

LEVERAGING BLOCKCHAIN AND BIG DATA FOR TRANSPARENT AND EFFICIENT FINANCIAL REPORTING: EVIDENCE FROM NIGERIAN LISTED FIRMS

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Abstract

This study empirically examined the effects of blockchain adoption readiness and big data analytics capability on the transparency and efficiency of financial reporting among firms listed on the Nigerian Exchange (NGX). The study is anchored on the Technology Acceptance Model and Diffusion of Innovation theory, for explaining the reporting-quality implications of these technologies. An ex post facto research design was adopted, covering 68 non-financial listed firms from 2019 to 2024, resulting in 408 firm-year observations. Primary data were collected through structured questionnaires administered to 312 preparers, auditors and users of financial statements, while secondary data were obtained from audited annual reports and NGX filings. Financial reporting transparency was measured using a disclosure quality index and analyst forecast dispersion, while efficiency was assessed through audit report lag and financial reporting preparation cost. Data were analyzed using descriptive statistics, Pearson correlation, ordinal logistic regression and generalized least squares panel estimation. The findings reveal that blockchain adoption readiness and big data analytics capability significantly improve both financial reporting transparency and efficiency. Big data analytics, however, has a stronger and more mature presence among Nigerian listed firms, while blockchain adoption remains at an early stage. Regulatory and infrastructural readiness significantly strengthens the relationship between technology adoption and financial reporting outcomes. The study contributes firm-level evidence from an emerging economy and integrates technology readiness with measurable reporting outcomes. It recommended clearer blockchain regulation, improved digital and power infrastructure, phased technology investment, and stronger professional capacity development. The study concludes that technological capability and a supportive institutional environment are essential for effective adoption.

Keywords: Blockchain, Big Data Analytics, Efficiency, Financial Reporting, Transparency, Nigerian Exchange, Emerging Markets.

Introduction

The goal of financial reporting is to supply information to the outside world to fill the gap between inside and outside of the company, but the bridge has always been tenuous. The conventional, paper-and-ledger-based reportage systems have proven to be insufficient in high- and low-income economies due to well publicized financial scandals, financial statements restatement and regular audits failures (Dashkevich et al., 2024). All these concerns are compounded by the poor enforcement of regulations, related party manipulation and timeliness and reliability of disclosure in the Nigerian capital market (Achebe et al., 2024). The two technologies that have come to the forefront as possible structural solutions to these chronic issues are: blockchain technology and big data analytics. Another promising technology is the distributed ledger technology (DLT) of blockchain that can be used to record transactions in real time with a decentralized, cryptographically secured and immutable accounting record that would dramatically reduce the scope for manipulating the underlying accounting record (Guo et al., 2022). In contrast, big data analytics offers the computing power to process and integrate large and complex financial and non-financial data, and to use it to provide more timely, continuous and risk-based financial reporting and assurance (Rane et al., 2023). When

taken together, blockchain as the trusted data substrate and big data analytics as the interpretive and predictive substrate, the two together constitute a possible paradigm shift for a financial reporting infrastructure (Ahmed, 2025).

The National Information Technology Development Agency (NITDA) officially launched the National Blockchain Policy in May 2023 and in August 2024, the Central Bank of Nigeria (CBN), through the Nigeria Inter-Bank Settlement System (NISS), established a pioneering partnership with a provider of blockchain network services to power the country with real-time, decentralized settlement infrastructure (Chambers & Partners, 2025). The developments represent the growing institution appetite for the use of distributed ledgers in the financial sector in Nigeria. This appetite, however, is yet to be manifested in the transparency and efficiency of the financial reporting process of listed companies in Nigeria as evidenced by the fact that it remains largely unanswered in the Nigerian accounting literature. Currently, the literature is limited in both scope and type, with most focused on conceptual aspects, developed economies, and/or cryptocurrency accounting and auditing, but not on corporate disclosure practices in general (Sheela et al., 2023; Pimentel & Boulianne, 2020). This paper addresses this gap, by empirically examining the influence of these blockchain and big data technologies on transparency and efficiency in the financial reporting of firms listed on the Nigerian Exchange, both with regard to preparedness/adoption and institutional constraints affecting technology diffusion in the emerging market. This study aims generally to analyze the influence of blockchain and big data technologies on the transparency and efficiency of financial reporting of listed companies in Nigeria.

