

BLOCKCHAIN-BASED ACCOUNTING SYSTEMS AND FINANCIAL TRANSPARENCY IN NIGERIAN HIGHER INSTITUTIONS: AN EMPIRICAL ANALYSIS

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Abstract

This study investigates the influence of blockchain-based accounting systems on financial transparency in Nigerian higher institutions. A quantitative survey design was adopted, with data collected from accounting and finance professionals and analyzed using multiple regression techniques. The findings reveal that blockchain-based accounting ($\beta = 0.412, p < 0.01$), data integrity ($\beta = 0.356, p < 0.05$), and audit efficiency ($\beta = 0.298, p < 0.05$) exert statistically significant positive effects on financial transparency. Among these, data integrity emerges as a critical determinant of transparency outcomes. The results suggest that the deployment of decentralized accounting technologies enhances the traceability, reliability, and credibility of financial information. However, given the reliance on perceptual measures, caution is required in generalizing the findings. The study contributes empirical evidence to the emerging discourse on digital financial governance in developing economies and recommends a phased adoption approach with capacity development.

Keywords: Blockchain; Financial Transparency; Data Integrity; Empirical Evidence; Accountability; Audit Efficiency; Nigeria

1. INTRODUCTION

Public financial management within Nigerian higher institutions has increasingly come under scrutiny due to persistent concerns relating to weak internal control systems, delayed financial reporting, opacity in fund utilization, and limited accountability mechanisms. These challenges have contributed to inefficiencies in resource allocation and erosion of stakeholder confidence, particularly among government agencies, donors, and the general public (Olaoye & Adebayo, 2021; World Bank, 2022). Despite ongoing reforms aimed at strengthening governance structures, many institutions continue to struggle with ensuring transparency, largely due to structural and technological limitations embedded in traditional accounting systems.

In recent years, the global shift toward digital financial architecture has introduced emerging technologies capable of transforming accounting and auditing practices. Among these, blockchain technology has gained considerable attention as a decentralized, immutable, and cryptographically secured ledger system that enables real-time recording and verification of transactions. Unlike conventional accounting systems that rely on centralized databases prone to manipulation and unauthorized alterations, blockchain operates on distributed consensus mechanisms, thereby enhancing data reliability, traceability, and auditability (OECD, 2021; Dai & Vasarhelyi, 2017).

The relevance of blockchain technology to public sector accounting lies in its potential to address long-standing issues of information asymmetry, data manipulation, and audit inefficiencies. By providing a

transparent and tamper-resistant record of financial transactions, blockchain-based accounting systems can significantly improve the credibility of financial reports and strengthen institutional accountability. Furthermore, the integration of smart contracts into blockchain frameworks offers opportunities for automating compliance and control processes, thereby reducing human intervention and associated risks.

However, despite these potential benefits, the adoption of blockchain technology within Nigerian higher institutions remains at a nascent stage. Factors such as inadequate technological infrastructure, limited technical expertise, regulatory uncertainties, and resistance to change continue to hinder widespread implementation (IMF, 2023). Additionally, empirical evidence examining the practical impact of blockchain-based accounting systems within developing economy contexts, particularly in the education sector, is still limited.

Against this backdrop, this study investigates the effect of blockchain-based accounting systems on financial transparency in Nigerian higher institutions, with specific emphasis on the roles of data integrity and audit efficiency. By empirically examining these relationships, the study seeks to provide context-specific insights that contribute to the growing body of knowledge on digital financial governance and inform policy decisions regarding technological adoption in public sector institutions.

Research Questions

1. Does blockchain-based accounting improve financial transparency?
2. What role does data integrity play in transparency outcomes?
3. How does audit efficiency influence financial transparency?

Hypotheses

- H1: Blockchain-based accounting significantly improves financial transparency
- H2: Data integrity has a significant positive effect on financial transparency
- H3: Audit efficiency significantly influences financial transparency

This study provides empirical evidence linking blockchain accounting systems to transparency outcomes in Nigerian higher institutions thus addressing a gap in developing economy research.

