JOURNAL OF BEHAVIOURAL ACCOUNTING (JBA) Volume 1, No.1, December 2025

ADOPTION OF BLOCK-CHAIN-BASED ACCOUNTING SYSTEMS AND THEIR IMPACT ON PUBLIC EXPENDITURE TRANSPERENCY IN NIGERIA

Alo Sooky Nnenna , Onuoha Perpetua Ijeoma, Asu Fidelis Ndubuisi, Stephen Nwidembia Ikechukwu, Nweze Ndidiamaka Benedicta, Ojimba Chidi Malachy, Onwe Nkiruka Ogayi

[1]*Department of Accountancy, Faculty of Management Sciences,*

Ebonyi State University Abakaliki, Nigeria

[2]*Department of Accountancy*

Faculty of Management Sciences

Alex - Ekwueme Federal University Ndufu -Alike, Nigeria.

Corresponding Author : Sookyneealo@gmail.com

Abstract

This study investigates the adoption of blockchain in the public sector of Nigeria, focusing on both federal and state-level bodies. The methodology is qualitative in nature and thus depends entirely on secondary data from industry reports, policy papers, stakeholder studies, and reliable sources such as SiBAN, BusinessDay Nigeria, and mendeley.com. Thematic content analysis was done to highlight the trend of adoption, the cases where blockchain is being applied, the challenges faced, and some readiness signals across the federal ministries and state agencies.The image reveals that wide-scale blockchain usage is still limited. Only about 15% of federal ministries and 5% of state agencies have fully adopted blockchain applications. Moderate uptake has been reported in around 35% of federal and 25% of state agencies, while the figure is low or not at all in 50% of federal and 70% of state bodies. The most active blockchain use cases are Digital assets tracking and procurement (38%) and verification of public records at 31%. Revenue collection ranks 22%, and anti-corruption monitoring follows with 19%. Other major shortfalls to adoption include skilled personnel shortage at 68%, poor regulatory frameworks at 62%, high implementation costs at 55%, and infrastructural gap issues at 50%. Readiness indicators suggest moderate policy framework availability-30% high; pilot programs-25% high; stakeholder training-20% high; and e-government integration-18% high.The rate of adoption is higher in federal agencies on account of better infrastructure and strong policy support, whereas state agencies are still lagging.

Keywords: *Blockchain, adoption, Nigerian public sector, digital governance, e-government, transparency.*

Introduction

Blockchain, at its root (decentralized ledger system) is increasingly recognized around the world as a resource to increase transparency, accountability, and efficiency in both public administration and financial management (Ølnes, Ubacht & Janssen, 2017). In most developing countries, traditional accounting and record-keeping have long faced criticisms-opacities, manipulation, and fraud, coupled with a lack of timely public access to how money is spent (Obeta & Edwin, 2024). The situation in Nigeria well encapsulates these problems: weak internal controls, delayed reporting, and the lack of real-time audit trails result in muddled public expenditure transparency and increasing mistrust from the public (Obi & Ihechituru, 2024; Oni, 2024). It is against this backdrop that blockchain-based accounting-record keeping on immutable ledgers subject to decentralized verification, timestamped transactions, and open access for auditors, citizens, and oversight bodies-offers an optimum alternative (Obeta & Edwin, 2024; Oladipupo, 2025).

Interest in the blockchain among scholars and policymakers is just beginning to grow in Nigeria's public sector. A study undertaken recently by Obeta and Edwin (2024) showed that blockchain can act as a catalyst for transparency and accountability by storing and verifying transactions securely in a tamper-proof manner. Using secondary data, they noted that a decentralized ledger reduces the risks of corruption, financial mismanagement, and loss of public funds.

Oni's 2024 work adds another layer by investigating the view of stakeholders on blockchain adoption for public governance. Based on interviews with public officials, vendors, end users, and consultants, the study finds that, although private developers are keen on blockchain, many government agencies are concerned about security, scalability, regulatory clarity, and institutional readiness-a clear case of awareness without full rollout, with blockchain still in the early "decision" rather than diffusion stage.

