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Review Article

Blockchain Technology in Accounting and Auditing: Benefits, Challenges, and Emerging Practices

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Abstract: Blockchain technology has emerged as a transformative innovation with the potential to reshape traditional accounting and auditing systems. As a decentralized, transparent, and immutable ledger, blockchain enhances the accuracy, reliability, and traceability of financial information. This study provides a comprehensive examination of the opportunities and challenges associated with implementing blockchain within corporate accounting and auditing environments. Drawing on existing literature, the paper explores how blockchain introduces a "third-entry" accounting model that strengthens data integrity and supports real-time transaction recording. The technology facilitates continuous auditing, automated verification through smart contracts, and instantaneous financial reporting, thereby improving efficiency and reducing the likelihood of fraud, manipulation, and human error. Despite these benefits, blockchain adoption faces several obstacles, including regulatory uncertainty, interoperability issues, scalability constraints, high implementation costs, and skill shortages among accounting professionals. Privacy concerns and the difficulty of modifying immutable records further complicate integration into existing accounting frameworks. The study also highlights emerging practices in blockchain-based auditing, such as automated confirmations, continuous assurance, and enhanced data analytics capabilities. By analyzing the current state of blockchain applications, this research underscores the need for regulatory harmonization, standardized frameworks, and capacity building to support effective adoption. The findings contribute to the growing discourse on digital transformation in accounting and call for future research to explore interdisciplinary applications, ethical considerations, and the long-term impact of blockchain on financial reporting ecosystems.

Keywords: Blockchain Technology, Accounting Information Systems, Auditing Practices, Digital Transformation, Financial Reporting.

1. INTRODUCTION

Distributive technologies are transforming the corporate landscape as we understand it. Blockchain technology (BT) is among the most consequential disruptive technologies of the present era (Parmoodeh *et al.*, 2023; Perera and Abeygunasekera, 2022). Blockchain technology gained prominence following its establishment in 2008 as the foundational framework for cryptocurrencies like Bitcoin (Alarcon and Ng, 2018). Since that time, BT has been a transformative influence across various sectors, including financial markets, information dissemination, and supply networks (Smith and Castonguay, 2020). It has recently garnered significant attention within the accounting and auditing sectors. Blockchain is a decentralised public ledger disseminated throughout a peer-to-peer computer network (Blockchain.com, 2022). Transactions are recorded and distributed throughout the whole network of computer systems on the Blockchain (Mahtani, 2022). Consequently, information recorded on the Blockchain is difficult to alter or manipulate.

BT is gaining prominence in the accounting profession due to its implementation of an innovative recording principle, referred to as "third-entry" accounting (Kiviat, 2015; Kabir *et al.*, 2022), as opposed to the traditional "double-entry" accounting that has underpinned corporate bookkeeping, recording, and reporting since its inception by Luca Pacioli in 1494.

BT facilitates the real-time documentation of business transactions among multiple participants, storing them in a computer database accessible to each participant (Alarcon and Ng, 2018). Furthermore, transactions are time-stamped and unchangeable (Kabir *et al*., 2022).

BT undoubtedly enhances the auditing profession by alleviating the auditor's workload. Moreover, BT attributes like decentralisation and security are expected to improve information quality and augment the efficiency of reporting and disclosure (Peprah *et al*., 2022). BT confirms asset ownership and obligations, mitigates fraud, and conducts audit trails, therefore conserving time and resources (Lombardi *et al*., 2022; Abreu *et al*., 2018; Supriadi *et al*., 2020). Consequently, numerous blockchain technology solutions are available for auditing, including Libra, Verady, and Factom (Abreu *et al*., 2018).

However, the implementation of blockchain technology in auditing entails particular concerns, including those pertaining to privacy and security, which arise from the public nature of transactions in a distributed ledger (Schmitz and Leoni, 2019; Wang and Kogan, 2018). Scholars and practitioners must confront these BT effects, as they require more elucidation. The comprehensive integration of blockchain technology into the accounting ecosystem faces numerous technical and non-technical challenges, including scalability, security, and appropriate design (Shi *et al*., 2022).

The investigation of blockchain technology in accounting is in an emerging and flourishing phase (Perera and Abeygunasekera, 2022; Lombardi *et al*., 2022). BT research is crucial for practitioners, academics, organisations, regulators, and standard-setting entities (Fosso Wamba and Guthrie, 2020; Lombardi *et al*., 2022). The influence of BT on auditing remains largely unexamined (Elommal and Manita, 2021; Ali *et al*., 2020; Helliar *et al*., 2020; Troshani *et al*., 2019).