Statement of the Problem

The credibility of corporate financial reporting in Nigeria is an on-going issue despite decades of regulatory changes. Timely filing, restated accounts and controversial audit opinions remain current concerns of listed companies, while stakeholders frequently doubted the sufficiency of existing non-failover, centralized reporting systems to ensure the reliability of information disclosed (Achebe et al., 2024). Conventional financial reporting systems are significantly reliant on manual processes, sequential checks and a central repository of financial reports, all of which allow for opportunities to manipulate data, slow down reporting and introduce human error, increasing the cost of audit assurance.

The global literature is replete with significant contributions that advance the promise of blockchain as a structural solution to these challenges, leveraging its ability to create an immutable and decentralized ledger, and its integration with big data technologies which provide real-time analytical capability, all of which could significantly reduce information asymmetry and shorten reporting timelines (Ahmed, 2025; Dashkevich et al., 2024). It is important, however, to note that there are three issues that restrict the definite extrapolation of this promise to the Nigeria context. First, much of the empirical evidence on which these assertions are based comes from the developed world where the markets are well established and digital infrastructure is well-developed; it remains uncertain whether similar benefits can be realized in settings with significantly different infrastructure and regulations. Second, past Nigerian research on blockchain adoption has largely focused on the cryptocurrency, financial inclusion, and payment systems (Adebayo et al., 2024; RSIS International, 2024) instead of mainstream financial reporting practice by listed firms. Third, it is not quite sure from the empirical evidence whether the real problem with achieving transparency and efficiency in Nigeria is the technology itself, or its environment – the regulatory and infrastructure framework in which it must function.

Against this background, this study empirically examines the relationship between the use of blockchain and big data technology and their influence on transparency and efficiency of financial reporting amongst listed companies in Nigeria and the conditions of institutions that moderate the relationship.

Review of Related Literature

Conceptual Review

The conceptual review explains the main concepts underlying the study and shows how blockchain technology, big data analytics, financial reporting transparency, financial reporting efficiency, and the wider regulatory and infrastructural environment are connected. These concepts are considered within the context of firms listed on the Nigerian Exchange (NGX), where the quality and timeliness of financial information are important to investors, regulators and other stakeholders.

Blockchain Technology and Financial Reporting

Blockchain is a distributed digital ledger that records transactions across a network using cryptographic security and time-stamping. Unlike traditional accounting systems that rely on centralized databases and periodic reconciliation, blockchain allows authorized participants to access a shared and verifiable record of transactions. Its importance to financial reporting lies mainly in its ability to strengthen data integrity, traceability and auditability. Because validated records are difficult to alter, blockchain can reduce the risk of manipulation and provide a reliable audit trail. Studies have shown that blockchain can support real-time validation, secure accounting records and automated financial reporting (Bhandari et al., 2025; Achebe et al., 2024; Atadoga et al., 2024; Dashkevich et al., 2024). This study focuses on blockchain adoption readiness, rather than full implementation. The concept refers to the extent to which listed firms have the technological, organizational and institutional capacity needed to introduce blockchain into their financial reporting systems.

Big Data Analytics and Financial Reporting

Big data analytics involves the use of advanced technologies to collect, process and analyze large volumes of structured and unstructured information. In financial reporting, it supports faster analysis, anomaly detection, forecasting and improved decision-making. Its importance has increased as business transactions and financial information have become more complex. Big data analytics can help firms identify unusual transactions, detect errors and produce financial information more quickly. Rane et al. (2023) emphasized its growing value in accounting and finance because of its ability to handle complex datasets and support better decisions.

Blockchain and big data analytics can also complement each other. Blockchain provides secure and traceable transaction records, while big data analytics helps organizations analyse those records for reporting and decision-making. Their integration has been associated with improvements in transparency, fraud detection, traceability and reporting efficiency (Ahmed, 2025; Rahman et al., 2025).

