Assessing the Impact of Blockchain Technology on Financial Reporting and Audit Practices

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Abstract

The significant influence of blockchain technology on contemporary financial reporting and auditing procedures is examined in this paper. The rapid spread of blockchain technology brought about a new era in financial data management, which can completely transform the accounting ecosystem's efficiency, security, and transparency. This study explores the various ramifications of blockchain adoption in accounting, concentrating on how it affects regulatory compliance, audit trail integrity, cost-effectiveness, smart contracts, and financial reporting accuracy. This study aims to clarify blockchain technology's advantages and challenges to accounting professionals, regulators, and auditors by analyzing its disruptive potential. With the help of growing regulatory frameworks and real-world use examples, it offers a thorough grasp of how financial reporting and auditing processes are changing in the blockchain era. The study also emphasizes the significance of understanding how blockchain technology changes traditional accounting practices as more companies incorporate it into their financial operations. It draws attention to the benefits of blockchain technology. Also, it emphasizes the need for flexibility and compliance with legal requirements to fully realize its potential in the fields of audit assurance and financial reporting. This investigation allowed us to provide accounting managers, professionals, policymakers, and other stakeholders with priceless knowledge of the potential for blockchain technology to revolutionize the accounting industry.

Keywords: blockchain, technology, smart contracts, financial reporting, auditing processes

1. Introduction

The introduction and broad use of blockchain technology (BT) has caused a fundamental shift in the financial sector in recent years (Javaid, Haleem, Singh, et al., 2022). Blockchain, initially recognized as the technology that powered cryptocurrencies, such as Bitcoin, expanded beyond its initial use to provide a paradigm change across several industries, most notably financial reporting and auditing procedures (Trivedi, Mehta, and Sharma, 2021). This introduction lays the groundwork for an in-depth examination of the significant ways blockchain technology is changing the conventional landscape of financial reporting, auditing, and accounting.

Financial reporting and audit procedures have always depended on centralized systems, typified by paper-based records, middlemen, and a large margin for human error (Safety IQ, 2023; Han, Shiwakoti, Jarvis, et al., 2023). However, the emergence of blockchain technology has brought about a decentralized, immutable ledger system that might completely change how financial data is stored, published, and audited (Tapscott and Euchner, 2019). Blockchain's core ideas of immutability, transparency, and cryptographic security are the keys to its revolutionary potential.

The fundamental feature of blockchain technology is its capacity to generate a distributed, transparent ledger

where transactions are recorded chronologically and permanently. A network of participants shares this ledger, and every participant keeps an exact duplicate of the database (Han, Shiwakoti, Jarvis, et al., 2023). Crucially, entries on the blockchain are protected from fraud and modification by cryptographic hashing. Thus, a key component of financial reporting and auditing, the integrity and accuracy of financial data, might be significantly improved by blockchain technology.

Additionally, the blockchain's ability to support self-executing contracts with established rules, or smart contracts, has ramifications for accounting standard compliance and financial transaction automation. The potential effects of smart contracts on financial reporting and auditing are of concern, especially revenue recognition and compliance testing (Ata, Hassan, Selim, et al., 2023).

However, there are several challenges with incorporating blockchain technology into the accounting industry. Standards and regulatory frameworks are still changing to sustain this cutting-edge technology (Anis, 2023). Furthermore, additional challenges in comprehending how to balance blockchain-based systems with conventional accounting methods are present. It is critical to evaluate the potential benefits and drawbacks of blockchain adoption for financial reporting and audit procedures.

The objective of this research is to investigate the various ways that blockchain technology is affecting financial reporting and audit procedures. It examines the possible advantages and challenges, the changing legal environment, and the practical use cases that highlight how blockchain technology can revolutionize accounting. By examining these crucial aspects, this study offers significant perspectives for auditors, regulatory agencies, accounting professionals, and industry participants as they navigate the complex relationship between blockchain technology and financial reporting.

This paper consists of five sections. Section two provides the research methodology. Section three presents the literature review of blockchain technology and its impact on financial services. Section four expands the literature review but addresses an exposition of future trends and ethical considerations. Section five ends with the conclusion and recommendations.

2. Research Methodology

This paper uses a descriptive research approach, a qualitative one. According to Hejase and Hejase (2013), "Under this approach, the researchers concentrate on the selection of secondary data studies, where there is no need to collect and manipulate data since the researchers have in hand reliable and valid data that is extracted from recognized and reliable sources" (p. 114).

This research advances a comprehensive grasp of blockchain characteristics and offers an overview of the financial services currently utilizing blockchain-enabled solutions. Using a content analysis methodology, the researchers draw attention to the growing interest from the academic and professional communities and pinpoint specific areas of research: (i) categorizing the variety of blockchain-based applications in the financial sector; (ii) determining whether the blockchain technology is suitable to add value in this sector while taking into account the various limitations this technology presents; and (iii) directing researchers by offering a framework of promising research directions, opportunities, and challenges that require further exploration and investigation. It is important to note that this paper is not considered comprehensive due to the dynamic nature of blockchain technology.

Capitalizing on Elommal's and Manita's (2022, p. 39) reasoning for conducting a theoretical work and building upon additional reported research is a proactive meditation on the potential ramifications of this technology on the financial accounting profession, consequently creating a study that is a synthesis of publications produced on the topic. The continuous track of development that blockchain technology is undergoing adds difficulty in obtaining comprehensive information and the fact that most businesses do not use this technology, especially in the context of Lebanon or even the Middle East. Audit firms—particularly the Big Four— and software developers like IBM and Microsoft are spending significant investments to learn more about this technology, build new tools and control procedures, and acquire skills.

3. Literature Review

Even though practitioners have struggled with the challenges of accounting for crypto assets, this particular issue has not received substantial attention in academic literature (Pimentel and Boulianne, 2020). Originally, blockchain technology found its application in creating cryptocurrencies because of its secure, transparent, and reliable transaction system (Tandon et al., 2021). Such attributes have subsequently encouraged the utilization of blockchain-based technologies to address trust-related aspects in various other business domains, including supply chains, accounting, and auditing (Dai and Vasarhelyi, 2017; Wang et al., 2019). The emergence of new

cryptocurrencies can offer advantages, especially in the context of auditing; as auditors often encounter a significant challenge in bridging the gap between their responsibility of ensuring the accuracy of financial statements for investors and detecting fraudulent activities.

Schmitz and Leoni's (2019) study explores practitioners' perspectives on BT and its potential influence on accountants and auditors. The authors argue that insights from industry leaders and early adopters, as suggested by Bjǿrnenak (1997) and Malmi (1999), provide valuable insights into the future of BT innovation. The study categorizes international accounting bodies as leaders like CPA Canada, AICPA, CA ANZ, ACCA, and ICAEW while identifying the Big 4 audit firms (PwC, Deloitte, KPMG, and EY) as early adopters. Mahtani (2022) argued that implementing a distributed ledger on a blockchain-based database to store records and Smart contracts, alongside a reorganization of the finance and accounting department, promotes governance, transparency, and trust.