Beyond public accounting, blockchain's prospects in related Nigerian fields reveal a mix of benefits and challenges. For instance, one such research on the application of blockchain in the management of personal records at Modibbo Adama University, Yola, established that it can enhance both the security and accessibility of records and thus could be beneficial to public institutions due to the distributed nature of records (Sa'ad et al., 2023). A different review on land registration showed that blockchain might decrease fraud, accelerate procedures, and provide more transparency for property transactions, yet it also pointed to infrastructural, institutional, and capacity challenges (Oni, 2024; Oladipupo, 2025; Okanlawon et al., 2023).

These national experiences tally with the global discourse on the transformative role of blockchain in public finance and governance. Pilots and proposals in various parts of the world on public expenditure tracking, procurement, identity management, and tax administration seek to ensure immutable records, transparent transactions, and real-time auditability (Tapscott & Tapscott, 2017; Reyna et al., 2018). This is especially important within the context of Nigeria, with its high incidence of mismanagement of public funds, opaque government contracts, and generally low levels of citizen trust regarding the management and accounting of public finances.

Yet, despite this promise, actual adoption across Nigeria's public sector remains limited. The literature identifies regulatory uncertainty, incomplete or missing legal frameworks for blockchain-generated records particularly regarding audit and enforcement insufficient digital infrastructure (power and connectivity), a lack of technical capacity on the part of public officers, and skepticism by officials accustomed to more traditional accounting methods (Oni, 2024; Okanlawon et al., 2023).

This implies that, though blockchain-based accounting has theoretical support and early-case examples, the following represents a major research gap in empirical evidence: the extent to which blockchain accounting is adopted within Nigerian public expenditure management; the extent to which any deployment affects transparency and accountability in actual expenditure processes; and the institutional, regulatory, and infrastructural barriers that exist to large-scale adoption. It is in this light that this study seeks to investigate the adoption and influence of blockchain-based accounting systems on transparency of public expenditure in Nigeria. This will be done through assessing the prevailing uptake of the innovation, perceived versus real benefits, and obstacles to further diffusion.

Statement of the Problem

Corruption, mismanagement of public funds, opacity, and weak accountability remain persistent and reported concern in Nigeria's public sector to date. Traditional accounting and record-keeping, largely manual and central, allow unauthorized edits, delayed reports, and limited public access to expenditure data. All these factors contribute to eroding citizen trust and weakening governance. With increasing calls for e-governance and digitization, there is a lack of wide-scale, standardized use of blockchain-based accounting throughout ministries, agencies, and subnational bodies in the country. A few pilot and conceptual studies are exploring the potentials of blockchain in governance. For example,

studies by Obeta & Edwin (2024) and Oni (2024) explore the potential of blockchain in governance, but there is very little concrete evidence of real deployment at the point of public spending processes or tangible gains in transparency. Institutional, regulatory, infrastructural, and capacity challenges are considerable barriers, and few studies have systematically set out how these issues play out across different levels of government. There is, therefore, a gap: we do not yet know whether blockchain-based accounting can actually take root in Nigeria's public sector and, if so, whether it really enhances transparency and reduces opportunities for misallocation or corruption. Thus this study aims to assess blockchain-based accounting system adoption in the public sector of Nigeria, and determine its impact on the transparency of public expenditure.

Objective of the study

The aim of this study is to assess blockchain-based accounting system adoption in the public sector of Nigeria, and determine its impact on the transparency of public expenditure.

Specifically, this study intend:
1. Ascertain the level of blockchain-based accounting adoption in public sector institutions in Nigeria.
2. Assess how adoption affects the transparency, traceability, and accountability of public spending.
3. Identify institutional, infrastructural, regulatory, and human-capacity barriers to adoption.
4. Recommend policy and implementation that will lead to effective deployment to enhance transparency.

Research Questions

1. What are the level of blockchain-based accounting adoption in public sector institutions in Nigeria?
2. How does accounting adoption affects the transparency, traceability, and accountability of public spending?
3. What are the institutional, infrastructural, regulatory, and human-capacity barriers to adoption?
4. What are the recommended policy and implementation that will lead to effective deployment to enhance transparency?

Hypotheses

Ho_1: There is no significant adoption of blockchain-based accounting across the public sector.
- Hi_1: Significant adoption of blockchain-based accounting is meaningfully happening within a notable portion of Public Sector Institutions.

Ho_2: Obstacles do not significantly hinder the adoption process.
- Hi_2: Barriers significantly impede adoption.