The reason for this study was the necessity for accounting scholars and professionals to get deeper understanding of this technology to enhance digital accounting research and practice. This article examines the ramifications of BT for corporate accounting. Considering that blockchain could signify a groundbreaking method in this domain and potentially revolutionise existing accounting practices, it is essential to investigate the potential and challenges of this technology within the accounting information system. The objective of this investigation is dual. Initially, due to the scarcity of study on this subject, a comprehensive overview and analysis of the existing literature will be presented and examined. This article seeks to evaluate the evolution of the existing accounting paradigm by examining the advantages and problems associated with the implementation of blockchain technology. Furthermore, we endeavor to ascertain the ramifications of BT inside the auditing domain.

2. Blockchain-Based Accounting Transaction

The integration of blockchain technology into accounting has transformed how financial transactions are recorded, verified, and reported. Unlike traditional centralized accounting systems, blockchain provides a distributed, transparent, and immutable ledger that enhances the reliability and traceability of financial information. By leveraging cryptographic methods and consensus mechanisms, blockchain ensures that accounting records are tamper-proof and verifiable in real time. Figure 1 illustrates the sequential flow of accounting activities within a blockchain framework, highlighting the process from transaction initiation to auditing and assurance.

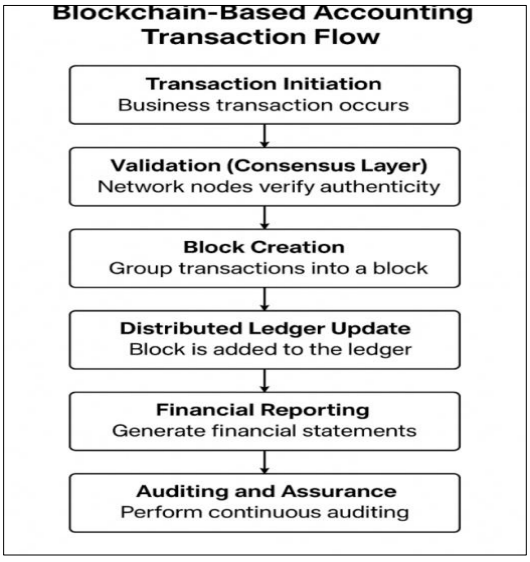

Figure 1: Blockchain-Based Accounting Transaction Flow

1. Transaction Initiation

The process begins with the initiation of a business transaction, such as a purchase, sale, or payment event, that generates financial data requiring accounting recognition. In blockchain-based accounting systems, each transaction is recorded digitally at the point of occurrence. The transaction details—such as parties involved, monetary values, and timestamps—are encrypted to ensure confidentiality and integrity. This digital representation of business activity provides the foundation for a transparent and traceable financial record on the blockchain network (Tapscott & Tapscott, 2017).

2. Validation (Consensus Layer)

Following initiation, the transaction is broadcast to the blockchain network for verification. Network participants, referred to as nodes or validators, authenticate the transaction using a consensus mechanism such as Proof of Work (PoW), Proof of Stake (PoS), or Practical Byzantine Fault Tolerance (PBFT). This step ensures that the transaction is legitimate, accurate, and consistent with prior records. The consensus layer eliminates the need for a centralized intermediary, thereby enhancing the reliability and integrity of financial data (Dai & Vasarhelyi, 2017; Schmitz & Leoni, 2019).

3. Block Creation

Once validated, a group of verified transactions is compiled into a data block. Each block contains transaction details, a timestamp, and a cryptographic hash that links it to the preceding block in the chain. This cryptographic linkage guarantees data immutability and prevents unauthorized alterations. The process of block creation serves as a secure and systematic method of organizing financial transactions into a continuous, chronological sequence, forming the backbone of the blockchain ledger (Kokina *et al*., 2021; Pimentel & Boulianne, 2020).

4. Distributed Ledger Update

After block creation, the new block is appended to the distributed ledger and simultaneously updated across all nodes within the blockchain network. This synchronization ensures that every participant maintains an identical and up-to-date copy of the ledger. The distributed nature of this database prevents data manipulation and promotes transparency among stakeholders. In the context of accounting, this guarantees that all financial entries are consistent, verifiable, and permanently preserved (O'Leary, 2017; Yermack, 2017).