Under the latter theme, Casey and Vigna (2018) describe blockchain as a 'truth machine' that has the potential to establish high levels of trust and transparency. BT's decentralized nature eliminates the need for intermediaries (Onay, 2021) and provides features like data security and immutability (Noor, 2022). Scholars suggest that these features can significantly enhance accounting and auditing practices, encouraging auditors and accountants to adopt more transparent behavior (PWC, 2020; Han, Shiwakoti, Jarvis, et al., 2023). BT allows the creation of immutable accounting records, virtually preventing manipulation due to cryptographic protection (Noor, 2022). Immutability is recognized as crucial for accountability, as blockchains enable participants to verify encrypted transactions (Rawat, Chaudhary, Doku, 2019; Politou, Casino, Alepis, et al., 2021; Artasanchez, 2023), ultimately improving governance and transparency (Yermack 2017; Shi, He, Li, et al., 2020; Tandon, 2021).

In the context of continuous auditing, BT facilitates real-time auditing (Schmitz and Leoni, 2019; Elommal and Manita, 2022, p. 58). Ernst & Young (EY) (2017) described it as an 'always-on' audit, a departure from traditional periodic audits" (para 12). BT's real-time tracking eliminates the need for sampling (Rooney, Aiken, Rooney, 2017; Elommal and Manita, 2022, p. 58) and streamlines transaction processing, recording, and reconciliation (Hobbs, de Moll, Griswold, 2018; Kokina et al., 2017). This eliminates the risk of errors associated with multiple database entries (Kokina et al., 2017; Wright and Serguieva, 2018; Mahtani, 2022).

Regarding Smart contracts, these self-executing agreements are processed through consensus protocols in a blockchain network (Hileman and Rauchs, 2017; Wright and Serguieva, 2018; Trivedi et al., 2021). BT enables the execution of smart contracts by providing a shared database and reduces the risk of errors or manipulation, eliminating the need for third-party intermediaries (Dai and Vasarhelyi, 2017; Yermack, 2017; Mahtani, 2022). Smart contracts expand blockchain's utility from transaction record-keeping to the automated implementation of multiparty agreements (Muneeb, Raza, Ul Haq, et al., 2022). For accountants and auditors, Smart contracts play a crucial role by facilitating the autonomous recording of transactions in compliance with predefined terms (Dai and Vasarhelyi, 2017; Yermack, 2017; Kozlowski, 2018; Schmitz and Leoni, 2019; Rabetti, 2023).

Hejase, Rkein, and Fayyad-Kazan (2021) posit, "Technology literacy and information literacy have become of concern in an era governed by an ICT-rich knowledge economy that is boosted by artificial intelligence" (p. 1). In addition, Hejase, Rkein, Hamdar, et al. (2023) emphasized digital literacy for accounting graduates in preparation for diverse accounting roles. Hence, when it comes to accountants' and auditors' roles before implementing blockchain technology, internal audit departments should initiate training programs for their staff members in the field of blockchain (Rooney et al., 2017). In addition, Alsaqa (2019) recommends that "The Accountants' expertise will also need to be expanded to include an appreciation of the core features and functions of Blockchain" (p. 72).

BT cannot prevent various accounting errors and issues, such as asset misappropriation and incorrect measurement or estimation of valid transactions (ICAEW, 2018; Burns, Steele, Cohen, et al., 2020; Sasongko, Sriwijianingsih, and Nugraha, 2023; Rabetti, 2023). Both scholars (e.g., Dai and Vasarhe, 2017; Kokina et al., 2017; Rozario and Vasarhelyi, 2018; Hejase, Rkein, and Fayyad-Kazan, 2021; Elommal and Manita, 2022) and professional accounting bodies and Big 4 audit firms (e.g., ACCA, 2016; CPA Canada, AICPA and UWCISA, 2017; Lardo, Corsi, Varma, et al., 2022) concur that accountants and auditors will continue to play essential roles despite the advent of BT. It is unlikely that all company transactions will be stored on blockchains, as recent studies indicate that organizations currently employing BT only record specific transactions, typically related to accounts receivable and accounts payable (Dai and Vasarhe, 2017; Tiron-Tudor, Cluj-Napoca, Deliu, et al., 2021). BT is likely to lead to a transformation in the roles of accountants and auditors, necessitating a new generation of professionals with skills to operate effectively in the evolving blockchain ecosystem (Ćirić, Sedlak, & Ivanišević, 2019). This shift represents a change from the current accounting and auditing paradigm (Kabir,

Farid, Sobhani, et al., 2021). In that context, auditors possessing IT proficiency will be better equipped to enhance their efficiency and effectiveness in accomplishing financial reporting tasks (Alsaqa, 2019; Ashraf et al., 2020).

Blockchain technology has relevant operational impacts and has a significant potential with the concept of triple-entry accounting (Coyne & McMickle, 2017; Dai & Vasarhelyi, 2017; Kokina et al., 2017; Mahtani, 2022; Sasongko, Sriwijianingsih, and Nugraha, 2023). Ijiri (1986) posits that triple-entry accounting is labeled the third entry that would help management make strategic decisions for operating their business. This concept capitalized on the cryptographic verification and immutable recording of each transaction in a blockchain, providing information about both the seller and the purchaser, albeit with their identities protected through public keys (Watson & Mishler, 2017). In addition, it "provides independent verification and enhances trust in the system (Kiviat, 2015; Dai and Vasarhelyi, 2017; Yermack, 2017), thereby increasing the transaction speed and security (Lardo et al., 2021, p. 205). However, this shift to triple-entry accounting will not replace the current double-entry system used in financial reporting (Watson & Mishler, 2017).

Finally, researchers have voiced concerns about the notion of blockchain being resistant to fraud (Coyne and McMickle, 2017; Wang and Kogan, 2018). They argue that despite the blockchain's immutability, the possibility of fraudulent activities continues to exist because any false information recorded on the blockchain remains false (Bradbury, 2015). Researchers caution practitioners against overestimating the ability of BT to prevent fraud, emphasizing that it may not be a foolproof solution (Ruckeshauser, 2017). Nevertheless, while BT may not completely eradicate fraud, it has the potential to aid in real-time fraud detection (Wang and Kogan, 2018).

3.1 Blockchain Technology

This section explores the fundamental ideas of blockchain technology, providing a thorough grasp of its tenets and the many kinds of blockchains with emphasis on how these elements affect financial reporting.

3.1.1 Foundations of Blockchain

It's critical to comprehend the fundamental ideas behind blockchain technology and how they support its dependability and security as one digs deeper into its foundations. Salient features of blockchain technology are examined that render it a revolutionary tool for augmenting information systems management.