2. LITERATURE REVIEW

2.1 Conceptual Review of Blockchain-Based Accounting

Blockchain-enabled accounting introduces a verifiable record-keeping structure in which transactions are cryptographically validated and shared across a distributed network, thereby strengthening the credibility of financial records (Dai & Vasarhelyi, 2017). This approach enhances the reliability of financial records by ensuring that transactions are independently verifiable. This structure ensures that financial records are not only transparent but also resistant to tampering, thereby enhancing trust among stakeholders.

The core attributes of blockchain, decentralization, immutability, transparency, and security, make it particularly relevant for financial reporting environments characterized by weak governance structures. By eliminating reliance on a central authority, blockchain reduces opportunities for data manipulation while enabling real-time verification of transactions. This capability is critical in institutional contexts where accountability and transparency are essential for effective resource management (Dai & Vasarhelyi, 2017).

Transparency in financial reporting is widely recognized as a key determinant of accountability in public institutions. Prior studies indicate that digital technologies can improve reporting accuracy and reduce opportunities for manipulation, particularly in environments characterized by weak governance structures (Awasthi & Engelschalk, 2018).

2.2 Financial Transparency in Public Institutions

Financial transparency refers to the extent to which financial information is made accessible, accurate, timely, and understandable to stakeholders. In public sector institutions, transparency is a fundamental pillar of accountability and good governance. It enhances stakeholders' ability to monitor financial activities, evaluate performance, and hold management accountable for resource utilization. Prior studies suggest that digital technologies play a significant role in improving financial transparency by reducing information asymmetry and enhancing reporting accuracy (Awasthi & Engelschalk, 2018). In developing economies, where institutional weaknesses often create opportunities for financial mismanagement, the adoption of robust technological systems is particularly crucial. Blockchain technology, in this regard, offers a promising solution by ensuring that financial data is verifiable, consistent, and resistant to unauthorized modifications.

2.3 Data Integrity and Financial Reporting Quality

Data integrity is a critical determinant of financial transparency, as it ensures the accuracy, consistency, and reliability of financial information throughout its lifecycle. In traditional accounting systems, data integrity is often compromised due to manual processes, system vulnerabilities, and lack of adequate controls.

Blockchain technology enhances data integrity through its immutable ledger structure, where once a transaction is recorded, it cannot be altered without consensus from the network. This feature significantly reduces the risk of fraud and errors, thereby improving the credibility of financial reports. Empirical evidence indicates that improved data integrity leads to higher levels of stakeholder trust and better governance outcomes, particularly in public sector institutions.

2.4 Audit Efficiency and Blockchain Integration

Audit efficiency refers to the ability of auditing processes to be conducted accurately, timely, and with minimal resource expenditure. Traditional auditing methods are often time-consuming and reliant on periodic verification, which may fail to detect irregularities in real time. Blockchain-based systems have the potential to revolutionize auditing by enabling continuous auditing and real-time access to verified financial data. This reduces the need for extensive manual verification and enhances the speed and accuracy of audit processes. Furthermore, the transparency and traceability provided by blockchain systems facilitate easier detection of anomalies, thereby strengthening audit effectiveness.

2.5 Theoretical Framework

This study is anchored on two key theories:

Agency Theory (Jensen & Meckling, 1976):

This theory explains the relationship between principals (stakeholders) and agents (institutional managers), highlighting issues of information asymmetry and opportunistic behavior. Blockchain technology reduces these challenges by providing transparent and verifiable financial information, thereby aligning the interests of both parties (Jensen & Meckling, 1976).

Institutional Theory (DiMaggio & Powell, 1983):

Institutional theory posits that organizations adopt new practices and technologies in response to external pressures such as regulatory requirements, competitive forces, and societal expectations. The increasing global emphasis on transparency and accountability is likely to drive the adoption of blockchain-based accounting systems in public institutions (DiMaggio & Powell, 1983).