5. Financial Reporting

The integration of blockchain technology facilitates real-time financial reporting. Because transactions are recorded and verified instantaneously, organizations can generate up-to-date financial statements without the delays associated with traditional accounting systems. Smart contracts—self-executing codes embedded in the blockchain—can automate accounting tasks such as journal entry posting, revenue recognition, and audit trail creation. This automation reduces human error, improves reporting efficiency, and supports continuous assurance in financial management (Dai & Vasarhelyi, 2017; Kokina *et al*., 2021).

6. Auditing and Assurance

Blockchain-based accounting enables a paradigm shift from periodic auditing to continuous auditing. Since all financial records are immutable and time-stamped, auditors can access transaction data directly from the blockchain in real time. This enhances transparency, reduces the risk of fraud, and significantly lowers the cost and time of audit procedures. Moreover, the verifiability of each transaction strengthens assurance functions by allowing auditors to confirm data authenticity without reliance on third-party reconciliation or manual verification (Schmitz & Leoni, 2019; Dai & Vasarhelyi, 2017).

3. Benefits of Blockchain Technology

Blockchain provides numerous benefits in accounting by improving the transparency, security, and efficiency of financial transactions and record-keeping procedures. The advantageous features of Blockchain-based accounting are illustrated in Figure 2 and elaborated upon below.

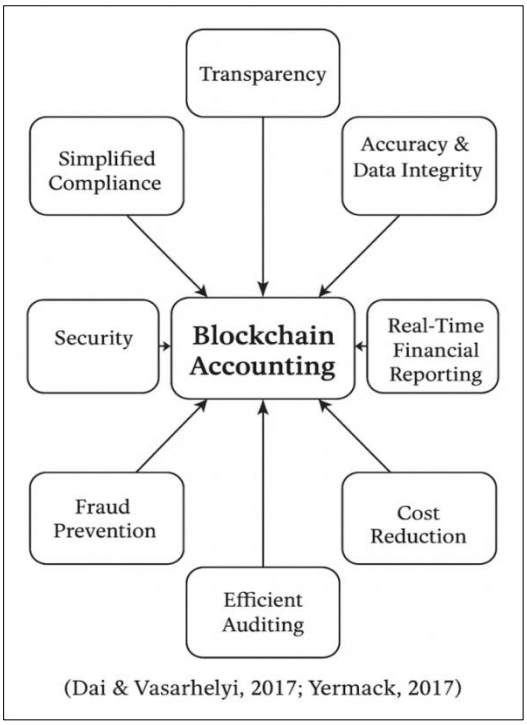

Figure 2: Benefits of Blockchain-based accounting

Enhanced Transparency:

Blockchain records are immutable and visible to authorized participants in real time. This transparency reduces the risk of manipulation or fraud and provides a clear audit trail for all transactions (Armiani *et al*., 2023).

Improved Accuracy and Data Integrity:

Every transaction is cryptographically verified and recorded across multiple nodes. This decentralized verification minimizes human error and ensures that financial records are accurate and consistent (Alabadla, 2025).

Real-Time Financial Reporting:

Blockchain enables continuous, real-time updating of accounts. Organizations can generate instant financial reports without waiting for batch processing or manual reconciliation (Fahdil *et al*., 2024).

Reduced Costs:

Automation through smart contracts can streamline accounting processes, reducing the need for intermediaries, manual data entry, and repetitive reconciliation work, ultimately lowering operational costs (Fahdil *et al*., 2024).

Enhanced Security:

Data stored on a blockchain is encrypted and decentralized, making it extremely difficult for unauthorized parties to alter records or conduct cyber-attacks successfully (Zhang *et al*., 2025).

Efficient Auditing:

Auditors can access a complete and tamper-proof ledger, reducing the time required for audit verification. Blockchain's traceability allows auditors to perform continuous auditing rather than periodic checks (Fahdil *et al*., 2024; Zhang *et al*., 2025).

Simplified Compliance:

Regulatory compliance is easier because blockchain provides a verifiable, time stamped record of all transactions. Smart contracts can also enforce compliance automatically (Adewale *et al.,* 2022).

Smart Contracts:

Smart contracts are self-executing contracts with predefined terms and conditions written into the code. They are stored and executed on a blockchain. Smart contracts can automate accounting processes like invoice processing, payments and revenue recognition. These contracts can significantly reduce the likelihood of errors and provide higher trust and efficiency.