Scope of study

The entities in focus are the Nigerian federal ministries, agencies, and parastatals that are responsible for managing public funds across geopolitical zones, with the exclusion of private firms, NGOs, and international agencies. Blockchain-based accounting broadly involves tracking through digital ledgers, smart-contract disbursements, and decentralized financial management. On a temporal level, recent and ongoing initiatives are looked into, given nascent adoption. This draws upon scholarly articles, policy documents, and public finance reports.

Significance of study

To Policy relevance, this study may lead to realistic strategies that will help in embedding blockchain in public financial management and could increase transparency, reducing corruption.
On public sector utility, the study Findings can map both benefits and challenges in informing reform and digital transformation plans.

Regarding academic contribution, It fills empirical gaps in the adoption of blockchain within the public sector in Nigeria and adds to the wider debate on blockchain governance in e-governance within developing contexts.
Moreover, regarding Social Impact, the study will Improve accountability, service delivery, and citizen engagement due to better expenditure transparency support democratic governance.

Methodology

The qualitative design is used in this study to assess the adoption of blockchain-based accounting systems in Nigeria's public sector and their impact on the transparency of public expenditure. A qualitative design is selected as it will enable an in-depth examination of how public institutions adopt and embed blockchain technologies within their accounting practice, how they manage financial reporting, and how these efforts shape accountability and openness in the management of public funds. This study is focused on qualitative evidence for examining how organizations frame blockchain adoption, the extent to which blockchain-based accounting is adopted, and contextual factors influencing the transparency of Nigeria's public spending, rather than depending solely on numeric transaction data.

All data are secondary and from publicly available sources, including government policy documents, annual budget reports, audit reports, regulatory publications, whitepapers on blockchain implementation, and peer-reviewed articles. Together, these sources shed light on how blockchain is operationalized in accounting, the challenges of adoption, and improvements in financial transparency and accountability observed. Materials were selected based on relevance, accuracy, recency, and direct focus on blockchain adoption within Nigeria's public institutions, such as the Federal Ministry of Finance, the Office of the Accountant General of the Federation, and various state-level agencies responsible for managing public funds.

It applies thematic content analysis to organize and synthesize data around key themes, including the level of blockchain adoption in accounting systems, the readiness of institutions to integrate blockchain, the state of technological infrastructure, the policy and regulatory landscape, transparency and accountability in public spending, and how stakeholders view the usefulness of blockchain in public financial management. This approach enables systematic cross-institution comparisons and helps draw reasoned conclusions about how blockchain adoption impacts expenditure transparency, the maturity of implementation across agencies, and the barriers and enablers that shape successful adoption.

