccurate or fraudulent initial inputs; thus, the quality of source data remains critical and requires prior control mechanisms and sound governance design.

REGULATION

The regulatory dimension drives the adaptation of regulatory frameworks and international auditing standards, promoting convergence between conventional and digital auditing practices and reinforcing the auditors' legitimacy in technological environments. The scientific literature identifies two main regulatory barriers limiting the widespread adoption of blockchain technology, which are the need to adapt existing regulations and the high implementation costs, which remain the principal obstacles to adoption (Hamzah et al., 2024; Cagle, 2020). In this regard, regulators are expected to play a crucial role in the adoption phase of blockchain within the auditing domain. Regulatory bodies must develop a deep understanding of blockchain technology and its potential impact on businesses and provide appropriate guidance and oversight to prevent misuse and abuse of blockchain and smart contracts. Moreover, regulators should consider how existing accounting standards might be adapted to blockchain-based ecosystems in ways that ensure verifiability and transparency (Dai & Vasarhelyi, 2017).

Regulatory and standardization changes are urgently needed to guarantee independence and sound governance in the intensive use of blockchain. This requires redefining access controls, assigning responsibilities for data alterations, and reconsidering the auditor's role, particularly regarding the risk of compromising independence if involved in system design (Saheb et al., 2025). Furthermore, the growing need for standardization calls for frameworks that enable interoperability among private and consortium blockchains, as well as guidelines for integrating smart contracts with accounting principles, in addition to specialized auditor training (Garanina et al., 2021; Saheb et al., 2025).

Recent research warns that initial findings must be validated over longer time horizons and across diverse contexts before codifying permanent regulatory systems. Therefore, the absence of formal regulation and standards, coupled with the lack of governmental policies and guidelines regarding preferred blockchain technologies, increases audit risk (Dyball & Seethamraju, 2021). Nonetheless, some experts contend that no major changes to existing

standards are needed in response to digitalization, as the core concepts of accounting and auditing remain fundamentally intact (Tiberius & Hirth, 2019).

EFFICIENCY AND EFFECTIVENESS

The efficiency and effectiveness derived from process automation and the immediate availability of real-time data improve the productivity and accuracy of audit work, enabling a more analytical and forward-looking approach to risk assessment. Currently, blockchain technology has gained considerable relevance due to its ability to provide high levels of transparency, security, trust, and efficiency in data management (Fernández-Caramés et al., 2019). Furthermore, it enhances corporate risk management and internal control systems while strengthening investor and public confidence by increasing the transparency and credibility of financial reporting. Its implementation in the auditing field has a significant positive effect on process quality, offering several benefits, including enhanced security in information handling, transparency and traceability of transactions, reduced risk of fraud and data manipulation, and potential cost savings in audit services. As the technology continues to evolve, there is growing interest among audit professionals in studying and integrating it, which could lead to substantial transformations in traditional auditing systems and approaches.

Empirical research has demonstrated significant reductions in accounting manipulations, as well as in the time and costs associated with audit processes. The integration of blockchain technology into accounting and auditing systems promotes transparency, traceability, and trust by generating a distributed, chronologically ordered, and verifiable ledger that enhances information visibility and accessibility among stakeholders and auditors. This characteristic enables real-time auditing, allowing stakeholders to directly verify transactions without intermediaries, thereby increasing the synchronicity and consistency of information across all participants (Hamzah et al., 2024).

The immutable traceability derived from chained records and hashing mechanisms ensures that transaction histories remain fully auditable and verifiable (Alagha & Özçelik, 2025; Andoko & Lindrianasari, 2025). Likewise, the blockchain-based audit trail designed as a decentralized verification mechanisms provides tamper-resistant and immutable records, establishing itself as an effective tool for the early detection of inconsistencies and fraudulent activities.

In auditing practice, the incorporation of artificial intelligence (AI) may render certain procedures less visible to external stakeholders, while simultaneously increasing scrutiny over audit quality (Seethamraju & Hecimovic, 2022). In this context, it is essential for firms to implement AI-based technologies with the aim of providing value-added services to clients and consequently enhancing audit quality. The adoption of such tools also contributes to the development of organizational competencies and capabilities, enabling firms and professionals to prioritize resources based on their specific needs, strengths, and weaknesses. This, in turn, supports the design and implementation of more effective and contextually appropriate solutions.

KNOWLEDGE OF INFORMATION TECHNOLOGIES

Knowledge of information technology is emerging as a new determinant of professional competence; mastery of blockchain and distributed ledger systems is becoming a requirement to ensure the quality of professional judgment and the technical independence of auditors. Within this trend, audit work is increasingly perceived as high-risk. This is largely due to the lack of experience and technical capacity among audit firms to effectively use blockchain applications, including their integration with financial accounting systems. There

is a general unawareness that blockchain could significantly transform a client's business model, streamline commercial processes, and help mitigate inherent risks in a timely manner (Bellucci et al., 2022; Dyball & Seethamraju, 2021).

The adoption of blockchain technology provides both empirical and practical evidence of its capacity to reduce fraud risks and strengthen trust among stakeholders. Several studies demonstrate that the decrease in fraudulent activity is reflected in lower levels of accounting manipulation and a reduction in reported incidents within organizations that have integrated distributed ledger systems into their accounting and financial processes (Cagle, 2020; Fahdil et al., 2024).

