

Blockchain Technology Application and Financial Reporting Quality: A Field Study on the Mediating Role of Technical, Intra-Organizational, and External Barriers

Dr. Nayera Abdeldayem Eltamboly

Department of Accounting Faculty of Commerce, Tanta University Nayra_dayem@commerce.tanta.edu.eg

Abstract

This research examines the impact of blockchain technology applications on financial reporting quality. Accordingly, this research adopted a Partial Least Square Structural Equation Modeling (PLS–SEM) analysis to test the influence of the application of blockchain technology on financial reporting quality. In addition, this research investigates the mediating effect of technical, intraorganizational, and external barriers on the association between blockchain technology and financial reporting quality. The main results of this research suggest that blockchain technology can reshape the nature of accounting by automating the accounting process and enhancing the quality of financial reporting practices. Moreover, the technical and intra-organizational barriers significantly reduce the positive effect of the implementation of blockchain technology on financial reporting quality. Nevertheless, external barriers do not significantly impact the relationship between the implementation of blockchain technology and financial reporting quality.

KeyWords:Blockchain technology; Financial reporting; Technical barriers; Intra-organizational barriers; External barriers.

Received on 12/2/2025, accepted on 16/3/2025.

تطبيق تكنولوجيا سلاسل الكتل وجودة التقارير المالية: دراسة ميدانية حول الدور الوسيط للمعوقات التقنية والتنظيمية والعوامل الخارجية

ملخص البحث

تتناول هذه الدراسة تأثير تطبيقات تكنولوجيا سلاسل الكتل علي جودة التقارير المالية. لتحقيق هذا الغرض أعتمد البحث علي نموذج المعادلات الهيكلية للمربعات الصغرى الجزئية لتحليل أثر استخدام تقنية سلاسل الكتل علي جودة التقارير المالية. كما قام هذا البحث أيضا بدراسة الدور الوسيط للمعوقات التقنية والتنظيمية والعوامل الخارجية علي العلاقة بين تقنية سلاسل الكتل وجودة التقارير المالية. تشير النتائج الرئيسية لهذا البحث إلي أن تطبيقات تقنية سلاسل الكتل تعزز بشكل كبير جودة التقارير المالية، حيث يمكن لهذه التقنية إعادة تشكيل طبيعة المحاسبة من خلال أتمتة العمليات المحاسبية وتحسين ممارسات إعداد التقارير المالية. ومع ذلك، فإن العوائق التقنية والتنظيمية تقلل بشكل ملحوظ من التأثير الإيجابي لتطبيق تقنية سلاسل الكتل علي جودة التقارير المالية. بينما، لا تؤثر العوامل الخارجية بشكل كبير علي شكل هذه العرابي الخارجية بي جودة التقارير المالية. يتنا تقنية والتنظيمية تقلل بشكل ملحوظ من التأثير

الكلمات المفتاحية: تكنولوجيا سلاسل الكتل، التقارير المالية، المعوقات التقنية، المعوقات التنظيمية، المعوقات الخارجية.

1-Introduction

Nowadays, many businesses worldwide are adopting new technologies to enhance how they carry out their operations. Moreover, the rapid development of digital technologies and their successful applications in various fields have made blockchain one of the most significant innovations.

Blockchain is a distributed ledger that is adapted to record and share information within a peer-to-peer network, which enables the exchange of value through registering and transmitting it in a tamper-proof manner (Centobelli et al., 2022). Blockchain is a database preserved and validated by only network members, with accepted transactions inserted into blocks using cryptographic signatures. Each new block is marked in chronological order through a temporary coding process and this new block includes information about the previous block. This ensures that any attempt to change the blockchain would require changing each of the previous blocks (Bonsón & Bednárová, 2019). This ensures transparency and assurance of information without needing a trusted third party (Centobelli et al., 2022).

The evolution of blockchains has been divided into four tiers. Initially, blockchain proved its successful implementation in creating cryptocurrencies (Danach et al., 2024), which is called Blockchain1.0. The second tier, which is Blockchain 2.0 focuses on the operation of contracts in the economy and marketplace. Blockchain 3.0 expanded its focus to different areas such as education, government, and culture (Tandon et al., 2021). Finally, Blockchain 4.0 enabled the joint use of blockchain and artificial intelligence (Han et al., 2023). Nowa-days, there are also successful implementations of blockchain in supply chains and banking (Khan et al., 2023; Casella et al., 2022; Guo & Liang, 2016)

These features, coupled with successful adaptations, enhance the implication of this technology in the area of accounting especially in the recognition, measurement, presentation, and disclosure of financial accounting information (Han et al., 2023; Demirkan et al., 2020; Bonsón & Bednárová, 2019; Yu et al., 2018).

2. Research Problem

Recently, there has been an increasing demand for the adoption of technology in various fields. Unsurprisingly, accounting is considered one of these fields that is expected to benefit from such technology (Centobelli et al., 2022). Accounting also faces various challenges related to inadequate analysis and misrepresentation of accounting information among different users (Borhani et al., 2021). In addition, accounting has been criticized for being labor-intensive and far from automation, as the accounting data is entered manually through spreadsheets or accounting software (Han et al., 2023).