Supply Chain Transparency:

Blockchain can be utilized to enhance the transparency and traceability of supply chains, which is relevant for auditing purposes. By recording every transaction and movement of goods on the Blockchain, auditors can verify the accuracy of inventory records, trace the origin of products and ensure compliance with regulations, principles and standards.

Cryptocurrency Accounting:

With the rise of cryptocurrencies like Bitcoin, accounting for digital assets has become crucial. Blockchain technology facilitates the recording and tracking of cryptocurrency transactions, ensuring accuracy and reliability in cryptocurrency accounting. This includes maintaining proper records of digital wallets, tracking transfers and calculating gains or losses.

Reduction of Costs, Human Error and Fraud:

Cai and Zhu (2016) point out that there is a reduction in human error because there are automatic transactions and controls. According to Palfreyman (2015) and Tapscott and Tapscott (2016), BCT can also reduce the costs of executing and validating a transaction through automated verifications. Some authors also claim that BCT might help to avoid fraud and manipulation (Swan, 2015; Cai & Zhu, 2016), and even to reduce corruption (Kshetri, 2017), because a data entry cannot be altered once it has been cryptographically sealed.

It is important to note that while blockchain technology offers various benefits for the accounting and auditing profession, its implementation and adoption are still in the early stages. In addition, there are challenges to overcome, including scalability, regulatory considerations and standardization.

4. Challenges of Implementing Blockchain in Accounting & Auditing

Coyne and McMickle (2017) delineate potential deficiencies that obstruct the utilisation of BCT as a financial reporting instrument. The primary obstacles identified by these writers are: confidentiality issues in public blockchains; the risk of manipulation in private blockchains; and the restricted verification of transactions.

Dai and Vasarhelyi (2017) identify three distinct categories of challenges—technological, organisational, and environmental—that may impede the implementation of this technology in accounting and auditing. The technological background pertains to the intricate nature of blockchain solutions, necessitating substantial financial and temporal investments; thus, a corporation may encounter difficulties in locating business partners and other entities willing to collaborate on a decentralised architecture. The organisational environment pertains to the readiness of managers to embrace this novel methodology. Consequently, the anticipated advantages must above the possible expenses. The environmental context pertains to the critical function of regulators in the implementation of BCT within the accounting framework.

Regulatory and Legal Uncertainty:

A major barrier is the absence of comprehensive regulatory frameworks tailored for blockchain applications in accounting. Organizations encounter ambiguity surrounding legal status, taxation, data ownership, and reporting obligations when using distributed ledger technologies. Because accounting and auditing are highly regulated, this lack of clarity hinders adoption, as firms cannot reliably anticipate compliance risks or align blockchain-based systems with existing financial reporting standards (Akter *et al*., 2024; Barros, *et al*., 2025).

Integration with Legacy Systems and Interoperability:

Implementing blockchain typically requires integration with existing accounting systems, databases, and enterprise resource planning (ERP) platforms. Many legacy systems were not designed to interface with decentralized ledgers, leading to complexity, time-intensive migration, and potential disruption of established processes. In addition, different blockchain platforms often lack standardization and interoperability, making it difficult for firms to choose or switch networks or coordinate across different blockchain instances (Iqbal *et al*., 2025).

Scalability and Performance Constraints:

Blockchain networks may struggle to handle the high transaction volumes, real-time processing demands, and diverse account-data types found in large organizations. Slow transaction throughput, high latency, and increasing costs as network size grows remain significant obstacles. When accounting systems require rapid updating and reconciliation across thousands of entries, these performance limitations can negate many of the anticipated benefits of blockchain adoption (Akter *et al*., 2024).

Technical Expertise and Skill Gaps:

Effective implementation of blockchain in accounting demands not only accounting domain knowledge but also technical proficiency in distributed ledger technologies, cryptography, consensus mechanisms, and smart contracts. Many organizations report a lack of internal expertise or suitably trained staff. This skill gap elevates training costs, slows deployment, and reduces confidence among accounting professionals in supporting or trusting blockchain-based systems (Elshqirat, 2023; Iqbal *et al*., 2025).

Privacy, Confidentiality, and Data Governance Issues:

Although blockchain's immutability and transparency are attractive, they present challenges when applied to sensitive financial data. Once data are recorded on a ledger, they cannot easily be altered or deleted, which can conflict with data-protection laws (such as the right to be forgotten) or confidentiality obligations in accounting. Firms must therefore carefully design permissioned or private blockchain architectures, manage access controls, and ensure compliance with data governance requirements (Akter *et al*., 2024; Barros *et al*., 2025).