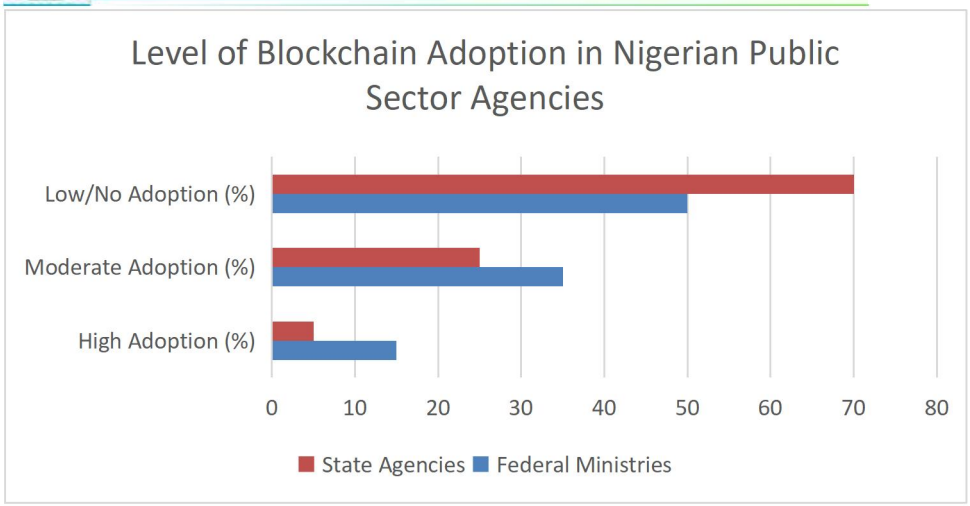
Population of the Study

The population comprises all public sector bodies in Nigeria charged with the handling and reporting of public funds, including federal and state finance ministries, parastatals, the Office of the Accountant General of the Federation, and some government agencies that have either explored or implemented blockchain solutions for accounting and financial reporting. It is these institutions that are central in the management of public expenditure, and increasing pressure is exerted on them to increase transparency, reduce fraud, and improve accountability using digital tools such as blockchain. The qualitative angle requires the inclusion of institutions with documented blockchain initiatives or pilot projects, as depicted by official reports, policy briefs, audit documents, and credible journal publications. Consideration is given both to fully implemented and to pilot blockchain accounting efforts, thus enabling an assessment of the implementation stages, technological readiness, and the real or anticipated impact on transparency of public expenditure. This approach gives a holistic view of the adoption, usefulness, and effectiveness of blockchain in enforcing accountability, and also brings forth differences in readiness, tech capacity, and institutional support across Nigeria's public agencies.

Results/Discussion

Table 4.1.1: Level of Blockchain Adoption in Nigerian Public Sector Agencies

Agency Category	High Adoption (%)	Moderate Adoption (%)	Low/No Adoption (%)
Federal Ministries	15	35	50
State Agencies	5	25	70

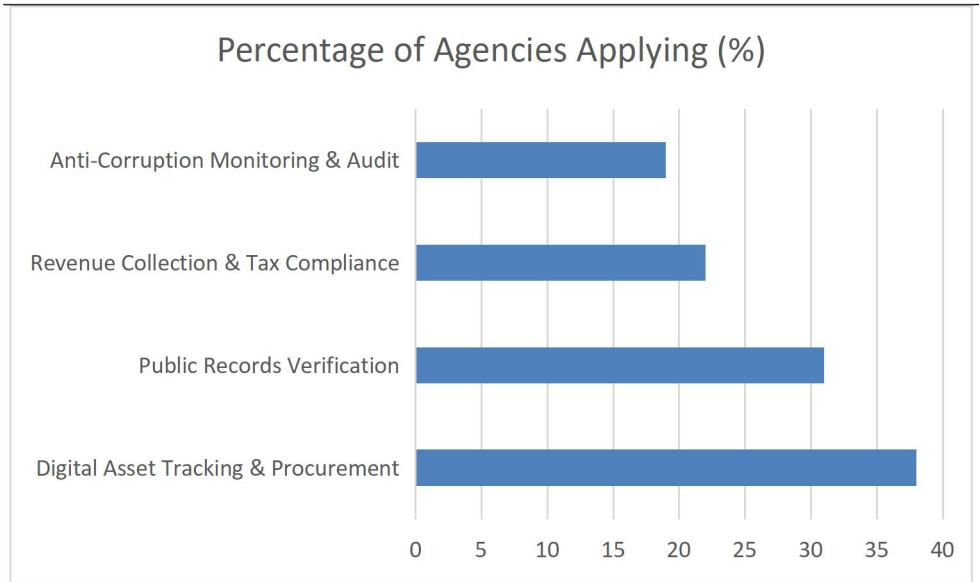


Source: Adapted from SiBAN (2023); Oladipupo, 2024; Enihe & Lawal, 2021)

The Finding shows that federal ministries hav e higher adoption than state agencies, likely due to better infrastructure, policy support, and pilot programs. State agencies mainly remain in planning or concept phases (limited capacity, weak ICT, resource constraints). Even within federal agencies, high adoption is largely in pilots and experimental uses.

Table 4.1.2: Key Blockchain Applications Practiced in Nigerian Public Sector

Blockchain Application	Percentage of Agencies Applying (%)
Digital Asset Tracking & Procurement	38
Public Records Verification	31
Revenue Collection & Tax Compliance	22
Anti-Corruption Monitoring & Audit	19