In this regard, the benefits of blockchain implementation have attracted the attention of many researchers and practitioners to explore the applicability of this technology to overcome the various challenges that face accounting practices. The study of Bonsón & Bednárová (2019) confirmed that blockchain offers a decentralized feature since all records are stored at various nodes instead of one location which enables them to be accessible to only authorized participants and they are immutable, this results in a highly secured, efficient, and transparent method of performing transactions without any modifications. Also, Hughes et al. (2019) acknowledged that blockchain is characterized by a peer-to-peer system that does not require an intermediary, transactions can occur smartly between sole parties, blockchain avoids double spending, and guarantees that transactions are debited to one account and credited to different accounts. These features reduce the concern about trust placed on financial institutions as well as a significant reduction in transaction time and cost.

In addition, Han et al. (2023) and Du et al., (2019) explained smart contracts as an important pillar that defines the terms of a contract between parties through technical codes. Additionally, these digital smart contracts automatically verify and self-enforce the terms of the agreement. Finally, Al-Okaily et al. 2023 & Carlin (2019) confirmed that cryptographic techniques, consensus mechanisms, and secure methods of authentication components enhance the ability of blockchain to provide users with a secure system which makes this technology preferable among various industries. However, the benefits of implementing blockchain are vastly addressed. The continuous development of blockchain technology adds more difficulty to gaining information, and many businesses in the Middle East, do not apply and are not familiar with this technology (Danach et al., 2024 & Anis, 2023). Similarly, the study of Al-Okaily et al. (2023) addressed that accountants in developing countries are worried about the easiness of use rather than the usefulness of this technology, due to the limited technological advancement and implementation in developing countries Furthermore, accounting is conventional and lags beyond in terms of blockchain investigations (Centobelli et al., 2022). Also, Ivanchenkova et al. (2023) addressed that the application of blockchain in the area of accounting is still in its infancy stage. This, in turn, calls for more papers to investigate these challenges (Danach et al., 2024; Ivanchenkova et al., 2023; Bellucci et al., 2022; Centobelli et al., 2022).

Therefore, the current research takes a step forward and proposes the research questions as follows:

- How does the application of blockchain technology impact financial reporting quality?
- How do technical barriers mediate the association between blockchain technology and financial reporting quality?
- How do intra-organizational barriers mediate the association between blockchain technology and financial reporting quality?
- How do external barriers mediate the association between blockchain technology and financial reporting quality?

3. Research Objective

The main objective of this research is to examine the impact of the application of blockchain technology on financial reporting quality in the Egyptian context, with a specific focus on exploring the mediating effect of technical, intra-organizational, and external barriers on this relationship. Through investigating these dimensions, firms can identify the different challenges that face the implementation of blockchain technology on financial reporting quality.

Hence, this research uses Partial Least Squares Structural Equation Modeling PLS-SEM as the appropriate research method to test the proposed hypotheses and analyze the relationships between the latent variables in the model. PLS-SEM is particularly suitable for this study due to its ability to handle complex models with multiple constructs, even when the data may not meet the strict assumptions required by the covariance-based SEM technique.

4. Research Structure

The rest of this research is organized as follows, the following pattern:

- Section 5 outlines the theoretical framework and hypotheses development.
- Section 6 explains the research method and the model specification.
- Section 7 addresses the various data sources and research samples.
- Section 8 shows the main empirical results and implications drawn from the statistical analysis.
- Section 9 presents the conclusion, and highlights practical implications, research limitations, and recommendations for future research.

5. The Theoretical Framework and Hypothesis Development

This section will address the evolving blockchain technology along with the benefits and challenges associated with its application.

5.1 Blockchain and Financial Reporting Quality

The digital transformation coupled with the various criticisms directed toward the current accounting practices, have driven the proliferation of blockchain technology to boost trust, efficiency, and transparency in accounting practices. So, many researchers and practitioners have initiated conversations discussing the advent of blockchain technology which provides novel insights into accounting, especially in the areas of measurement and disclosure in financial statements. The study by Danach et al. (2024) addressed the characteristics of blockchain presented in immutability, transparency, cryptography, and decentralization enhance both confidence and data integrity in financial reporting. Moreover, Borhani et al. (2021) investigated the impact of blockchain on accounting and financial reporting and confirmed that blockchain technology has a favorable impact on the qualitative characteristics of accounting information presented as timeliness, relevance, verifiability, completeness, comparability, and faithful representation.

In addition, Yu et al. (2018) investigated the application of blockchain in financial accounting and confirmed that blockchain can reduce errors in disclosure, enhance the quality of accounting information, and reduce information asymmetry. In a similar vein, it was concluded that blockchain immutability is preferred by accountants, as it contributes to preventing earning manipulation and boosts assurance of data and information (Bellucci et al., 2022). Furthermore, the study by Carlin (2019) investigated the implementation of blockchain in record-keeping and transaction processing and acknowledged that it could advance transparency, accuracy, and significant cost savings.

Therefore, the first research hypothesis is proposed as follows:

H₁: The application of blockchain technology has a significant positive impact on financial reporting quality.

However, various challenges that face this technology may significantly impact financial reporting as one of the accounting practices. Therefore, this section addresses the various challenges presented by technical, intra-organizational, and external barriers as follows:

5.2 The Barriers Proliferated With Blockchain Applications

Various studies in literature address the numerous barriers that proliferate with the application of blockchain technology. Moreover, Pizzi et al. (2022) confirmed that the implementation processes of blockchain technology are highly complicated for organizations that prefer to integrate this technology into their businesses. **H**₂: The application of blockchain technology has a significant impact on many barriers within firms.

These barriers are divided into three cornerstones: technical, intraorganizational, and external barriers. The following paragraphs will explain each of these barriers and their contribution to the main hypothesis, gaining a deeper understanding and validation of the main hypotheses.