Cost of Implementation:

The initial investment required—hardware infrastructure, software, integration, training, and ongoing maintenance—can be substantial. Especially for small or medium-sized firms, the cost may be prohibitive. Moreover, the return on investment may be uncertain until the blockchain system is fully operational and participants are engaged across the network (Iqbal *et al*., 2025).

Organizational Resistance and Change Management:

Adopting blockchain often implies significant shifts in process workflows, roles (for example, the accountant's or auditor's role), and organizational mindset. Resistance to change—due to lack of awareness, perceived risk, or satisfaction with existing systems—can considerably slow or block deployment. Effective stakeholder communication, training, and leadership commitment are therefore critical success factors (Elshqirat, 2023; Akter *et al*., 2024).

5. Practices of Blockchain in Auditing

Blockchain technology has introduced innovative practices that are reshaping the traditional auditing landscape by enhancing transparency, data reliability, and efficiency in assurance processes. In essence, blockchain's distributed ledger allows auditors to access real-time, tamper-proof records of transactions, reducing the need for manual verification and reconciliation of financial data (Dai & Vasarhelyi, 2017). The use of immutable audit trails ensures that all recorded transactions can be independently verified without the risk of alteration, thereby strengthening the integrity and credibility of audit evidence (Rozario & Thomas, 2019).

A key practice emerging from blockchain adoption in auditing is the implementation of continuous auditing systems. Unlike conventional audits conducted periodically, continuous auditing leverages blockchain's real-time data-sharing capabilities to enable ongoing verification of transactions (Schmitz & Leoni, 2019). Through automated smart contracts, auditors can establish pre-defined criteria that trigger alerts whenever irregularities or exceptions occur, thus allowing for proactive risk detection and more dynamic assurance services (Appelbaum & Smith, 2018). This practice not only increases audit timeliness but also improves the relevance of audit opinions in fast-changing financial environments.

Another significant practice is the use of blockchain-based confirmations to validate transactions, account balances, and asset ownership. Traditionally, auditors rely on third-party confirmations through manual correspondence, which is time-consuming and prone to errors. Blockchain eliminates this process by offering instant verification of transactions on a shared ledger accessible to all authorized participants (Kokina *et al*., 2017). For instance, audit firms can trace the flow of assets and payments directly within the blockchain system, providing a verifiable and transparent record of all activities.

Furthermore, blockchain facilitates audit data analytics by integrating transaction-level information into advanced analytical tools. Auditors can apply machine learning and data visualization techniques on blockchain data to identify patterns, anomalies, or fraudulent behaviors (Pimentel & Boulianne, 2020). This approach enhances audit quality by combining the reliability of blockchain records with the predictive power of artificial intelligence, leading to more informed decision-making and strategic assurance.

However, the practical application of blockchain in auditing also requires auditors to develop new technical competencies and understanding of cryptographic processes. Audit firms such as the Big Four—Deloitte, PwC, EY, and KPMG—have begun experimenting with blockchain audit platforms to automate testing procedures and improve audit efficiency (Yermack, 2017). These initiatives demonstrate a gradual but significant shift toward technology-enabled auditing, where blockchain acts as a foundational infrastructure for trust and verification.

The practical use of blockchain in auditing revolves around continuous auditing, automated confirmations, and enhanced data analytics. While these practices hold the potential to improve audit accuracy, speed, and transparency, they also demand a redefinition of audit methodologies and the development of new professional standards to govern blockchain-based assurance services.

6. DISCUSSION, FINDINGS AND IMPLICATIONS

Blockchain technology has emerged as a transformative innovation with the potential to revolutionize traditional accounting and auditing practices. By enabling decentralized, transparent, and immutable recordkeeping, blockchain challenges the conventional reliance on centralized ledgers and intermediaries (Dai & Vasarhelyi, 2017). Its distributed nature ensures that transactions are recorded across multiple nodes in real time, minimizing human errors and enhancing the accuracy and integrity of financial data (Yermack, 2017). As a result, blockchain offers significant opportunities to improve efficiency, reduce fraud, and foster trust among stakeholders in financial reporting processes (Pimentel & Boulianne, 2020).