Moreover, blockchain functions as a single, verifiable source of truth, reinforcing public and institutional trust, particularly among investors, issuers, and auditors, by mitigating information asymmetries that often undermine transparency in financial reporting processes (Hamzah et al., 2024; Fahdil et al., 2024).

It is important to note that the antifraud benefits are amplified when blockchain implementation is accompanied by robust governance mechanisms, rigorous data provenance verification protocols, and continuous audits of participants and smart contracts, thereby ensuring the overall integrity and reliability of the system.

Moreover, the integration of multiple disciplines such as accounting, programming, mathematics, statistics, accounting software, and blockchain will inevitably impact traditional auditing practices (Jumah & Li, 2020). However, despite technological advances in blockchain within the accounting field, there remains a notable gap in the academic literature. This gap may hinder academics from leading the development of policies and best practices that would foster the broader application and evolution of blockchain technologies in accounting (Demirkan et al., 2020). Gao (2025) proposed a framework called "Block Crypto Audit" to enhance internal audit processes through cryptographic encryption methods and blockchain technology, ensuring secure and transparent audit operations.

SUSTAINABILITY

Sustainability introduces a conceptual expansion of the audit object. Blockchain facilitates the verification and traceability of non-financial data, particularly in reports related to environmental, social, and governance (ESG) criteria, strengthening the auditor's role as guarantor of the integrity and transparency of sustainable information. Resilient manufacturing is a key vision within the Industry 5.0 roadmap aimed at meeting the Sustainable Development Goals (SDGs). To realize this vision, researchers are seeking secure solutions based on the integration of blockchain technology into decentralized Industrial Internet of Things (IIoT) systems that can effectively ensure the consistency, integrity, and availability of data in audit functions (Leng et al., 2022). Blockchain is one of these enabling technologies and has been increasingly applied in microgrid systems to help build a more sustainable society (Younes et al., 2013). In this context, audit quality will depend on the accuracy of information provided through blockchain platforms, especially considering the potential for blockchain to be integrated into production processes across various economic sectors, ensuring business sustainability (Singh et al., 2022).

Lastly, the role of blockchain in the exchange of financial and environmental data has wide-ranging applications in the auditing field (Secinaro et al., 2021). For instance, audits may soon be conducted by simply accessing account information, portfolios, and smart contract codes linked to blockchain systems. This shift will necessitate adaptive audit procedures capable of supporting real-time auditing processes (Silva et al., 2022). Furthermore, technology offers

significant opportunities for corporate business applications, especially in strategic business management and control. It also benefits the supply chain sector by enabling cost reduction and environmental sustainability through carbon accounting (Secinaro et al., 2022).

By incorporating blockchain technology, industries can store and exchange data reliably and securely, addressing issues such as interoperability and data protection, thereby fostering trust among participants in the value chain (Leng et al., 2022). In this regard, blockchain-enabled accountability is also emphasized as a key approach to combating air pollution, enabling early alerts for citizens and businesses (Secinaro et al., 2022). Such trust is fundamental to collaborative efforts toward sustainability.

CONCLUSIONS

This study presents an analysis of the scientific literature on blockchain technology and audit quality published in recent years. Although several literature reviews have previously been conducted, this work contributes a bibliometric perspective, allowing for the objective identification of the most influential authors, countries, and keywords, while also mapping the emerging research trends in the field.

Regarding publication volume, the journals with the highest number of articles include IEEE Access, Electronics, IEEE Internet of Things Journal, International Journal of Accounting Information Systems, Journal of Emerging Technologies in Accounting, Information Sciences, Heliyon, and Concurrency and Computation: Practice and Experience. Additionally, the co-citation analysis revealed Susilo Willy, Tiah Huohua, Yang Zhen, and Yu Shui as the most frequently cited authors. In terms of geographic contribution, the United States and China lead in the number of publications related to this topic. These five trends demonstrate that blockchain not only transforms auditing procedures but also improves their quality by integrating technology, ethics, and sustainability, creating a paradigm of assurance and efficiency.

The study also identified five key research trends in the literature at the intersection of blockchain and audit quality:

- Security and privacy
- Regulation
- Efficiency and effectiveness
- Knowledge of information technologies
- Sustainability

The literature makes it possible to identify five trends that show that blockchain not only transforms auditing procedures but also improves their quality by integrating technology, ethics, and sustainability, creating a paradigm of assurance and efficiency. Future research on blockchain for smart grids should focus on overcoming scalability issues, improving cybersecurity, optimizing real-time operations, enhancing user identity management, and developing adaptive system designs to maximize the benefits of the technology. Despite the study's rigor, relevance, and comprehensive scope, certain limitations should be acknowledged. Only a few studies have examined the role of blockchain as a stakeholder aggregator in advancing sustainability. The data collection was restricted to a single database (Web of Science) and included only peer-reviewed journal articles written in English. Therefore, future research is encouraged to expand the scope to include other databases such as Scopus or ProQuest for a more complete overview.

Finally, considering that research on blockchain and audit quality remains in a nascent phase, we recommend conducting periodic bibliometric analyses to monitor evolving trends and contribute to the continuous advancement of knowledge in this domain.

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The authors declare no conflict of interest.

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ETHICS STATEMENT

This study did not involve human participants or animals and therefore did not require ethical approval.

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