5.2.1 Technical Barriers

Privacy, security, energy, storage, and scalability are examples of technical challenges associated with the implementation of blockchain technology in businesses. Blockchain enhances transparency to all nodes that participate in the network, although transactions are encrypted. Hence, transactional privacy is difficult to attain, as each transaction is exposed to each node in this network (Politou et al., 2021 & Zheng et al., 2018). In addition, Akter et al., (2024) and Danach et al. (2024) explained that blockchain is immune to cybersecurity attacks and resistant to manipulation. However, there are various threats posed by the theft of digital wallets by numerous hackers, which make blockchains less safe.

In addition, blockchain requires a huge amount of computing power to verify transactions and a significant amount of memory to store the history of transactions (Ivanchenkova et al., 2023). Moreover, with the increasing number of transactions every day, all these transactions need to be stored to be considered validated (Zheng et al., 2018). Hence, scalability problems may occur because blockchain has to handle numerous transactions (Danach et al., 2024 & Zheng et al., 2018).

Finally, the study by Han et al. (2023) confirmed that blockchain technology is not a one-size-fits-all solution to all the problems businesses face. However, the use of this technology needs to be aligned with organizational purposes, which means that not all data should exist in the blockchain. (Akter et al., 2024). Therefore, the first sub-hypothesis is proposed as follows:

H_{2a}: The application of blockchain technology significantly increases technical barriers within firms.

5.2.2 Intra-Organizational Barriers

The lack of sufficient skills and knowledge of accountants in working with blockchain represents another significant challenge facing the adoption of this technology. The study by Al-Okaily et al. (2023) noted that the knowledge gap between accountants and blockchain developers is one of the main reasons for the deficiency of blockchain development in the area of accounting. The study by Akter et al. (2024) addressed that this is because of the insufficient knowledge of organizations about the problems that can be solved by the blockchain and the value this technology contributes to the accounting domain.

In a similar vein, the studies conducted by Akter et al., (2024) and Ivanchenkova et al. (2023), raised concerns about the differences and unique aspects the blockchain brought in comparison to traditional accounting systems. They also highlight the severe need for accountants to get sufficient education and training about the way they record transactions in the blockchain, who will be responsible and accountable for the data source, and the mechanism that ensures that the accounting data is secure during audits.

Therefore, the second sub-hypothesis is proposed as follows:

H_{2b}: The application of blockchain technology significantly increases intraorganizational barriers within firms

5.2.3 External Barriers

The lack of a legal framework and cultural barriers represent two of the most crucial external barriers that face blockchain technology. Pizzi et al. (2022) explained that businesses need to follow the laws and regulations, despite this issue, which may limit the adoption of new technologies. Also, blockchain is a novel technology, and the lack of legal supervision results in legal difficulties that businesses may face (J et al., 2023). Since the process of recording transactions in the

blockchain does not imply that this transaction happened in the real world, which urge the need for a legal framework to apply this technology (Akter et al., 2024).

In addition, cultural barriers can be represented by management's willingness or lack of interest in digitizing their operations without any regulatory pressures (Centobelli et al., 2022 & Pizzi et al., 2022). The study by Clohessy & Acton (2019) concluded that IT providers should formulate strategies to publicize information about blockchain technologies, also equipping management with the necessary knowledge and skills that are important for adopting this technological innovation.

Therefore, the third sub-hypothesis is proposed as follows:

H_{2c}: The application of blockchain technology significantly increases external barriers within firms.

5.3 The Impact of the Various Barriers on Financial Reporting Quality

There are various studies available in the literature that address the various challenges that impact financial reporting quality. The study of Hamawandy et al. (2021) address the challenges associated with the implementation of International Financial Reporting Standards in developing countries that will ensure accountability and boost transparency in financial reporting, the challenges were addressed as the political, legal, and economic factors along with the resistance to change. In addition, Mesioye & Bakare (2024) shed light on the different internal and external barriers that hinder firms from maintaining high-quality financial reports. The internal barriers are presented in financial misstatements and managerial discretion, also, external barriers are regulatory complexities. Moreover, Doyle et al., (2007) acknowledged that the weakness in internal control represents a major barrier to financial reporting. Furthermore, Biehl et al. (2024) confirmed that poorly prepared financial reports are misleading and lead firms to make inefficient decisions.

H_{3a}: The technical barriers significantly impact financial reporting quality.

- $\mathbf{H_{3b}}$: The intra-organizational barriers significantly impact financial reporting quality.
- **H**_{3c}: The external barriers significantly impact financial reporting quality.

5.4 Blockchain Technology and Financial Reporting: The Mediating Effect of the Various Barriers

According to the previously discussed literature, various studies address the impact of the application of blockchain technology on the quality of financial reports. In addition, various studies emphasized the barriers facing the implementation of blockchain in business. In a similar vein, the studies of (Danach et al., 2024; Zheng et al., 2018) highlighted that scalability challenges may arise because blockchain handles many transactions, which results in financial reporting procedures being delayed and ineffective. In addition, the lack of sufficient skills and knowledge of accountants in working with blockchain is considered one of the most significant barriers impacting the quality of financial reports (Ivanchenkova et al., 2023; Lombardi et al., 2022). Therefore, the final research hypothesis is that the application of blockchain technology has a significant impact on financial reporting quality and this impact is mediated by the technical, intraorganizational, and technical barriers. Therefore, the fifth and final research hypothesis is proposed as follows.

H₄: The application of blockchain technology has a significant impact on financial reporting quality and this impact is mediated by technical, intraorganizational, and external barriers.