- Delocalization: Blockchain technology's decentralized structure is its main feature (Anderson, 2019; Zarrin, Wen Phang, Babu Saheer, et al., 2021; Banaeian Far, Imani Rad, Rajabzadeh Asaar, 2023). Unlike conventional centralized systems, managed by a single authority, a blockchain functions as a distributed ledger that is accessible across a network of computers. Every member of the network or node keeps an exact duplicate of the ledger. Because no middlemen are required (Gupta, 2017), decentralization improves security by getting rid of single points of failure. By enabling the network to collaboratively verify financial transactions documented on a blockchain, fraud risk is reduced and system trust is preserved (Mahtani, 2022).

- Un-changeability: Blockchain's immutability is one of its key characteristics (Politou, Casino, Alepis, et al., 2021; Tripathi, Abdul Ahad, Casalino, 2023). A transaction is nearly impossible to remove or change once it is included in a block and validated by the network. Cryptographic hashing assures that any change to a block would require modifying all following blocks, making fraud extremely difficult. Thus, permanence is achieved. Immutability, which forbids unauthorized modifications or retrospective changes to transaction history, is essential to preserving the accuracy and dependability of financial data (IBM, 2023).

- Objectivity: A fundamental feature of blockchain technology is transparency (PWC, 2020; Artasanchez, 2023). Every member of a blockchain network has instant access to and a view of the whole transaction history. Transparency encourages accountability and confidence by allowing stakeholders to verify the accuracy of transactions and financial data independently. Transparent and auditable data are a huge benefit for financial reporting since they eliminate the need for laborious reconciliation procedures and increase trust in the accuracy of financial statements (Javaid, Haleem, Singh, et al., 2022; Karim, Rabbani, and Bawazir, 2022).

- Cryptanalysis: Blockchain uses sophisticated cryptography methods (Sahu, 2023) to protect data and confirm the legitimacy of transactions. The use of cryptographic hashing guarantees the security and immutability of the data within a block. Another cryptographic element, digital signatures, verifies the parties' identities in a transaction, guarding against illegal access and guaranteeing transaction legitimacy. The foundation for the dependability and security of financial data stored on the blockchain

is provided by cryptographic protections (Javaid, Haleem, Singh, et al., 2022; Alajlan, Alhumam, and Frikha, 2023).

3.1.2 Blockchain Types

Many kinds of blockchains are out there. In information systems management, each kind has unique benefits and is appropriate for particular tasks. This section will examine several types of blockchains and highlight their distinct features and uses.

- Public Ledgers: Public blockchains (Sharma, 2023) are decentralized networks that are accessible to all users, enabling anyone to engage, conduct transactions, and verify them. Well-known instances of public blockchains are Ethereum and Bitcoin. Public blockchains in financial reporting provide transparency to a worldwide audience but may also cause privacy and confidentiality issues.

- Individual Blockchains: Private Blockchains limit access to a limited number of users who usually are in an association or consortium. According to Sharma (2023), "Such Blockchain is mostly used within an organization where only particular members are participants of a Blockchain network" (para 17). These blockchains are frequently utilized for internal collaborations and processes where control and privacy of data are crucial. Private Blockchains give more control over financial reporting but can give up some of the transparency and decentralized benefits. Examples of private blockchains include IBM, R3 Corda, Hyperledger Fabric, Hyperledger Sawtooth, and others (ibid).

- Authenticated Blockchains: A middle ground between public and private blockchains is provided by permissioned blockchains (Joannou, Kalawsky, Mart ńez-Garc á, et al., 2020). They preserve some characteristics of decentralization while retaining a certain level of control by requiring members to apply before joining the network. These blockchains can provide safe and transparent financial reporting solutions and are appropriate for applications unique to some industries.

- Blockchains for Consortiums: Blockchains used in consortiums feature several organizations working together on a common network (Bahalul Haque and Bhushan, 2023). These blockchains preserve a certain level of security and decentralization while facilitating data transfer between reliable parties. Consortium blockchains have the potential to simplify procedures in multi-entity financial ecosystems for financial reporting while maintaining data integrity. Consortium Blockchain examples include "IBM Food Trust, TradeLens, Energy Web Foundation, and Contour" (Sharma, 2023, para 30).

3.1.3 Financial Reporting and Blockchain Benefits

Financial reporting capitalizes on Blockchain's impact on data accuracy and credibility (Alkafaji, Dashtbayaz, Salehi, 2023). Of special interest are the following characteristics: Decentralization, immutability, transparency, and cryptography, which together support data integrity and confidence in financial reporting (Anderson, 2019; Kabir, Farid, Sobhani, et al., 2021; Javaid, Haleem, Singh, 2022; Banaeian Far, Imani Rad, Rajabzadeh Asaar, 2023). A Blockchain's high degree of trustworthiness makes transactions and financial data recorded less likely to require lengthy reconciliation and audit processes.

3.1.3.1 Private vs. Public Blockchains

The financial reporting decision between public and private blockchains is based on specific organizational requirements (Blockchain Smart Solutions, 2023). Although public blockchains provide unmatched transparency, there may be issues with data privacy. Although they may lose some decentralization and openness, private blockchains offer more control. When choosing a blockchain solution for financial reporting, organizations need to carefully assess their priorities and compare advantages and disadvantages (Budhi, 2022).

Through an examination of the abovementioned foundational concepts and the differences between diverse kinds of blockchain, the coming section provides a clear basis to understand the discussions regarding how blockchain affects financial reporting and audit procedures. Comprehending these notions is crucial to appreciate the revolutionary possibilities of blockchain technology within the financial reporting sphere.

3.2 Blockchain in Financial Reporting

This section examines the critical role that blockchain technology plays in enhancing the integrity and accuracy of financial data. Actual cases of businesses using blockchain technology for financial reporting are discussed to provide insight into the usefulness of this technology. In addition, concrete blockchain advantages are highlighted to provide data validation and financial statement preparation.

3.2.1 Improving the Accuracy and Integrity of Data

Blockchain technology presents a game-changing answer to the enduring problem of preserving accuracy and data integrity in financial reporting (Casino, Dasaklis, and Patsakis, 2019; Kabir, Farid, Sobhani, et al., 2021). The immutability of blockchain ensures that financial transactions are permanently recorded, protecting the integrity of financial data and removing the possibility of illegal changes or mistakes (Politou, Casino, Alepis, et al., 2021). Additionally, a Blockchain's instantaneous data updates feature makes it possible for all authorized network users to quickly access and validate transactions, which lowers the possibility of data conflicts and guarantees that financial reports always show the most recent data (Afreen, 2023).

3.2.2 Actual Case Studies

There is verifiable proof of the usefulness of blockchain in financial reporting by looking at specific instances of companies that have effectively incorporated it into their reporting procedures. According to IBM (2023a), "Benefits of using blockchain to replace outdated paperwork and processes for financial institutions include a reduction in delays and friction as well as an increase in industry-wide operational efficiency for consumer banking, lending, trade finance, clearing and settlement, and international trade" (para 9). Relevant applications are shown next.