Financial Reporting Transparency

Financial reporting transparency refers to the extent to which financial information is complete, reliable, clear and timely enough to support informed decisions by investors, creditors, regulators and other stakeholders. Transparent reporting helps reduce information asymmetry and strengthens confidence in corporate disclosures. Digital technologies can contribute to transparency by improving the accuracy, accessibility and timeliness of financial information. In this study, transparency is measured using outcomes such as the disclosure quality index and analyst forecast dispersion. These measures help determine whether greater blockchain readiness and stronger big data analytics capability are associated with better financial reporting transparency.

Financial Reporting Efficiency

Financial reporting efficiency refers to an organization's ability to produce reliable financial information within the required time and at reasonable cost. An efficient reporting system reduces unnecessary manual work, reconciliation problems, delays and processing costs without compromising reporting quality. Traditional reporting processes often involve extensive manual verification and reconciliation, which can increase both time and cost. Blockchain and big data

analytics can help automate selected activities, improve access to information and accelerate verification and analysis. Evidence indicates that blockchain can support automated financial statement preparation and real-time validation, while its combination with big data analytics can improve reporting efficiency (Ahmed, 2025; Dashkevich et al., 2024). For this study, financial reporting efficiency is assessed using audit report lag and the cost of financial statement preparation. Lower delays and reduced processing costs indicate greater reporting efficiency.

Regulatory and Infrastructural Readiness

The adoption of emerging technologies depends not only on the willingness of firms but also on the environment in which they operate. Clear regulations, reliable electricity, adequate digital infrastructure, internet connectivity, cybersecurity and access to technical expertise are important for successful technology adoption. Nigeria has taken steps towards digital transformation and blockchain development, including the National Blockchain Policy. However, policy development alone is insufficient. Firms also need clear implementation guidelines, appropriate technical standards, reliable infrastructure and adequate professional expertise. In this study, regulatory and infrastructural readiness serves as a moderating condition. It is expected that blockchain and big data analytics will produce stronger improvements in financial reporting where firms operate within a supportive regulatory and infrastructural environment. Thus, the effectiveness of these technologies depends not only on their availability but also on the institutional and technological conditions surrounding their adoption.

Theoretical Review

The theoretical review explains why organizations adopt emerging technologies and why adoption differs across firms. The study is mainly anchored on the Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI) theory. TAM explains technology acceptance based on perceived usefulness and ease of use, while DOI explains how innovations spread and the factors that influence their adoption. Together, they provide a basis for understanding blockchain and big data analytics adoption among Nigerian listed firms and their effects on financial reporting.

Technology Acceptance Model (TAM)

The Technology Acceptance Model, developed by Davis (1989), explained technology acceptance through two main factors: perceived usefulness and perceived ease of use. Perceived usefulness concerns the belief that a technology can improve performance, while perceived ease of use relates to how simple it is to learn and operate. When users consider a technology useful and manageable, they are more likely to accept and use it. TAM has also been applied to organizational technology adoption, particularly where professionals assess the benefits and practical challenges of new technologies (Alshamsi et al., 2024). TAM is relevant because the adoption of blockchain and big data analytics depends partly on whether financial reporting professionals consider them useful and practical. Blockchain may be accepted where it improves data integrity, traceability, auditability and reporting timeliness, while big data analytics may be valued for improving data processing, anomaly detection, forecasting and decision-making. The model also explains why implementation difficulties may discourage adoption. High costs, inadequate infrastructure, limited technical expertise and difficulties integrating new technologies with existing systems can reduce users' willingness to adopt them.

Diffusion of Innovation (DOI) Theory

Diffusion of Innovation theory, developed by Rogers (2003) explained how new technologies and practices spread within organizations and social systems. It identifies five characteristics that influence adoption: relative advantage, compatibility, complexity, trialability and observability. Innovations are more likely to spread when they provide clear benefits, fit existing systems, are not overly difficult to use, can be tested before full adoption and produce visible results. DOI is relevant

because blockchain and big data analytics have different levels of adoption among Nigerian listed firms. Relative advantage explains the willingness to adopt technologies that improve reporting quality, data integrity, transparency and processing speed. Big data analytics may have spread faster because its applications are already more familiar and compatible with existing digital systems. Compatibility is particularly important in Nigeria because successful adoption depends on the ability of new technologies to fit existing accounting systems, audit practices and regulatory requirements. Complexity may slow blockchain adoption because of its technical requirements and the shortage of specialized expertise. Trialability allows firms to test blockchain applications before committing substantial resources, while observability enables other firms to learn from visible successful applications. DOI therefore explains why big data analytics appears more developed than blockchain. Big data analytics has more visible benefits and greater compatibility with existing systems, whereas blockchain adoption remains constrained by regulatory uncertainty, infrastructure limitations and technical complexity.