6. Methodology

6.1 Research Design

To achieve the main objective of this research, this research focuses on a quantitative research model that uses PLS-SEM to examine the impact of the application of blockchain technology on financial reporting, with this impact being mediated by technical, intra-organizational, and external barriers. PLS-SEM was chosen due to its ability to handle complex research models involving

multiple constructs (variables and indicators) and interactive effects. It is suitable for situations where the data may not meet the stringent assumptions required by covariance-based SEM, such as large sample sizes or normal distribution (Hair et al., 2019). PLS-SEM is particularly useful for predictive research and theory development, as it focuses on maximizing the explained variance of the dependent variables, making it an ideal method for exploring the relationships between latent constructs in this study. Moreover, PLS-SEM's ability to work effectively with smaller samples while still providing reliable estimates ensures the robustness of the model in capturing the underlying structural relationships (Sarstedt, Ringle, & Hair, 2017). The approach also supports the reflective and formative measurement models used in the study, allowing for a comprehensive assessment of the constructs' validity and reliability (Henseler, Ringle, & Sarstedt, 2015).

6.2 Research Sample and Data Collection

This research relies on a survey collecting data from experts on blockchain and users of financial reports regarding different technical, legal, and cultural issues related to the application of blockchain technology in financial reporting, including challenges related to privacy, security, energy consumption, storage, scalability, as well as legal and cultural aspects.

The research sample consists of accountants, auditors, and IT experts, who are working in Egyptian companies that have considered or have already adopted blockchain technology for financial reporting. A purposive sampling method was used to identify participants with experience or knowledge of blockchain technology. Table (1) provides details about the background of the respondents in the current research.

Demographic characters		Sample Size	Frequency	%
Gender		487		100%
1	Female	211	211	43.3%
1	Male	276	276	56.7%
	Years of Experience	487		100%
	Less than 10 Years	384	384	78.8%
2	From 10 to 20	64	64	13.2%
	More than 20	39	39	8%
	Field	487		100%
	Accountants	196	196	40.3%
3	Auditors	167	167	34.2%
	IT Experts	124	124	25.5%
	Total	487		100%

Table 1: Background of Respondents

* Note: Since the researcher depends on a questionnaire as the data collection tool, the period = 1, which means that the sample size for each category is equal to the frequency (Frequency column).

6.3 Research Model

This research aims to test the impact of the barriers presented in technical, extra-organizational, and external batteries associated with the adoption of blockchain technology and their effect on the overall financial reporting quality. This impact is mediated by various technical, extra-organizational, and external barriers. Figure (1) presents the main constructs of the PLS–SEM model for these variables:



Figure 1: The Proposed Construction Model

Figure 1 explains the direct and indirect effects of blockchain technology on financial reporting, while this relationship is affected by various challenges. The model suggests blockchain as the exogenous variable and financial reporting as the endogenous variable. Also, there are three variables presented in technical challenges, internal company concerns, and external obstacles, which could either lessen or increase the influence of blockchain on financial reporting practices. The direct path between blockchain and financial reporting quality shows how blockchain directly affects financial reporting quality (H1). At the same time, the model considers the effects of three different paths presented in H2a, H2b, and H2c as the various challenges associated with implementing blockchain technology. In addition, the model presents H3a, H3b, and H3c to reflect the impact of these barriers on financial reporting quality. Finally, hypothesis H4 reflects the mediation effect of the barriers on the relationship between blockchain technology implementation and financial reporting quality. This multi-path approach enables a detailed examination of how different technical, organizational,

and external obstacles arising from blockchain use may influence financial reporting.

Table (2) shows the measures of each variable. Blockchain adoption in financial reporting processes can be measured using the extent of blockchain implementation within the firm, the complexity of blockchain solutions employed, the level of blockchain data storage, the transparency of digital financial records, the level of top management support for blockchain initiatives, the presence of blockchain expertise within the firm, and the availability of necessary technological infrastructure.

To assess the financial reporting practices, the author uses timeliness, accuracy, transparency, compliance, stakeholder satisfaction, and automation levels in preparing financial reports. The three barriers resulting from blockchain applications focus on technical barriers measured by the degree of privacy, security, energy, storage, and scalability. Additionally, intra-organizational barriers are measured using adequate skills and knowledge, knowledge gaps, education and training, defining responsibilities, and the need for robust mechanisms. Finally, external barriers are measured based on the legal framework, cultural barriers, lack of regulatory pressure, and effective firm strategies.

Dimensions	Sub-Dimensions/Indicators	References
1) Blockchain Technology	 Degree of implementation (X1). Complexity of blockchain solutions employed (X2). Level of blockchain data storage (X3). Transparency of Financial Records (X4) Level of top management support for blockchain initiatives (X5) Presence of blockchain expertise within the organization (X6) Availability of necessary technological infrastructure (X7) 	Casella et al., (2022) Pizzi et al. (2022) Bonsón & Bednárová (2019) Centobelli et al. (2022) Akter et al. (2024) Clohessy & Acton (2019) Al-Okaily et al. (2023)