- Supply-Chain Management: To authenticate and track the origins of products throughout their supply chains, businesses like Walmart and IBM have embraced blockchain technology (IBM, 2023a). They can provide thorough and transparent records of product movements and transactions via blockchain to quickly integrate these data into financial reporting. That guarantees auditing standards are met and improves the accuracy of the data (Blockchain Council, 2023).

- Cross-Border Transactions: Santander and JPMorgan, two financial firms that specialize in cross-border payments, have adopted blockchain technology (The Hash Insider, 2023). Blockchain enables safer and quicker international transactions by drastically cutting settlement times from days to just a few minutes. Improved transaction accuracy and transparency impact the precision of financial reporting, especially in foreign currency and remittance activity (IBM, 2023b).

3.2.3 Advantages of Data Validation and Financial Statement Preparation

Blockchain technology offers several significant benefits to data validation and financial statement preparation.

Decreased Fraud and Errors: Reduction of fraud risk and human error occurs by the immutability and transparency of blockchain transactions. Financial statements generated using blockchain data are intrinsically more accurate and dependable (Blockchain Council, 2023).

Simplified Certification: Auditors can confirm financial facts by accessing a transparent and safe blockchain ledger. That improves the efficiency of financial statement audits, streamlines the auditing process, and lowers audit-related expenses (Elommal and Manita, 2022).

Validation of Data and Trust: Data validation may be done in a safe, trustworthy environment thanks to blockchain technology. Financial reporting is strengthened because stakeholders, such as investors and regulators, may rely on the veracity of financial data stored on the blockchain (Yermack, 2017; Schmitz and Leoni, 2019).

Blockchain technology is an effective means of improving financial data integrity, accuracy, and transparency. Real-world examples highlight its usefulness in a diversity of businesses, and it is clear what advantages it provides for data validation and financial statement preparation. The potential for more dependable and trustworthy financial reports grows as more businesses integrate blockchain into their financial reporting procedures.

3.3 Smart Contracts and Financial Reporting

This section explores the idea of smart contracts and how these can significantly automate accounting, revenue recognition, and spending control. To illustrate the concrete advantages of integrating Smart contracts, several case studies from the real world in a variety of industries are considered.

3.3.1 Examining Intelligent Contracts

This section delves into the realm of smart contracts, a cutting-edge technology that is revolutionizing reporting and financial transactions. Smart contracts are changing the nature of agreements and how they are carried out. They are more than simply trendy terms. The basics of Smart contracts and their important role in automating financial transactions are presented next.

- Synopsis and Foundations: Smart contracts are self-executing contracts with predetermined terms and conditions encoded into the code. They do not require middlemen and automatically carry out and enforce contract requirements. From this basic idea, there are revolutionary implications for financial reporting (Rozario and Vasarhelyi, 2018; Rozario and Thomas, 2019; Muneeb, Raza, Ul Haq, et al., 2022).

- Financial Transaction Automation: Many financial activities, including asset transfers, settlements, and payments, can be automated using Smart contracts. They increase transaction speed and accuracy by doing away with the need for manual intervention, which lowers the possibility of fraud and errors. In addition, the World Bank Group (2020) posits that "Smart contracts may unlock value for firms and consumers through automation, self-execution, immutability, and distributed access and verification" (p. 10).

3.3.2 Streamlining Expense Management and Revenue Recognition

It is essential to integrate smart contracts to simplify the procedures of revenue recognition and spending control. By using predetermined triggers to automate revenue acknowledgment, these contracts make sure income is recognized on time by following contractual requirements (Chou, Hwang, Schneider, et al., 2021). Additionally, they provide real-time tracking and transparency, which helps with more accurate revenue recognition in financial reporting. Furthermore, by automating expense tracking, putting predetermined spending regulations into place, and reducing the possibility of fraudulent expenditure claims, Smart contracts enhance the accuracy of financial data and extend their benefits to expense control (Anis, 2023).

3.3.3 Industries Gaining from the Integration of Smart Contracts: Case Studies

Examples from the real world demonstrate how many sectors are using smart contracts to optimize financial reporting.

Supply Chain and Logistics: Shipping and Cross-border Trade

Case Study: A multinational shipping corporation uses Smart contracts to streamline supplier and carrier payment settlements. Coordinating payments with the timely delivery of goods lowers the number of payment disputes and guarantees accurate financial reporting. For example, "When items are transported, a smart contract can be set up to release payment automatically when certain conditions are met, i.e., successful delivery and quality inspection. This lessens disagreements between suppliers and buyers, guarantees the correctness, and cuts down on delays" (Antiersolutions, 2023, para 2). Moreover, these contracts ease customs clearance and currency exchange.

Real Estate

Case Study: Real estate companies use Smart contracts for rental agreements of real estate properties. For property management organizations, automatic enforcement of lease terms and rent payments improves the openness and accuracy of financial reporting. Moreover, according to Aniersolutions (2023), "Real estate transactions frequently entail several middlemen, documentation, and drawn-out procedures. Through the automation of processes like title transfers, escrow payments, and ownership verification, smart contracts can streamline real estate transactions. This shortens the time it takes to finish a transaction and lowers the possibility of fraud" (para 7).

Healthcare Contracts

Case Study: Healthcare providers use Smart contracts to streamline insurance claims and billing procedures. That lowers billing errors and guarantees timely revenue recognition and expense control, all of which improve the accuracy of financial reports. Moreover, Healthcare supply chains (HCSC) have the potential to significantly improve the quality and safety of care for patients while also saving money and improving treatment outcomes for healthcare providers (Lagasse, 2019; Omar, Jayaraman, Debe, et al., 2021). By automating transactions, expediting revenue recognition, and improving expense management, smart contracts are completely changing financial reporting. The practical advantages of Smart contract integration are highlighted with case studies from a variety of real-world sectors. These benefits include increased accuracy of financial reporting procedures, transparency, and efficiency. The effects of smart contracts on financial reporting procedures are becoming more and more noticeable as their use grows.

3.4 Challenges and Regulatory Considerations

The challenges in implementing blockchain technology for financial reporting, the dynamic nature of standards and regulatory frameworks, and the issues with security and compliance that come up when using blockchain

technology for financial reporting are all covered in this section.

3.4.1 Determining the Challenges to Financial Reporting Adoption of Blockchain

The following obstacles prevent blockchain technology from being widely used in financial reporting:

- Integration Complexity: Blockchain technology integration might be hard and resource-intensive in the current financial systems. In addition to upgrading outdated systems and ensuring smooth data flow between blockchain and traditional databases, organizations also need to manage compatibility issues (Chang, Baudier, Zhang, et al., 2020).