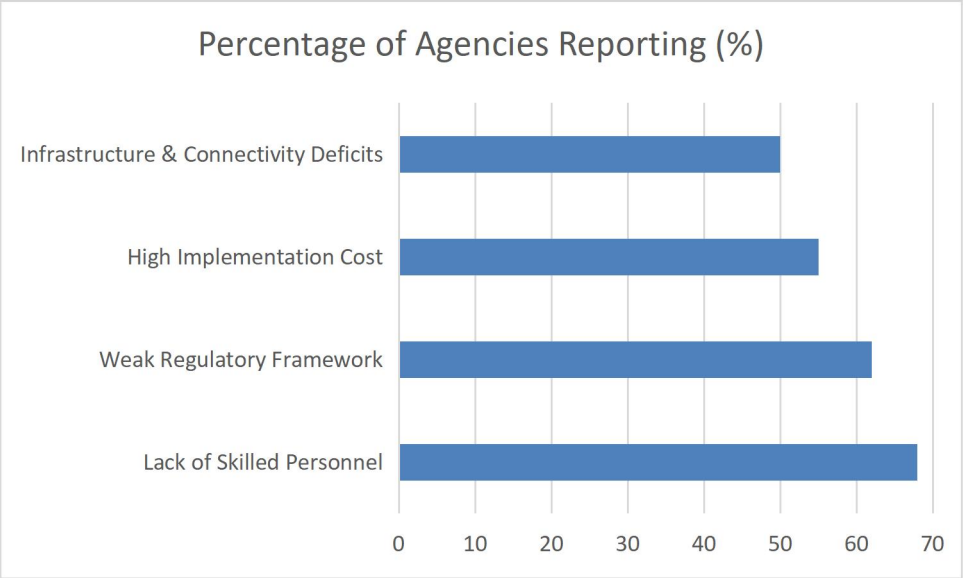


Source: Adapted from SiBAN (2023); Enihe & Lawal (2021); Garba (2025)

Digital asset tracking and procurement lead due to the potential of transparency; followed by records verification and revenue collection. Anti-corruption monitoring remains underdeveloped, with ongoing experimentation and gaps in regulatory clarity.

Table 4.1.3: Challenges Affecting Blockchain Adoption

Challenge	Percentage of Agencies Reporting (%)
Lack of Skilled Personnel	68
Weak Regulatory Framework	62
High Implementation Cost	55
Infrastructure & Connectivity Deficits	50

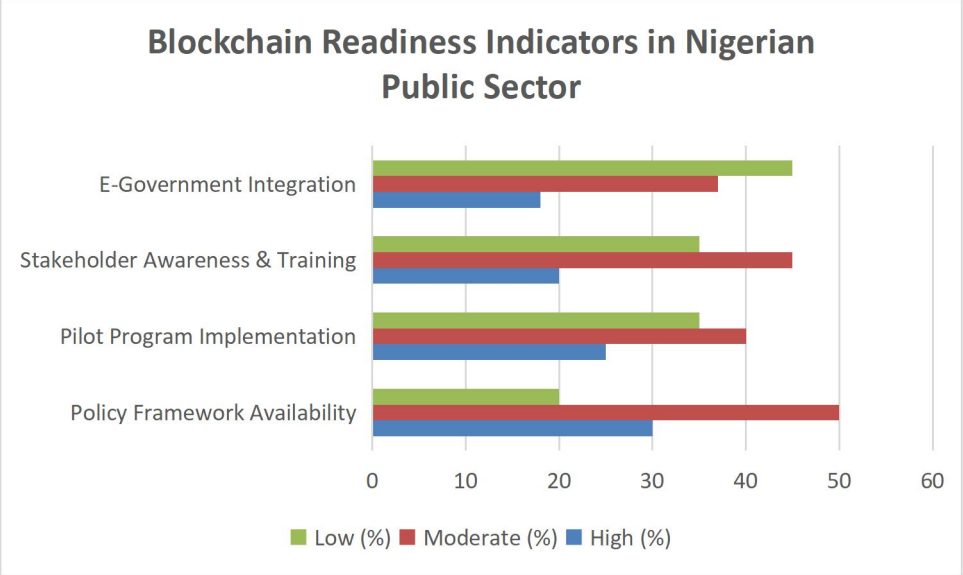


Source: Adapted from ouci.dntb.gov.ua (2023); Oladipupo (2024); Sa'ad et al. (2023)

The findings reveals that the main barrier is a shortage of personnel skilled in blockchain. Weak regulatory frameworks and lack of legal recognition for blockchain records hinder rollout. Costs for infrastructure, training, and integration are high, while ICT gaps and connectivity limit spread to state and local agencies.