 Table 2: Variables Measurement Dimensions

Dimensions	Sub-Dimensions/Indicators	References
		Borhani et al.
		(2021)
	- Timeliness (Y1)	Bellucci et al.,
a) E' ' I	– Accuracy (Y2)	(2022)
2) Financial Reporting	- Transparency (Y3)	Yu et al. (2018)
Reporting	- Compliance (Y4)	Mesioye &
	- Automation Level (Y5)	Bakare (2024)
		Han et al.
		(2023)
		Danach et al.
		(2024)
	- Technical barriers (M1) (e.g., privacy, security, energy, storage	Politou et al.
3) The tech-	and scalability)	(2021)
nical, intra-	- Intra-Organizational barriers (M2) (e.g., adequate skills and	Zheng et al.
organiza-	knowledge, knowledge gap, education, and training, defining r	(2018)
external	esponsibilities, needs robust mechanisms)	Ivanchenkova
barriers	- External barriers (M3) (e.g., clear legal framework, cultural	et al. (2023)
	barriers, Lack of regulatory pressure, effective strategies)	Clohessy &
		Acton (2019)
		J et al., (2023)

7. Results and Discussion

7.1 Reliability and Construct Validity

Table (3) shows the minimum, maximum, mean, and standard deviations for the five variables which are BCT, FRQ, TB, IB, and EB, according to a sample of 487 respondents. EB is the highest with a value of 3.7862, whereas BCT shows the lowest mean of 3.71. While the mean value of FRQ is 3.7621, IB has a mean of 3.7534 and TB is 3.7242. The standard deviation for the variables is between 0.69597 and 0.71241 indicating consistency and low variability in responses.

Variables	Ν	Minimum	Maximum	Mean	Std. Deviation
BCT	487	1.00	5.00	3.7115	0.69597
FRQ	487	1.00	5.00	3.7621	0.70501
TB	487	1.00	5.00	3.7242	0.70265
IB	487	1.00	5.00	3.7534	0.71241
EB	487	1.00	5.00	3.7862	0.70535
Valid N (listwise)	487				

Table 3: Descriptive Statistics

To assess the reliability and validity of the measurement model, factor loading is adopted to test the reliability of each item. Hence, Table 4 shows the PLS loadings for the measurable variables. An item's result is reliable and acceptable if the PLS loading is greater than 0.7 (Hair et al., 2014). The results of factor loadings for all tested items exceed 0.7, indicating the reliability and validity of all items employed in this research.

	Measurable Item	N	PLS Loadings
BCT_1	Your firm has integrated blockchain technology into the financial reporting process	487	0.798
BCT_2	The solutions offered by blockchain are complex and require specialized knowledge	487	0.781
BCT_3	The data storage capacity of blockchain solutions meets the firm's needs	487	0.809
BCT_4	The use of blockchain in financial reporting has made financial records more accessible and verifiable	487	0.783
BCT_5	Blockchain initiatives receive adequate support, resources and attention from top management	487	0.775
BCT_6	Firms have sufficient blockchain expertise to manage and optimize blockchain solutions.	487	0.788
BCT_7	The current technological infrastructure in your firm is well-suited for blockchain integration	487	0.780
BCT_8	Blockchain technology enhanced the transparency of financial records	487	0.778
FRQ_1	The use of the blockchain has improved the timeliness of financial reporting.	487	0.848
FRQ_2	Blockchain technology has enhanced the accuracy, speed, and transparency of financial reports	487	0.834
FRQ_3	Stakeholders have better visibility into financial data through blockchain technology	487	0.816

Table 4: Pls Loadings for Measurable Items

FRQ_4	Blockchain technology helps ensure that financial reports meet all regulatory requirements	487	0.823
FRQ_5	Achieving privacy in blockchain technology is challenging as all transactions are exposed to every node in the network	487	0.799
FRQ_6	Errors in financial reporting decrease with the implementation of blockchain technology.	487	0.839
FRQ_7	Blockchain has increased the level of automation in the financial reporting process.	487	0.814
TB_1	Blockchain technology requires an enormous amount of computing power to verify transactions, which poses a significant challenge	487	0.853
TB_2	The storage capacity needed to keep the history of blockchain transactions is a major technical challenge	487	0.828
TB_3	Blockchain technology is not a solution for all issues faced by busi- nesses and should be used in line with organizational goals	487	0.827
TB_4	Not all data needs to be on the blockchain to keep data secure.	487	0.837
TB_5	Lack of adequate skills and knowledge of accountants in dealing with blockchain is one of the most important barriers affecting the quality of financial reporting	487	0.791
TB_6	Although blockchain is immune to cyberattacks, theft of digital wallets remains a major threat to its security.	487	0.691
IB_1	Lack of adequate skills and knowledge of accountants in dealing with blockchain is one of the most important barriers affecting the quality of financial reporting	487	0.775
IB_2	The main concern of accountants in developing countries about blockchain has more to do with ease of use than the usefulness of the technology itself	487	0.805
IB_3	The knowledge gap between accountants and blockchain develop- ers is one of the main reasons for the underdevelopment of the technology in accounting	487	0.848
IB_4	Insufficient organizational knowledge of the issues that blockchain can solve negatively affects its adoption in accounting	487	0.833
IB_5	The use of blockchain causes differences and uniqueness compared to the traditional accounting system, which raises concern among accountants	487	0.843
IB_6	There is an urgent need for accountants to receive adequate educa- tion and training on how to record transactions in blockchain to ensure accurate financial reporting	487	0.796
IB_7	There are clear challenges in defining responsibilities in blockchain accounting, including who will be responsible for the source of the data	487	0.810
IB_8	Blockchain accounting data needs robust mechanisms to ensure its security and audit effectiveness	487	0.856
IB_9	Blockchain accounting data requires robust system to ensure audit effectiveness	487	0.822
EB_1	The lack of a clear legal framework has been one of the main barri- ers to the adoption of blockchain technology in financial reporting	487	0.845
EB_2	Lack of legal oversight of blockchain may lead to legal difficulties for companies	487	0.823