- Data Confidentiality and Privacy: Blockchain provides transparency, but it might also violate data privacy laws, particularly when it comes to sensitive financial information. It might be hard to strike the right balance between data security and transparency (Shah, Forester, Berberich, et al., 2019). Moreover, Zheng, Xie, Dai, et al. (2018) state that Blockchain is vulnerable to collusive, self-serving miner (i.e., hacker) assaults, as demonstrated by numerous other attacks, which make Blockchain less safe.

- Scalability: Blockchain networks that handle many transactions, particularly public ones, have scalability issues (Zheng, Xie, Dai, et al., 2018; Marr, 2023). Financial reporting procedures may not operate as fast or as effectively as possible if scalability issues are present.

3.4.2 Standards and Regulation Frameworks Changing to Accommodate Blockchain Technology

The emergence of blockchain technology has led to a dynamic change in the regulatory landscape:

- Changing Regulatory Environment: Global regulatory agencies are still getting used to financial reporting using blockchain technology. Clear legal frameworks are defined by governments and other organizations to control blockchain use, especially in industries like finance (Shah, Forester, Berberich, et al., 2019).

- Accounting Guidelines: Organizations that oversee accounting standards, like the International Financial Reporting Standards (IFRS) Foundation and the Financial Accounting Standards Board (FASB), are actively investigating the potential effects of blockchain technology on financial reporting standards. They are attempting to offer guidelines for how assets and transactions based on blockchain should be handled (Moosa, Coveney, Flannery, 2023).

- Reporting and Taxation: Tax authorities are developing regulations about the taxation of blockchain transactions and assets. Businesses that use blockchain for financial reporting need to keep up with changing tax laws, reporting standards, and compliance requirements. Baer, de Mooij, Hebous, et al. (2023) posit that "The primary challenge with taxing cryptocurrency assets is their "pseudonymous" nature. In other words, transactions use public addresses that are very challenging to associate with specific people or businesses. This may facilitate tax evasion. For tax authorities, implementation is therefore crucial" (para 13).

3.4.3 Security and Compliance Issues With Blockchain-Based Financial Reporting

To guarantee transaction compliance, companies using blockchain for financial reporting—especially those in the financial services industry—must abide by Know Your Customer (KYC) and Anti-Money Laundering (AML) laws (Baer, de Mooij, Hebous, et al., 2023). In addition, it is critical to preserve data and network security, which includes taking precautions like enforcing access rules, preserving secret keys, and protecting financial data from vulnerabilities that can compromise reporting integrity. Strong audibility and traceability are required due to the immutability and openness of blockchain, which means that auditors must have access to sufficient resources, training, and data (Shah, Forester, Berberich, et al., 2019). Scalability, data security, and integration issues in blockchain-based financial reporting provide challenges that are exacerbated by the constantly changing legal environment as standards-setting organizations and government agencies work to adopt blockchain technology. To fully realize the disruptive potential of blockchain technology in the financial reporting space, end-user companies must place high priority on adherence to AML/KYC (Nowak and Mateja, 2023), security, data protection, and auditability. They also need to be flexible enough to adjust to changing legal requirements. Moreover, Nowak and Mateja (2023) assert that compliance to KYC leads to minimizing financial crime, fostering trust, improving compliance, reducing operational costs and improving efficiency, and enhancing customer experience" (para 12).

3.5 Blockchain in Audit Practices

This section explores how blockchain technology has significantly impacted audit processes and procedures,

how it helped with real-time auditing and fraud detection, and provides case studies from actual audits to show blockchain technology use in audit practices.

3.5.1 Blockchain's Effect on Audit Methodologies and Procedures

Blockchain technology improves auditing procedures in a significant way:

- Automation and Efficiency: Blockchain technology automates the verification of financial data and transactions leading to streamlining audit processes. Since blockchain records are transparent and accurate, auditors don't need to perform as much manual testing or reconciliation (CPA Canada, AICPA, and UWCISA, 2017).

- Real-time Data Access: Because blockchain technology is instantly accessible, auditors may view the recording of financial data. That makes continuous auditing possible, allowing auditors to monitor financial activities and transactions in real-time instead of depending on sporadic sampling (Schmitz and Leoni, 2019; Elommal and Manita, 2022, p. 58).

- An unchangeable audit trail: Because blockchains are immutable, the audit trail's integrity is guaranteed. Once a transaction is recorded, it cannot be altered, giving auditors an unchangeable record of the financial activity. That increases confidence in financial reporting and streamlines the auditing process (PWC, 2020; Onay, 2021; Han, Shiwakoti, Jarvis, et al., 2023).

3.5.2 Using Blockchain Technology to Detect Fraud and Audit in Real-Time

Real-time auditing and proactive fraud detection are made possible by blockchain technology:

- Instantaneous Auditing: Blockchain gives auditors immediate access to financial data, which makes real-time auditing easier. Auditors can monitor transactions, spot irregularities, and guarantee that accounting rules are followed (Elommal and Manita, 2022). Being proactive, the likelihood that financial irregularities would go unnoticed is decreased.

- Fraud Encounters: Blockchain is an effective tool for fraud detection because of its transparency and immutability. In real-time, auditors can track down the source of fraudulent transactions, spot unlawful modifications, and uncover abnormalities. That improves the efficacy of efforts to detect fraud (Wang and Kogan, 2018).

3.5.3 Case Studies Illustrating How Blockchain Is Applied to Audit Procedures

In the following section, the researchers explore compelling case studies that exemplify blockchain integration into audit procedures. These real-world examples illustrate how businesses leverage blockchain's capabilities to enhance the integrity of their audit processes. From supply chain management to financial services and healthcare, these case studies demonstrate the tangible impact of blockchain on fraud detection, real-time auditing, and the creation of reliable audit trails.

Supply Chain Audits:

Case Study: A global company uses blockchain technology to audit its supply chain. From manufacture to distribution, every step of the supply chain process is tracked on a blockchain. The risk of counterfeit goods is decreased since auditors can instantly trace the origin of raw materials and confirm the authenticity of products (Blockchain Council, 2023).

Auditing Financial Services:

Case Study: A financial institution uses blockchain technology to examine its internal financial procedures. Confirm that transactions comply with financial legislation and auditing standards, auditors check the blockchain ledger. Real-time auditing facilitates the quick discovery of disparities (Elommal and Manita, 2022).

Healthcare Assessment:

Case Study: Healthcare organizations use Blockchain to audit billing and patient record procedures. On a blockchain, auditors may follow a patient's full medical path, from surgeries to insurance claims. Prompt detection of unapproved modifications or false assertions improves financial precision and adherence (Omar, Jayaraman, Debe, et al., 2021).

These case studies demonstrate how audit procedures in different businesses are incorporated with blockchain technology. They draw attention to the advantages of enhanced fraud detection, real-time auditing, and the dependability of blockchain-based audit trails. The integration of blockchain technology into audit procedures by firms is showing promise for higher efficiency, accuracy, and proactivity in auditing practices.