Theoretical Implication for the Study

TAM and DOI complement each other in explaining the study's findings. TAM focuses on the willingness of organizational users to accept technologies based on their usefulness and ease of use, while DOI explains how the characteristics of the technologies and the surrounding environment influence their spread. Together, the theories support the view that blockchain adoption readiness and big data analytics capability can improve financial reporting transparency and efficiency, but the extent of these benefits depends on users' acceptance, perceived advantages, compatibility, complexity and the availability of adequate regulatory and infrastructural support. They therefore provide a strong theoretical foundation for explaining technology adoption and its effects on financial reporting among Nigerian listed firms.

Empirical Review

Dashkevich, et al. (2024) explored the integration of blockchain into financial reporting, creating and testing a Blockchain Financial Statements (BFS) system that enhances transparency, accounting precision, and liquidity management in financial statements. The researchers used Design Science Research Methodology (DSRM) and Domain-Driven Design (DDD) to design, develop and validate a prototype of the accounting system using BlockChain. The results showed Blockchain Financial Statements system could integrate blockchain technology into financial statements effectively and create a real-time validation system, an immutable financial record and an automatic financial statement generation system, thereby ensuring tamper-proof financial records. The prototype greatly increased transparency, accuracy, traceability and reliability of financial reporting and minimized the potential for accounting fraud and financial misrepresentation. This study by Dashkevich et al. (2024) is closely aligned to the current research as it validates blockchain technology's potential to improve transparency and efficiency in financial reporting by maintaining an immutable ledger, real-time validation, and automated financial statement preparation. Their research focused on the design science approach to validate a blockchain accounting prototype while the current study is an empirical study of the impact of blockchain and big data technologies on financial reporting transparency and efficiency of listed firms on the Nigerian Exchange (NGX). Therefore, the current study builds on the prototype-based evidence provided by Dashkevich et al., and provides organizational-level evidence in an emerging economy.

Ahmed (2025) explored the implications of the convergence of blockchain technology and big data analytics for financial transparency, the quality of financial reporting, and fraud detection in financial systems. The study was not a primary empirical study, but used a systematic literature review design. Secondary data were gathered from 50 scholarly publications related to blockchain technology, big data analytics, financial reporting, financial auditing, financial fraud, and financial regulation. Thematic analysis was performed to draw conclusions about the role of blockchain and big data in increasing the transparency of financial services from the reviewed studies. Overall, the study found that the combination of blockchain technology and big data analytics has the potential to

revolutionize financial reporting, with benefits in terms of increased transparency, accountability, fraud detection, and reporting efficiency. Ahmed's (2025) study is pertinent to the research study conducted in this paper as it offers both theoretical and synthesized empirical findings that the application of blockchain technology and big data analytics would improve the transparency of financial reporting, operational efficiency, fraud detection and regulatory compliance. The present study, however, uses empirical research design to examine the effect of blockchain and big data technologies on the transparency and efficiency of financial reporting among firms listed on the Nigerian Exchange (NGX), different from Ahmed (2025) whose study was based on the systematic review of the previous works. The current study, therefore, contributes to the existing literature on digital transformation in corporate financial reporting with empirical evidence from the firm level in an emerging economy, which extends the scope of Ahmed's work.