EB_3	A legal framework supporting blockchain implementation is urgent- ly needed to ensure the validity and legitimacy of recorded transac- tions	487	0.806
EB_4	Cultural barriers, such as management's lack of interest in digitizing their processes, are a barrier to blockchain adoption	487	0.806
EB_5	The need to comply with existing laws and regulations may limit the ability of organizations to adopt new technologies such as blockchain	487	0.843
EB_6	IT providers must develop effective strategies to spread awareness about blockchain technologies among businesses	487	0.815
EB_7	Providing management with the necessary knowledge and skills is essential for the adoption of blockchain technology in organizations	487	0.854

Table 5 shows the Cronbach's alpha (CA), composite reliability (CR), and average variance extracted (AVE). The value of CA and CR for all components must be higher than 0.7, and AVE has to be higher than 0.5 (Lamey et al., 2024). The results indicate that the values of CA and CR for all tested constructs exceed 0.7, also the AVE values are higher than 0.5. Thus, the reliability and validity of the model fulfill the internal consistency of the constructs. Table 5 also shows the correlation matrix of the five constructs. All the correlation values among the constructs of the model are statistically significant (p-value < .01).

Construct	Cronbach Alpha (CA) Must be>0.7	Composite Reliability (CR) Must be> 0.7	Average Variance Extracted (AVE) Must be> 0.5	вст	FRQ	ТВ	IB	EB
BCT	0.912	0.928	0.619	1				
FRQ	0.922	0.937	0.680	0.866**	1			
TB	0.892	0.917	0.650	0.789**	0.819**	1		
IB	0.940	0.949	0.675	0.818**	0.868**	0.833**	1	
EB	0.922	0.938	0.683	0.827**	0.837**	0.825**	0.908**	1

Table 5: Reliability, Construct Validity, and Correlation Matrix

6.2 Results of PLS-SEM Analysis

Figure 1 shows the results of the PLS-SEM analysis. The minimum R-squared value in the model is 0.574; therefore, the model can be described as substantial (Hair et al., 2019).



Figure 2: Results of PLS-SEM analysis

The results of Tables (6) and (7) imply that blockchain applications have a significantly positive impact on the quality of financial reporting with a coefficient of 0.869 and 0.453, t-value of 36.914 and 7.211, and a p-value of less than 1%. This result is in line with prior literature that measures the impact of block-chain applications on financial reporting (Danach et al., 202; Borhani et al., 2021; Yu et al., 2018).

In addition, blockchain technology applications have significantly created technical barriers with a coefficient of 0.792, a t-value of 21.375, and a p-value of less than 1%. Furthermore, blockchain technology applications have created Intra-organizational barriers with a coefficient of 0.821, a t-value of 24.472, and

a p-value of less than 1%. Also, their application creates external barriers with a coefficient of 0.829, a t-value of 30.145, and a p-value of less than 1%.

Moreover, the results imply that technical barriers have a significant negative impact on the quality of financial reporting, with a coefficient of -0.173, a t-value 2.188 and a p-value less than 5%. Furthermore, the results show that intra-organizational barriers associated with blockchain implementation have a significant negative impact on the quality of financial reporting, with a coefficient of 0.375, a t-value of 4.408, and a p-value of less than 1%. However, the results do not indicate any observable impact of external barriers associated with blockchain applications on the quality of financial reporting with a coefficient of -0.010 and a t-value of 0.098.

Finally, regarding the mediating effect of technical barriers on the association between blockchain application and financial reporting quality, the results confirmed that technical barriers have significantly reduced the positive impact of blockchain application on financial reporting quality with a coefficient of 0.137, a t-value of 2.164 and a p-value of less than 5%. This result aligns with previous studies that investigate the impact of technical barriers to blockchain adoption on financial reporting (Danach et al., 2024; Zheng et al., 2018).

In a similar vein, intra-organizational barriers have significantly decreased the favorable impact of blockchain applications on financial reporting quality with a coefficient of 0.308, a t-value of 4.318, and a p-value of less than 1%. This result is similar to the previous studies that investigated the impact of intra-organizational barriers on blockchain applications (Akter et al., 2024; Al-Okaily et al., 2023).

Nevertheless, external barriers do not have a significant impact on the relationship between blockchain application and financial reporting quality with a coefficient of 0.008, and a t-value of 0.097, in contrast to earlier studies that confirmed the external challenges associated with blockchain implementation (J et al., 2023; Pizzi et al., 2022).

Dependent Variable	EB	ТВ	IB	FRQ
R2	0.688	0.628	0.675	0.838
Independent Variable	Coefficient	Coefficient	Coefficient	Coefficient
BCT -> EB	0.829 (30.145)***			
		0.792		
		(21.735)***		
			0.821	
			(27.472)***	
				-0.173
IB — FKQ				(2.188)**
				-0.375
IB — FRQ				(4.408)***
				-0.010
LD - FKQ				(0.098)
				0.869
BCI - FRQ				(36.914)***

Table 6: Results of PLS-SEM Analysis (Total Effects)

Note. EB = Environmental barriers; IB = Intra-organizational barriers; TB = Technical barriers; FRQ = Financial reporting quality; BCA = Blockchain adoption. **p < .05.