4. Future Trends and Developments

The use of blockchain technology in financial reporting and audit procedures is examined in this section. It also highlights possible future trends and advances. It includes forecasts on how blockchain technology will develop and how auditors' roles will change in financial ecosystems driven by blockchain technology.

4.1 Forecasts Regarding Blockchain's Potential Use in Financial Reporting and Audit

There are several possible advancements in the use of blockchain technology for financial reporting and auditing in the future:

- A Rise in Adoption: Blockchain will become increasingly popular in financial reporting and auditing. More industries and sectors will adopt blockchain technology as businesses see the advantages of increased data integrity, transparency, and efficiency (Elommal and Manita, 2022; Han, Shiwakoti, Jarvis, et al., 2023).

- Mutual Compatibility: There could be more blockchain network compatibility in the future. According to Brown (2018), "Compatibility advantages one gets from deploying multiple applications to the same blockchain network" (para 10). That will improve cooperation in financial reporting and audit procedures by facilitating easier data sharing and transactions across enterprises using various blockchain platforms.

- Financial Instruments Powered by Blockchain: It's possible that financial instruments built on the blockchain, such as security tokens, will be created and issued more often. Garrido (2023) posits that "Based on advancements in cryptography, specifically in Decentralized Ledger Technology (DLT) and related methods, tokens are digital goods whose transmission is affordable, traceable, and unforgeable. Tokens have a wide range of possible uses in banking, business, and other economic sectors" (p. 5). As a result of this change, auditors would need to adjust to new asset classifications and auditing techniques.

4.2 Potential Technological and Regulatory Advancements

The following significant developments in blockchain technology and auditing and financial reporting regulations could occur in the future:

- Solutions for Scalability: New scaling methods will surface to address the scalability issues present in public blockchains. These fixes could increase transaction throughput making public blockchains more appropriate for large-scale financial transactions. According to Takyar (2023), many different approaches are now being investigated to address the scalability problem with blockchain technology. There are four main approaches to solving scalability issues with blockchain. The various solution categories offer unique approaches to tackle the scalability problems associated with the Blockchain. These include "On-chain scaling methods, off-chain scaling methods, scalable consensus mechanisms, and scalable distributed ledgers" (para 13).

- Clarity in Regulations: The regulatory structures that oversee blockchain technology possibly will get stronger and more certain. To give businesses more regulatory certainty, governments and regulatory agencies will collaborate to establish standards for blockchain-based financial reporting and audit procedures (McQuinn and Castro, 2019).

- Asset Tokenization: It's possible that asset tokenization—the representation of digital and physical assets as blockchain tokens—will proliferate. To ensure the correctness and compliance of these tokenized assets, auditors will need to adjust to auditing them (Stefanoski, Sahin, Banusch, et al., 2020).

4.3 The Changing Function of Auditors in Financial Ecosystems Driven by Blockchain

Auditors' roles are probably going to undergo significant changes as blockchain continues to revolutionize financial reporting and auditing:

- Blockchain Auditors: Blockchain has the potential to drastically alter audit firms' operational procedures as well as how they plan and grow their businesses (Liu, Wu, Xu, et al., 2019). There may be a rise in the number of specialized blockchain auditors only interested in looking at financial systems that use blockchain technology. To guarantee the financial data's correctness and integrity, these auditors need to have a thorough understanding of blockchain technology, smart contracts, and cryptographic security. Moreover, Elommal and Manita (2022) report that "Auditors need to be focused on the chances to grow their business by providing new services like introducing blockchain governance, new control systems, or helping clients employ this technology, among other things" (p.

54).

- Continuous Auditing: With real-time access to blockchain data and with the integration of other technologies such as big data and analytics (Elommal and Manita, 2022, p. 51), continuous auditing may replace the conventional auditing methodology. Auditors can monitor financial transactions and data continually, improving transparency and enabling fast fraud identification as opposed to running sporadic audits.

- Assurance of Smart Contracts: Auditors will be essential to guarantee the security and accuracy of Smart contracts utilized in financial transactions. As a routine procedure to preserve confidence in blockchain-based financial operations, this entails inspecting the code of Smart contracts and watching for how they are being carried out (Javaid, Haleem, Singh, et al., 2022).

As blockchain technology becomes more widely accepted and is further explained by regulations concerning financial reporting and auditing, auditors will need to adjust by becoming proficient in blockchain technology and adopting continuous auditing procedures. As blockchain technology develops and becomes more integrated into financial ecosystems, auditors will continue to be crucial in ensuring the integrity and accuracy of financial reporting in this age of blockchain technology (Bible, Raphael, Taylor, et al., 2017; Black, 2018).

4.4 Ethical and Privacy Considerations

This section explores blockchain technology privacy and ethical issues, specifically as it relates to financial reporting. Topics addressed include permission, data privacy, and ways to keep blockchain-based financial reporting transparent and trustworthy.

4.4.1 Blockchain-Related Ethical Concerns

The use of blockchain technology presents several moral questions:

- Data Ownership and Privacy: The transparency of blockchain technology may not align with people's expectations regarding data privacy. When private or sensitive financial information is kept on a public blockchain without sufficient authorization or anonymization, ethical issues come up. De Haro-Olmo, Varela-Vaca, and Álvarez-Bermejo (2020, p. 17) posit that "Blockchain technology makes it possible to anonymize the transactions that take place, but it also presents some traceability issues that could reveal the true identities of the blockchain participants. A few annoyances have surfaced that may jeopardize the confidentiality and privacy of the data involved in a particular transaction as well as the identities of the parties taking part in the blockchain. Selective revelation of private information or even de-anonymization may happen if it is possible to track the transactions of a particular entity. Global regulation regarding anonymity and privacy is vital" (p. 17).

- Immutability and the Erasure Right: The immutability of blockchain presents moral conundrums for people who want to remove or edit their data. It can be difficult to strike a balance between blockchain's permanence and the right to erasure or the right to be forgotten (Jongerius, 2019). Also, Muma, Kappos, and Sumroy (2019) contend that "The right to erasure (often known as the "right to be forgotten") under the General Data Protection Regulation (GDPR) inevitably presents major compliance challenges to the continued development of immutable Blockchain-based solutions that involve the storage and transaction of personal data" (p. 4). In addition, Muma et al. (2019) assert that "the right to erasure concerns do not render GDPR compliance impossible. In particular, a GDPR-compliant Blockchain solution can exist where that solution involves a defined group of participants, all of whom agree to a common contractual governance framework. However, this will require steps to be taken by regulatory authorities and technology providers" (p. 4).

- Assent and Knowledgeable Involvement: It is crucial to ensure that blockchain network users comprehend the technology and give their permission before using it. Ethical issues may occur when people are unintentionally or under duress included in blockchain networks. Chainalysis (2023) contends that "Blockchain is based on peer-to-peer communication, trustless platforms, and open-source governance. Gaining an understanding of the underlying principle will enable you to see why and how blockchain technology may upend established business structures and empower institutions as well as individual individuals" (para 42-43).