2.6 Empirical Review

Empirical studies on blockchain adoption in accounting have largely focused on developed economies, with findings indicating that blockchain enhances financial reporting quality, improves audit efficiency, and strengthens internal controls (Dai & Vasarhelyi, 2017; OECD, 2021). Similarly, studies on digital financial systems in developing economies suggest that technological innovations can significantly improve transparency and reduce corruption (Awasthi & Engelschalk, 2018).

However, there is a notable scarcity of empirical research examining the application of blockchain technology within Nigerian higher institutions. Existing studies often adopt conceptual or theoretical approaches without providing measurable evidence on key variables such as data integrity and audit efficiency.

2.7 Research Gap

Despite growing interest in blockchain technology, there remains a significant gap in context-specific empirical studies within the Nigerian public sector, particularly in higher education institutions. Furthermore, limited research has simultaneously examined the combined effects of blockchain-based accounting, data integrity, and audit efficiency on financial transparency using quantitative methods. This study addresses these gaps by providing empirical evidence based on measurable constructs, thereby offering a more comprehensive understanding of how blockchain technology can enhance financial transparency in Nigerian higher institutions.

2.8 Conceptual Framework

The conceptual framework of this study is built on the premise that blockchain technology serves as an enabling tool for improving financial transparency.

Independent Variables

Blockchain Accounting, Data Integrity, Audit Efficiency.

Dependent Variable

Financial Transparency.

The diagram below shows the relationship between study variables.

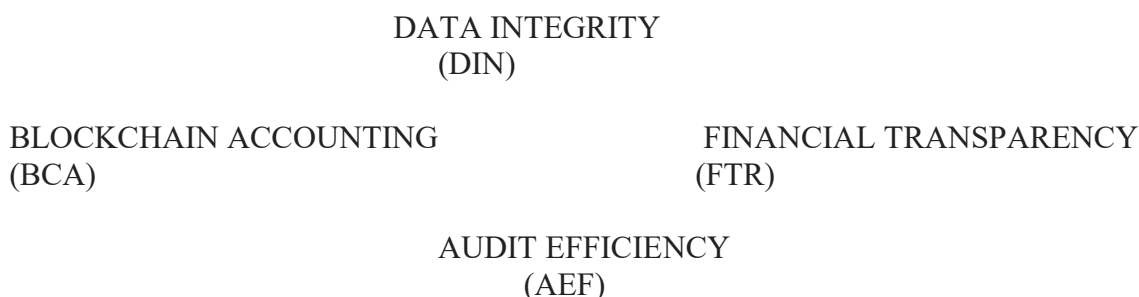


Figure 1: Conceptual Framework Showing the Relationship Between Blockchain-Based Accounting and Financial Transparency.

The framework illustrates that blockchain-based accounting directly influences financial transparency, while data integrity and audit efficiency act as reinforcing mechanisms that strengthen the reliability and credibility of financial reporting outcomes.

3. METHODOLOGY

This study employs a quantitative survey design to examine the relationships among blockchain-based accounting, data integrity, audit efficiency, and financial transparency. Primary data were collected via a structured questionnaire administered to the target population which encompasses accounting and finance professionals in selected Nigerian higher institutions. These categories were selected due to their direct involvement in financial reporting and control systems.

A purposive sampling technique was adopted to ensure that respondents possessed relevant expertise in financial operations. A sample size of 110 was determined using Yamane's (1967) formula.

The responses were analyzed using multiple regression to evaluate the relationship between blockchain-based accounting, data integrity, audit efficiency, and financial transparency.

All constructs were measured using five-point Likert scales adapted from prior studies. Reliability was confirmed using Cronbach's alpha, with all values exceeding the 0.70 threshold, indicating acceptable internal consistency.