Table 7: Results of PLS-SEM Analysis (Indirect Effects)

Variables	FRQ
R2	0.836
Mediating effect	Coefficient
BCT → FRQ	0.453 (7.211)***
$BCT \rightarrow TB \rightarrow FRQ$	-0.137 (2.164)**
$BCT \rightarrow IB \rightarrow FRQ$	-0.308 (4.318)***
$BCT \longrightarrow EB \longrightarrow FRQ$	-0.008 (0.097)

Note. EB = Environmental barriers; IB = Intra-organizational barriers; TB = Technical barriers; FRQ = Financial reporting quality; BCA = Blockchain adoption. **p < .05.

8. Conclusion

Blockchain technology can reshape the nature of accounting. It has the potential to automate the accounting process and improve the quality of financial reporting practices. However, the application of this technology faces several challenges posed by technical, intra-organizational, and external barriers. Hence, this research adopts PLS-SEM analysis to examine the impact of blockchain applications on financial reporting. Additionally, this research investigates the mediating effect of the various challenges associated with blockchain applications on financial reporting quality.

The main results of this research imply that the application of blockchain technology enhances the quality of financial reports. Nevertheless, the application of this technology creates various technical, intra-organizational, and external barriers. Concerning the mediating effect of these barriers, the results show that technical barriers significantly reduce the positive impact of blockchain applications on financial reporting. In addition, the intra-organizational barriers significantly decrease the positive impact of blockchain applications on financial reporting. On the other hand, external barriers do not have a significant effect on the relationship between blockchain technology applications and financial reporting quality.

Therefore, blockchain technology applications enhance the quality of financial reports. However, there are several points of caution and challenges firms need to overcome to leverage the application of blockchain technology and enhance its effectiveness in the area of accounting. Concerning technical barriers, firms should properly invest in their technical infrastructure including secure networks, scalable systems, and data security to prevent cybersecurity attacks and ensure the effective operation of blockchain systems effectively. Regarding intraorganizational barriers firms should foster blockchain technology adoption through effectively communicating the various benefits associated with blockchain technology adoption among their employees at all levels. In addition, firms must provide adequate technical training for their employees to equip them with the necessary skills and knowledge about blockchain applications. This research admits several limitations. First, this research focuses on the impact of blockchain technology applications on financial reporting quality. Future research can focus on the various opportunities and challenges associated with its application in the area of auditing. Second, the research focuses only on three kinds of challenges associated with blockchain technology implementation, thus future research can explore cybersecurity threats associated with the application of this advanced technology. Third and last, this research was conducted on a sample of experts and users of financial reports in the Egyptian context. Therefore, future research should consider the complex nature of blockchain through various cross-disciplinary case studies that include, for example, technology, accounting, and economics.

References

- Akter, M., Kummer, T. F., & Yigitbasioglu, O. (2024). Looking beyond the hype: The challenges of blockchain adoption in accounting. *International Journal of Accounting Information Systems*, 53(July 2022), 100681. https://doi.org/10.1016/j.accinf.2024.100681
- Al-Okaily, M., Al-Majali, D., Al-Okaily, A., & Majali, T. (2023). Blockchain technology and its applications in digital accounting systems: insights from Jordanian context. *Journal of Financial Reporting and Accounting*. https://doi.org/10.1108/JFRA-05-2023-0277
- Anis, A. (2023). Blockchain in accounting and auditing : unveiling challenges and unleashing opportunities for digital transformation in Egypt. *Journal of Humanities and Applied Social Sciences*, 5(4), 359–380. https://doi.org/ 10.1108/JHASS-06-2023-0072
- Bellucci, M., Cesa Bianchi, D., & Manetti, G. (2022). Blockchain in accounting practice and research: systematic literature review. *Meditari Accountancy Research*, *30*(7), 121–146. https://doi.org/10.1108/MEDAR-10-2021-1477
- Biehl, H., Bliebtrue, C., & Stefani, U. (2024). The real effects of financial reporting: Evidence and suggestions for future research. *Journal of International Accounting, Auditing and Taxation, 54*, 1–27.
- Bonsón, E., & Bednárová, M. (2019). Blockchain and its implications for accounting and auditing. *Meditari Accountancy Research*, *27*(5), 725–740. https://doi.org/10.1108/MEDAR-11-2018-0406
- Borhani, S. A., Babajani, J., Vanani, I. R., Anaqiz, S. S., & Jamaliyanpour, M. (2021). Adopting Blockchain Technology to Improve Financial Reporting by Using the Technology Acceptance Model (TAM). *International Journal* of Finance & Managerial Accounting, 6(22), 155–171. http://www.ijfma .ir/article_17481.html

- Carlin, T. (2019). Blockchain and the Journey Beyond Double Entry. *Australian Accounting Review*, *29*(2), 305–311. https://doi.org/10.1111/auar.12273
- Casella, G., Bigliardi, B., Filippelli, S., & Bottani, E. (2022). Cases of application of blockchain on the supply chain: a literature review. *Procedia Computer Science*, 217(2022), 1416–1426. https://doi.org/10.1016/j.procs.2022 .12.340
- Centobelli, P., Cerchione, R., Del Vecchio, P., Oropallo, E., & Secundo, G. (2022). Blockchain technology design in accounting: Game changer to tackle fraud or technological fairy tale? *Accounting, Auditing and Accountability Journal*, 35(7), 1566–1597. https://doi.org/10.1108/AAAJ-10–2020–4994
- Clohessy, T., & Acton, T. (2019). Investigating the influence of organizational factors on blockchain adoption: An innovation theory perspective. *Industrial Management and Data Systems*, *119*(7), 1457–1491. https://doi.org/10.1108/IMDS-08-2018-0365
- Danach, K., Hejase, H. J., Faroukh, A., Fayyad-Kazan, H., & Moukadem, I. (2024). Assessing the Impact of Blockchain Technology on Financial Reporting and Audit Practices. *Asian Business Research*, 9(1), 30. https://doi.org/10.20849/abr.v9i1.1427
- Demirkan, S., Demirkan, I., & McKee, A. (2020). Blockchain technology in the future of business cyber security and accounting. *Journal of Management Analytics*, 7(2), 189–208. https://doi.org/10.1080/23270012.2020.1731721
- Doyle, J. T., Ge, W., & Mcvay, S. (2007). Determinants of Weakness in Internal Control over Financial Reporting. *Journal of Accounting and Economics*, 44(1–2), 193–223. http://www.sciencedirect.com/ science/article/pii/ S0165410106000905