4.4.2 Techniques for Preserving Trust and Transparency

Various strategies are used to preserve trust and transparency in blockchain applications:

- Privacy controls and data encryption: Sophisticated privacy measures and robust encryption can be used

to protect critical financial data on the blockchain. Access to restricted permissioned blockchains can offer more control over data privacy. Alajlan, Alhuma, and Frikha (2023) posit that "We can create safe and dependable blockchain systems that spur innovation and revolutionize markets by using a broad and interdisciplinary approach that takes into account operational best practices, technological developments, and legal frameworks" (p. 23).

- Mechanisms for Consent and Anonymization: Strong consent procedures and anonymization strategies should be added to blockchain applications. Users ought to be in charge of deciding who can access their data and how. Bhardwaj (2023) asserts in his Blog that "Permissioned blockchain, a subset of blockchain, is a distributed ledger technology (DLC) that is not open to the public and needs 'permission' to access. The heightened level of security and access control ensures that only users with permission can execute specified actions" (para 5).

- Blockchain Management: Ethical concerns can be addressed in blockchain networks by establishing explicit governance systems. When appropriate, governance models can incorporate features for erasing or redacting data (Muma, Kappos, and Sumroy, 2019; Jongerius, 2019).

- Encouraging Openness via Auditing: It is essential to audit blockchain transactions to ensure adherence to privacy and ethical norms. Such organizations' adherence to ethical norms and regulatory obligations can be confirmed by independent auditors. Take for example research conducted in Egypt. Anis (2023) recommends that audit firms should adopt a systematic strategy when auditing blockchain-based accounting systems. In addition, "it is recommended to invest in regular BT education and training to effectively use the BT and be aware of the advances of a continuously evolving BT" (p. 375).

- Awareness and Education of Users: Businesses must inform stakeholders and users about how blockchain technology affects consent and data privacy. Establishing trust requires open and honest communication regarding the blockchain's data handling and storage practices. Surguli (2023) contends that "Blockchain has transparency because of its distributed and immutable ledger. It fosters trust, increases accountability, and lessens the need for middlemen to verify transactions. However, with the rise in data breaches, identity theft cases, and privacy violations; a balance between transparency and data security is needed. The European General Data Protection Regulation (GDPR) is a noteworthy legislative framework that acknowledges the right to protection of an individual's personal information (European Commission, 2016).

- Committees on Ethics and Supervision: Within blockchain consortia or organizations, creating ethics committees or oversight bodies can offer direction and guarantee that ethical issues are incorporated into blockchain projects. Dierksmeier and Seele (2020) report partnerships between a blockchain platform called VeChain, which aims to enhance corporate processes and supply chain management, and PwC that assists in overseeing the real-world application of VeChain's blockchain; Deutsche Bahn/Schenker manages a logistics pilot project; and DNV GL, a Norwegian registrar, is co-developing a digital system to improve the reliability of blockchain data employing certified assurances regarding the data input. Sharif and Ghodoosi (2022) propose, "Careful implementation is necessary and requires extensive examination of ethical implications in advance" (p. 1009). In addition, according to Tang, Xiong, Arreola, et al. (2019), four areas of blockchain study are studied concerning ethical issues. (1) The stack of technologies. Ethical challenges presented within the technological area. Second, cryptocurrencies. The usage of cryptocurrencies as alternatives to fiat money is the source of the ethical problems in this area. (3) Contracts for Smart contracts. In a blockchain-enabled economy, the digitalization and exchange of financial assets present significant ethical challenges. (4) Dispersion of power. Merely one particular use of distributed ledger technology. More extensive and profound moral dilemmas emerge from the possible consequences of switching from centralized to decentralized systems" (pp. 45-46).

Preserving trust and openness in blockchain-based financial reporting requires addressing ethical and privacy issues. While utilizing the advantages of blockchain technology, strategies that prioritize data encryption, privacy controls, consent processes, and regulatory compliance might help allay these worries. Ensuring blockchain practices conform to ethical norms and uphold individuals' privacy rights is contingent upon governance structure implementation, user education initiatives, and ethical awareness.

5. Recommended Framework and Conclusion

5.1 Proposed and Recommended Framework

The outcome of this study is to propose and recommend a framework that addresses ethical and privacy concerns while incorporating the essential ideas discussed earlier to show a thorough strategy for implementing blockchain in financial reporting and audit procedures:

5.1.1 A Framework for the Adoption of Blockchain Technology in Financial Reporting and Audit

A. Integration Strategy for Blockchain

Establishing a systematic methodology is recommended for firms incorporating blockchain technology into financial reporting and auditing:

- Evaluation of Assessment and Readiness: Evaluate the organization's preparation for using blockchain technology in detail concerning operational, technological, and cultural aspects.

- Employ Case Determination: Determine which specific blockchain technology use cases can be useful areas in financial reporting and auditing, such as revenue recognition, supply chain auditing, or expense management.

- Selecting a Type of Blockchain: Based on the needs of the company and privacy concerns, the right kind of blockchain (public, private, permissioned, consortium) is selected.

B. Privacy of Data and Ethical Issues

Ensuring Data Privacy and Addressing Ethical Concerns in Blockchain:

- Privacy controls and data encryption: Put robust privacy safeguards and data encryption in place to safeguard private financial information kept on the blockchain.

- Mechanisms for Consent and Anonymization: To guarantee user data privacy and consent compliance, deploy anonymization techniques and strong consent channels.

- Governance and Transparency: Provide unambiguous governance frameworks for the blockchain network to handle moral dilemmas, such as the ability to redact or erase data as needed.

- Awareness and Education of Users: Inform users and interested parties about how blockchain affects consent and data privacy. Encourage open dialogue on the processing and storing of data.

C. Integration and Execution

Blockchain Implementation and Integration in Financial Reporting and Auditing:

- Integration of Blockchain Technology: Make sure there is data flow and interoperability between blockchain and traditional databases by integrating blockchain technology into the current financial systems.

- Create Smart Contracts: Create Smart contracts that automate tasks like revenue recognition and spending management suited to the needs of financial reporting and audits.

D. Adherence to Regulations

Compliance with Regulations:

- Regulatory Coherence: That is, synchronizing blockchain operations with the applicable financial reporting standards (FASB, IFRS), data protection, and privacy laws (e.g., GDPR, data breach notification legislation).

- Meeting Audit Standards: Ascertaining that the applicable audit standards and guidelines are met by blockchain-based financial reporting and auditing procedures.

E. Constant Monitoring and Auditing

Continuous Monitoring and Auditing in the Blockchain Environment:

- Instantaneous Auditing: Use real-time auditing techniques to continuously monitor transactions and financial data, made possible by blockchain's accessibility and transparency.