Variables

- BCA: Blockchain-Based Accounting
- DIN: Data Integrity
- AEF: Audit Efficiency
- FTR: Financial Transparency

Measurement of Variables

All variables were measured using 5-point Likert scales adapted from prior studies.

Blockchain-Based Accounting (BCA): transparency, traceability, decentralization

Data Integrity (DIN): accuracy, consistency, reliability of records

Audit Efficiency (AEF): timeliness, cost-effectiveness, audit automation

Financial Transparency (FTR): clarity, accessibility, disclosure quality

Validity and Reliability

Content validity:

This is ensured through expert review and alignment with literature and construct validity supported by adapting established scales

Reliability:

Cronbach Alpha values exceeded the acceptable threshold (0.70):

- BCA = 0.81
- DIN = 0.78
- AEF = 0.76
- FTR = 0.83

Model Specification

$$FTR = \beta_0 + \beta_1 BCA + \beta_2 DIN + \beta_3 AEF + \varepsilon$$

Where:

FTR = Financial Transparency

BCA = Blockchain-Based Accounting

DIN = Data Integrity

AEF = Audit Efficiency

ε = Error term

3.6 Data Analysis Techniques

Data were analyzed using Descriptive statistics (mean, standard deviation) and Inferential statistics: Multiple regression analysis.

4. INTERPRETATION OF RESULTS

The regression results indicate that blockchain-based accounting exerts the strongest influence on financial transparency, suggesting that technological infrastructure plays a central role in strengthening reporting systems. Data integrity also demonstrates a significant effect, highlighting the importance of reliable and verifiable information in promoting accountability.

RESULTS

Table 1: Regression Results

Variable	Beta	t-value	p-value
BCA	0.412	3.85	0.001
DIN	0.356	2.97	0.004
AEF	0.298	2.45	0.016

Diagnostics

Diagnostic tests confirmed:

- No multicollinearity (VIF < 2.5)
- Model is statistically significant (F-test, $p < 0.01$)

5. DISCUSSION OF FINDINGS

The findings reveal that blockchain-based accounting ($\beta = 0.412$) exerts the strongest influence on financial transparency. This suggests that the adoption of decentralized and immutable accounting systems significantly enhances the credibility and traceability of financial records. This aligns with the position of Dai and Vasarhelyi (2017), who argue that blockchain introduces a trustless verification system that reduces reliance on intermediaries.

Data integrity ($\beta = 0.356$) also demonstrates a significant positive effect, reinforcing the idea that transparency is fundamentally dependent on the reliability of underlying financial data. In environments where data manipulation is prevalent, blockchain's immutability ensures that records remain consistent and verifiable over time (Appelbaum et al., 2017).

Audit efficiency ($\beta = 0.298$), while slightly lower, remains statistically significant. This indicates that improvements in auditing processes—particularly through automation and real-time verification—contribute meaningfully to transparency outcomes. Blockchain-enabled continuous auditing reduces delays and enhances the detection of irregularities (Appelbaum et al., 2017).

Overall, the results support Agency Theory, as blockchain reduces information asymmetry between institutional managers and stakeholders. They also align with Institutional Theory, suggesting that increasing global pressure for accountability may drive adoption.

Importantly,

6. CONCLUSION

This study provides empirical evidence that blockchain-based accounting systems can enhance financial transparency in Nigerian higher institutions through improved data integrity and audit efficiency. However, the reliance on perceptual data limits the generalizability of the findings. Future studies should incorporate longitudinal designs and objective financial datasets to strengthen empirical robustness.

7. RECOMMENDATIONS

1. Pilot Blockchain Accounting Systems

Institutions should implement pilot projects to test feasibility.

2. Strengthen Data Integrity Systems

Since data integrity strongly influences transparency, systems must be secured.

3. Enhance Audit Processes

Integrate blockchain with auditing tools to improve efficiency.

4. Capacity Building

Train accounting personnel in digital accounting systems.



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