- Du, W. (Derek), Pan, S. L., Leidner, D. E., & Ying, W. (2019). Affordances, experimentation and actualization of FinTech: A blockchain implementation study. *Journal of Strategic Information Systems*, 28(1), 50– 65. https://doi.org/10.1016/j.jsis.2018.10.002
- Guo, Y., & Liang, C. (2016). Blockchain application and outlook in the banking industry. *Financial Innovation*, 2(1). https://doi.org/10.1186/s40854-016-0034-9
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128
- Hamawandy, N. M., Omer, A. J., Jamil, D. A., Badran, F., & Al-Kake, F. R.
 A. (2021). Adopting and Imlementation of International Finacial Reporting Standard In Iraq Atheoretical Perspective. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(2), 312–318. https://doi.org/10.17762/turcomat.v12i2.716
- Han, H., Shiwakoti, R. K., Jarvis, R., Mordi, C., & Botchie, D. (2023). Accounting and auditing with blockchain technology and artificial Intelligence: A literature review. *International Journal of Accounting Information Systems, 48*(November 2022), 100598. https://doi.org/10. 1016/j.accinf.2022.100598
- Hughes, A., Park, A., Kietzmann, J., & Archer-Brown, C. (2019). Beyond Bitcoin: What blockchain and distributed ledger technologies mean for firms. *Business Horizons*, 62(3), 273–281. https://doi.org/10.1016 /j.bushor.2019.01.002

- Ivanchenkova, L., Shevtsiv, L., Beisenova, L., Shakharova, A., & Berdiyorov, T. (2023). Analysis of the Risks of Using the Blockchain Technology in the Accounting and Audit of a Fuel and Energy Complex Enterprise. *International Journal of Energy Economics and Policy*, 13(2), 316–321. https://doi.org/10.32479/ijeep.14047
- J, A., Isravel, D. P., Sagayam, K. M., Bhushan, B., Sei, Y., & Eunice, J. (2023). Blockchain for healthcare systems: Architecture, security challenges, trends and future directions. *Journal of Network and Computer Applications*, 215(April), 103633. https://doi.org/10.1016/j.jnca.2023.103633
- Khan, M. Z., Kumar, A., & Sahu, A. K. (2023). Blockchain applications in supply chain management: a systematic review of reviews. *Global Knowledge, Memory and Communication*. https://doi.org/10.1108 /GKMC-12-2022-0296
- Lamey, Y. M., Tawfik, O. I., Durrah, O., & Elmaasrawy, H. E. (2024). Fintech Adoption and Banks' Non-Financial Performance: Do Circular Economy Practices Matter? *Journal of Risk and Financial Management*, 17(8). https://doi.org/10.3390/jrfm17080319
- Lombardi, R., de Villiers, C., Moscariello, N., & Pizzo, M. (2022). The disruption of blockchain in auditing – a systematic literature review and an agenda for future research. *Accounting, Auditing and Accountability Journal, 35*(7), 1534–1565. https://doi.org/10.1108/AAAJ-10-2020-4992
- Mesioye, O., & Bakare, I. (2024). Evaluating Financial Reporting Quality: Metrics, Challenges, and Impact on International Journal of Research Publication and Reviews Evaluating Financial Reporting Quality: Metrics Challenges, and Impact on Decision–Making. October. https://doi.org/ 10.55248/gengpi.5.1024.2735
- Pizzi, S., Caputo, A., Venturelli, A., & Caputo, F. (2022). Embedding and managing blockchain in sustainability reporting: a practical framework. *Sustainability Accounting, Management and Policy Journal*, 13(3), 545– 567. https://doi.org/10.1108/SAMPJ-07-2021-0288

- Politou, E., Casino, F., Alepis, E., & Patsakis, C. (2021). Blockchain Mutability: Challenges and Proposed Solutions. *IEEE Transactions on Emerging Topics in Computing*, 9(4), 1972–1986. https://doi.org/10.1109/ TETC. 2019.2949510
- Tandon, A., Kaur, P., Mäntymäki, M., & Dhir, A. (2021). Blockchain applications in management: A bibliometric analysis and literature review. *Technological Forecasting and Social Change*, 166(October 2020). https://doi.org/10.1016/j.techfore.2021.120649
- Yu, T., Lin, Z., & Tang, Q. (2018). Blockchain: The Introduction and Its Application in Financial Accounting. *Journal of Corporate Accounting* and Finance, 29(4), 37–47. https://doi.org/10.1002/jcaf.22365
- Zheng, Z., Xie, S., Dai, H. N., Chen, X., & Wang, H. (2018). Blockchain challenges and opportunities: a survey. *International Journal of Web and Grid Services*, 14(4), 352. https://doi.org/10.1504/ijwgs.2018.10016848