- Fraud Encounters: Making use of blockchain's real-time visibility to improve fraud detection and quickly spot inconsistencies.

F. User rights and ethical oversight

The blockchain sector must establish a Council for Ethics to guarantee that ethical considerations are given precedence over technological breakthroughs. Monitoring and guiding blockchain innovations to conform to ethical standards should be performed by this oversight body composed of legal scholars, ethicists, and industry professionals. Within the blockchain ecosystem, it ought to aggressively promote values like responsibility, justice, and openness. In addition, the Council must collaborate closely with regulatory organizations to support the defense of user rights while facilitating adherence to current laws and regulations. Blockchain innovations should prioritize protecting user rights, such as consent, data privacy, and the right to be forgotten. That will help them comply with legal and ethical requirements to safeguard people's personal information and digital identities.

G. Instruction and Practice

Ensuring that workers, auditors, and other stakeholders have the requisite knowledge and comprehension of blockchain technology, data privacy, and ethical considerations, extensive education and training programs are essential. Organizations must promote a culture of appropriate blockchain usage by making continuous education investments. Along with covering the technical components of blockchain, this training should also focus on the ethical considerations, privacy issues, and legal requirements related to its use. Those initiatives can increase openness, lower risks, and guarantee that all parties involved in the blockchain ecosystem are knowledgeable and capable of making moral decisions. In the end, this will help secure the ethical and responsible use of this game-changing technology.

H. Communication and Reporting

Financial reporting must be transparent and open when it comes to the use of blockchain technology, data management practices, and adherence to privacy and ethical standards. Financial reports should give an honest and transparent picture of how blockchain is used inside the company, stressing its effects on data management and any privacy or ethical issues. Because of this transparency, stakeholders may evaluate the organization's blockchain processes' compliance with legal and ethical criteria and have a thorough understanding of them. Transparent reporting promotes a culture of accountability and responsibility in the blockchain implementation process by helping stakeholders make educated decisions about their interaction with the organization and by helping to establish trust.

I. Ongoing Enhancement

Establishing a feedback mechanism is crucial for entities seeking to consistently assess and improve privacy safeguards, ethics, and blockchain integration inside their operations. Blockchain technology has to be evaluated regularly for compliance with privacy laws and ethical standards due to its iterative nature. Through obtaining feedback from stakeholders, staff members, and specialists, companies can pinpoint opportunities for enhancement and implement the requisite modifications to their blockchain procedures. In the end, this continuous feedback loop promotes responsible and successful blockchain integration while maintaining transparency and integrity in financial reporting and audit processes. It also guarantees that the company stays flexible and responsive to changing ethical and privacy concerns.

5.2 Conclusion

The integration of blockchain technology into financial reporting and audit procedures signifies a noteworthy shift in the banking industry. The authors in this paper covered the foundational ideas of blockchain, its beneficial uses in financial reporting, and the privacy and ethics issues that arise with its implementation during this conversation. The influence of blockchain technology on audit and financial reporting is significant. By using Smart contracts, it streamlines procedures while improving data accuracy, integrity, and transparency. It transforms conventional audit approaches by enabling real-time auditing and fraud detection. Organizations adopting blockchain technology, however, may face ethical issues with data protection, consent, and transparency. The paradigm put forward in this debate provides an organized method for using blockchain technology while guaranteeing legal compliance, protecting user data, and upholding moral standards. The use of blockchain in financial reporting has a bright future. There will soon be a rise in adoption, asset tokenization, and blockchain network interoperability. Blockchain-driven ecosystems will be heavily dependent on auditors and will be shaped by technological breakthroughs and clear regulations. Corporations must handle these complexities sensibly and morally as they move forward. By doing this, they will be able to fully utilize blockchain technology's potential to transform financial reporting and bring in a new era of financial data management that is more accurate, efficient, and secure.

5.3 Limitations of the Study

Not being a comprehensive study is a must limitation, especially when the research topic is technology-related, country context-based (i.e., influence of a country's political, geostrategic situation, economic, etc.), and human resources specific.

5.3.1 Technology-related

This study did not address the current 'reservoir of knowledge' related to blockchain advances in the financial sector in the context of characterizing the most recent hands-on applications implemented to deal with blockchain interoperability challenges.

5.3.2 Country Context

This theoretical review did not cover the current adoption and applications of blockchain technology practices in the local financial sector, i.e., Lebanon and the Middle East.

5.3.3 Human Resources

Human resources are fundamental in the successful implementation of new technologies (Rkein, Issa, Awada, et al., 2020). In some parts of this work, some examples were used to mention the importance of preparing the personnel necessary to deal with blockchain, in financial reporting and auditors' practices, however, the study did not address fully the urge to upgrade specific competencies needed to adapt to the continuous changes due to technology. In addition, not covering the full range of impact on training practices necessary to prepare the proper end users' mindset and skills.

5.3.4 Practical Implementation Challenges

This study does not explore the real-world challenges that organizations face when implementing blockchain in their financial reporting systems. These challenges may include technical integration difficulties with existing IT infrastructure, resistance to change within the organization, and the cost implications of adopting new technologies.

5.3.5 Legal and Compliance Uncertainties

Given the nascent stage of blockchain regulation, this study does not address the full spectrum of legal and compliance uncertainties that may arise as blockchain technology becomes more prevalent. The potential for regulatory changes and the need for legal frameworks to evolve alongside technology remain areas ripe for exploration.

5.3.6 Data Security and Cybersecurity Risks

While blockchain is renowned for its security features, this study does not investigate the specific cybersecurity risks associated with blockchain technology in financial reporting, including potential vulnerabilities to hacking, data breaches, and other security threats.

5.3.7 Industry-Specific Applications

The research primarily takes a broad view and does not delve into the impacts and implications of blockchain technology within specific industries. The unique needs and challenges of industries such as manufacturing, retail, or services in adopting blockchain for financial reporting are not addressed in depth.

5.3.8 Technological Dependency and Disruption

Our study does not fully explore the dependency that blockchain technology creates and the disruption to traditional roles within finance and audit departments. The potential for job displacement and the need for new roles and skills could significantly impact organizational structures and employment patterns.

5.3.9 User Acceptance and Behavioral Aspects

The behavioral aspects of user acceptance of blockchain technology are not extensively covered. Resistance to adopting blockchain due to a lack of understanding or trust among stakeholders could be a significant barrier that deserves more attention.

5.3.10 Blockchain's Environmental Impact

This study does not cover the environmental impact of blockchain technology, including the energy consumption associated with blockchain mining and transaction validation processes, which may raise sustainability concerns.

Therefore, the abovementioned areas are recommended subjects for future work, theoretically and practically. Even though some recent papers (Bahalul Haque and Bhushan, 2023; Sharma, 2023) are addressing new

blockchain technology applications, the above areas were not fully addressed.

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