Rahman et al. (2025) explored the potential of using big data analytics and blockchain technology to improve transparency, operational efficiency, and trust in supply chain finance (SCF), with a specific focus on international digital trade. This study used a conceptual and evidence-synthesis method that leveraged previous empirical and industry data on blockchain-enabled supply chain finance and big data analytics. The results showed that the combination of blockchain and big data analytics can greatly improve the transparency of supply chain finance by ensuring that transactions are recorded in an immutable manner, enabling information to be shared in real-time, and minimizing information-based asymmetries between the trading partners. Overall, the authors found that blockchain and big data integration is a game-changing technology solution in the modern supply chain finance field because it enhances transparency, accountability, operational efficiency and trust among the actors of the supply chain. There is a need for increased cooperation between governments, financial institutions, technology providers and international regulators to encourage the broader application of these technologies and the development of common global rules for digital trade and supply chain finance, they said. The study is significant to the current study due to its findings that blockchain technology and big data analytics can enhance the transparency, information quality, operational efficiency, and accountability of financial transactions while ensuring information is processed in a secure and real-time manner. The study spanned out into the fields of supply chain finance and international digital trade, but the results also offer learnings for the use of blockchain and big data in improving transparency and efficiency in financial information systems in general. This is because the present study builds on this stream of research by empirically looking at the effect of blockchain and big data technologies on the transparency and efficiency of financial reporting in the Nigerian Exchange (NGX) corporate financial reporting environment, which helps to provide evidence from the corporate financial reporting environment of an emerging economy.

Achebe et al. (2024) explored the use of blockchain technology to bolster data integrity and improve legal accountability as a means of improving corporate fraud risk management. Systematic literature review was used in the study according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The results showed that blockchain technology significantly improves data integrity, as it provides a secure and transparent solution that ensures that corporate data cannot be altered or manipulated. Consequently, the study identified blockchain technology as a potential solution to enable a more comprehensive and transformative strategy to tackle corporate fraud risk management, which enhances data integrity, transparency, legal accountability and regulatory compliance. The study is of particular interest for the present research as it illustrates how blockchain can contribute to the improvement of the data integrity, transparency and auditability, which are basic pillars of good financial reporting and are of crucial importance for the financial reporting process. The approach adopted by Achebe et al. (2024) in the systematic review of existing literature to explore how blockchain technology can be used as a tool for corporate fraud risk management is insightful and informative but the present study takes a new approach by focusing on empirical studies to examine how blockchain technology and big data analytics improves transparency and efficiency in financial reporting among firms listed on the Nigerian Exchange (NGX). Therefore, the present study adds an empirical contribution from the organizational perspective to the conceptual and review based findings of Achebe et al. (2024) in the emerging economy.

This study by Bhandari et al. (2025) presents a systematic review of current literature to assess the use of blockchain in increasing transparency and accountability in sustainable finance. The study was conducted using a Systematic Literature Review (SLR) with bibliometric analysis based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. PICO (Population, Interest, and Context) approach was used to develop research questions. The search terms were predefined for the blockchain, sustainable finance, transparency, and accountability. These terms were used in Google Scholar, Springer Link, and Dimensions databases to collect data. We identified an initial 1,026 publications from 2018 to 2023, which were screened and further narrowed down using predefined inclusion and exclusion criteria and the PRISMA process. After the assessment for eligibility, 78 articles selected through the peer-review process were retained for the final synthesis and bibliometric analysis. The results showed that blockchain technology significantly contributes to the transparency and accountability of sustainable finance, through the capability of creating an immutable record of transactions, traceability, real-time verification of financial transactions and a bolstering of stakeholder trust. Overall, the authors found that blockchain technology shows great promise in shaping the future of sustainable finance, offering enhanced transparency, accountability, stakeholder trust, and sustainability reporting reliability. The study is relevant for the present research as it illustrates how blockchain technology can improve transparency, accountability, data integrity and credibility of financial disclosures by providing a secure and immutable record. The study concentrated on the topic of sustainable finance and used a systematic literature review methodology; however, the results offer robust theoretical and synthesized empirical evidence for the use of blockchain for enhancing financial reporting quality. This study builds on this body of knowledge by empirically examining the simultaneous role of blockchain technology and big data analytics on financial reporting transparency and efficiency of the firms listed on the Nigerian Exchange (NGX). The present study, therefore, provides an emerging economy's organization-level evidence supplementing the findings from a review by Bhandari et al. (2025).

In their study, Atadoga et al. (2024) explored the transformative potential of blockchain technology in the accounting profession, focusing on how it can enhance transparency, efficiency, security, and trust in financial reporting. The study aimed to close this gap between theory and practice by exploring the potential and challenges of blockchain in accounting systems. A qualitative thematic analysis approach was used in studying and summarizing the previous studies on blockchain applications in accounting. Themes emerged and were discussed regarding transparency, audit quality, security, regulatory issues, implementation challenges and future prospects. According to the study, Blockchain offers a means of an accounting record that cannot be altered or faked, giving more transparency and decreasing the opportunities for financial manipulation. Based on this, the authors found that blockchain has great promise in transforming accounting practice through enhancement of transparency, accountability, security, and operation efficiency. The study is especially significant for this paper because it offers proof of the benefits of blockchain in improving the transparency, reliability and efficiency of accounting information.