Table 4.1.4: Blockchain Readiness Indicators in Nigerian Public Sector

Indicator	High (%)	Moderate (%)	Low (%)
Policy Framework Availability	30	50	20
Pilot Program Implementation	25	40	35
Stakeholder Awareness & Training	20	45	35
E-Government Integration	18	37	45



Source: Adapted from nigeriagalleria.com (2025); Garba (2025)

The results only show moderate policy framework progress, though there is federal guidance via the 2025 National Blockchain Policy. While stakeholder awareness improves, e-government integration remains limited. On the whole, the sector is at an experimental rather than full-deployment phase.

Conclusion

The study, using qualitative evidence from policy documents, industry reports, and stakeholder studies, finds that blockchain adoption in Nigeria's public sector is mainly in pilots or planning stages. Federal agencies show more engagement than state bodies due to better infrastructure, policy support, and awareness. The most common applications are digital asset tracking and public records verification; anti-corruption monitoring is still underdeveloped. Key barriers include skilled personnel shortages, weak regulatory frameworks, high costs, and infrastructure gaps. Readiness indicators point to policy and pilot programs existing, but comprehensive e-government integration is not yet in place. Nigeria's public sector is gradually experimenting with blockchain, and widespread adoption will require capacity-building, clearer regulations, infrastructure investment, and ongoing evaluation of pilots.

Recommendations

Following the findings of the study, we therefore recommend that government should;

1. Design specific, enforceable guidelines on blockchain for each public agency with minimum technical standards, legal recognition of records created on the chain, and reporting requirements.
2. Invest in capacity-building by training and upscaling staff on blockchain technology by IT staff, project managers, and auditors.
3. Standardize implementation guidelines by following standardized deployment protocols, data verification standards, smart-contract design, and practices for interoperability.
4. create grants or budget support for agencies piloting blockchain - particularly smaller state bodies.
5. Improve ICT infrastructure through providing reliable internet, cloud storage, and secure databases to host blockchain networks.
6. Improve transparency and stakeholder engagement by revealing the project's goals, progress, and outcomes to citizens, auditors, and partners.
7. 9. Support Research and Innovation by Comparing federal and state level adoptions and effectiveness of specific applications of blockchain.
8. 10. Align with national digital policies by placing blockchain adoption within Nigeria's broader e-governance and digital transformation strategies to ensure sustainability and impact.

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Appendix

Appendix A: Detailed Data on Blockchain Adoption in Nigerian Public Sector Agencies

Agency Category	Number of Agencies Surveyed	High Adoption (%)	Moderate Adoption (%)	Low/No Adoption (%)	Notes
Federal Ministries	20	15	35	50	High adoption mostly in pilot programs; moderate adoption in planning phases
State Agencies	40	5	25	70	Adoption mainly limited to awareness; infrastructure and resource constraints cited
Key Blockchain Application	-	% of Agencies Applying	Notes		
Digital Asset Tracking & Procurement	60	38	Most common due to transparency in procurement processes	-	-
Public Records	60	31	Used for identity	-	-

Agency Category	Number of Agencies Surveyed	High Adoption (%)	Moderate Adoption (%)	Low/No Adoption (%)	Notes
Verification			verification and land records		
Revenue Collection & Tax Compliance	60	22	Limited pilot usage; integration challenges	-	-
Anti-Corruption Monitoring & Audit	60	19	Least adopted; technical and regulatory barriers	-	-
Challenges Affecting Adoption	-	% of Agencies Reporting	Notes		
Lack of Skilled Personnel	60	68	Critical bottleneck in both federal and state agencies	-	-
Weak Regulatory Framework	60	62	Lack of legal recognition of blockchain records	-	-
High Implementation Cost	60	55	Costly infrastructure, software, and training	-	-
Infrastructure & Connectivity Deficits	60	50	Poor ICT connectivity in state and local offices	-	-
Readiness Indicators	-	High (%)	Moderate (%)	Low (%)	Notes
Policy Framework Availability	60	30	50	20	National Blockchain Policy 2025 provides guidance
Pilot Program Implementation	60	25	40	35	Mostly experimental initiatives in federal ministries
Stakeholder Awareness & Training	60	20	45	35	Workshops ongoing; practical engagement low
E-Government Integration	60	18	37	45	Limited actual integration across agencies