One of the most profound benefits of blockchain in accounting and auditing is the enhanced transparency and traceability it brings to financial transactions. Since each entry on the blockchain is time-stamped and cryptographically secured, it provides a verifiable audit trail that can be accessed by authorized parties (Kokina *et al.*, 2017). This level of transparency can substantially reduce the likelihood of manipulation or data tampering, thereby strengthening audit reliability and stakeholder confidence. Furthermore, smart contracts—self-executing codes embedded within blockchain systems—allow for the automatic enforcement of accounting rules, which can simplify compliance and reduce administrative costs (Appelbaum & Smith, 2018).

However, despite its potential, the implementation of blockchain technology in accounting and auditing presents several challenges. One major concern lies in the lack of standardized regulatory frameworks governing blockchain applications across different jurisdictions (Schmitz & Leoni, 2019). The absence of uniform guidelines raises uncertainties regarding data ownership, privacy, and liability in case of errors or breaches. Moreover, integrating blockchain into legacy accounting systems demands substantial investments in infrastructure, technological expertise, and staff training (Kokina *et al*., 2017). Auditors also face challenges in adapting traditional audit methodologies to accommodate blockchain-based records, particularly in verifying off-chain data and ensuring the reliability of smart contracts (Rozario & Thomas, 2019).

Another critical issue is the scalability and energy consumption of blockchain networks. Public blockchains, such as Bitcoin, require significant computational power to validate transactions through consensus mechanisms like proof-of-work, leading to environmental and operational concerns (Pimentel & Boulianne, 2020). Additionally, the immutability of blockchain, while advantageous for data integrity, poses complications when accounting errors or misstatements need correction. This raises questions about the balance between transparency and flexibility in financial reporting systems (Dai & Vasarhelyi, 2017).

From a strategic standpoint, the implications of these findings are multifaceted. For accounting professionals, blockchain adoption necessitates the development of new technological competencies and ethical frameworks for handling decentralized data (Schmitz & Leoni, 2019). Accounting curricula and professional training programs must incorporate blockchain literacy, emphasizing both technical understanding and audit analytics. For auditing firms, blockchain integration offers opportunities to enhance audit quality through data-driven assurance and predictive analytics (Rozario & Thomas, 2019). However, firms must also invest in cybersecurity measures and digital governance to mitigate potential risks associated with data immutability and smart contract vulnerabilities.

At the policy level, regulators and standard-setting bodies must address the tension between innovation and compliance. The findings suggest that international accounting and auditing standards should evolve to accommodate blockchain's unique features, particularly regarding data verification, valuation of digital assets, and recognition of decentralized transactions (Yermack, 2017). Collaborative initiatives among governments, academia, and industry could foster the creation of interoperable blockchain frameworks that balance transparency, security, and accountability.

In summary, while blockchain technology presents an unprecedented opportunity to redefine accounting and auditing, its widespread implementation requires a synchronized approach that bridges technological innovation with regulatory and professional adaptation. The key implication for practice is that blockchain should not be viewed merely as a disruptive technology but as an enabler of trust, transparency, and transformation in the future of financial reporting and assurance.

7. Future Research Directions

Future studies should explore the standardization and regulatory harmonization of blockchain applications within accounting and auditing. Empirical research is needed to assess how existing accounting standards (e.g., IFRS, GAAP) can

adapt to accommodate digital transactions, tokenized assets, and decentralized ledgers. Additionally, longitudinal case studies could provide insights into how blockchain adoption influences audit quality, fraud detection, and financial reporting accuracy over time.

Another promising area of research lies in the intersection of blockchain with artificial intelligence (AI) and Internet of Things (IoT) technologies. Combining blockchain's secure ledger with AI-driven analytics may enable predictive auditing and risk assessment models capable of detecting anomalies in real time. Future scholars may also investigate the ethical and environmental implications of blockchain, particularly concerning data ownership, privacy, and energy consumption.

Finally, further exploration into education and capacity building is essential. As accounting professionals transition into a technologically advanced environment, researchers can examine how blockchain literacy and digital competency influence the profession's adaptability and ethical standards. Addressing these research directions will contribute to developing a robust theoretical and practical framework for blockchain-integrated accounting systems.

In conclusion, while blockchain technology has not yet reached full maturity within the accounting and auditing sectors, its potential to foster transparency, accountability, and innovation is undeniable. Continued interdisciplinary research will be critical to overcoming current barriers, aligning regulatory frameworks, and ensuring that blockchain serves as a catalyst for trustworthy, efficient, and future-ready financial ecosystems.

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