Comparing the literature reviewed shows that there are three major gaps that are being filled by this study. First, there is a contextual difference: Most empirical research on blockchain-big data integration and financial reporting quality is from developed economies, or Nigerian studies focused on financial inclusion and payments, not listed-firm disclosure practice (RSIS International, 2024). Second, there is a lack of methodological sophistication, as many of the existing studies on Nigeria focus at the conceptual, doctrinal (legal), or qualitative level (Academia.edu Legal Review, 2025; Achebe et al., 2024) and few of these studies utilize transparent and efficient proxies of increased level of transparency and efficiency, such as disclosure indices, dispersion of analyst forecast and audit report lag, at the firm level. Third, there is a theoretical-integration gap, since studies make use either of adoption theories (TAM, DOI) or of agency-based reporting-quality theories, but do not integrate adoption readiness and reporting-quality outcomes in one empirical model, while including institutional moderators like regulatory ambiguity and infrastructural deficits. This study is aimed at filling these three gaps by integrating both primary survey evidence on readiness of blockchain and secondary financial reporting data from the listed companies in Nigeria analyzed.

Conceptual Framework

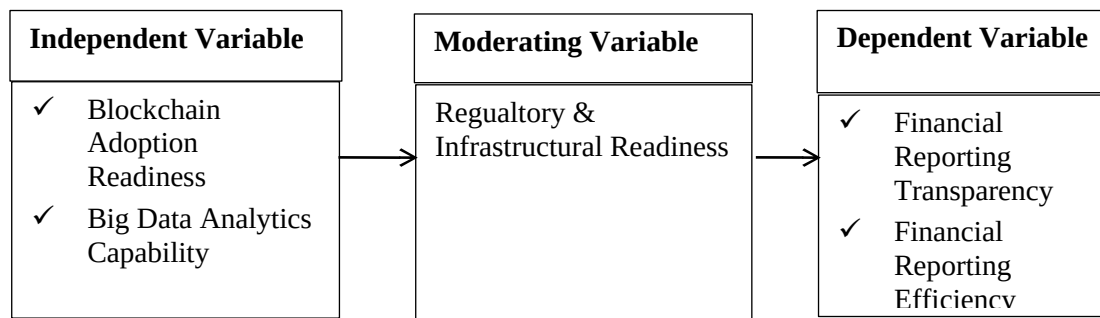


Figure 1: Conceptual Model

Methods

The study is of an ex post facto correlational design with both primary survey and secondary archival data as is done in previous studies of the technology-reporting relationship that involve both perceptual (readiness) measures and outcome (reporting quality) measures. The population consists of all the 155 non-financial firms that are listed on the Nigerian Exchange (NGX), up to December 2025. A sample of 68 firms was selected using Taro Yamane's formula with a 5% margin of error, stratified by 11 sectors to obtain 408 firm-year observations for the 2019-2024 time period (6 years). A purposive sampling technique was adopted to obtain a sample of 312 respondents comprising finance/accounts personnel, internal and external auditors and financial analysts associated with the sampled firms who had technical knowledge in financial reporting processes for the primary survey component. The primary data collection employed a structured five-point Likert scale questionnaire consisting of three constructs: Blockchain Adoption Readiness (eight items), Big Data Analytics Capability (eight items) and Regulatory/Infrastructural Readiness (six items) that were adapted from validated TAM and DOI based questionnaires used in previous studies on blockchain adoption (Alshamsi et al., 2024). Secondary data for this period (2019-2024) was obtained from annual reports which were audited, as well as NGX corporate filings to build a Disclosure Quality Index, and to calculate analyst forecast dispersion, audit report lag and audit reporting cost proxies.

Model Specification

To capture the ordinal nature of the transparency and efficiency outcome measures, the study specifies the following ordinal logistic regression models:

$$FRT_{it} = \beta_0 + \beta_1 BCAR_{it} + \beta_2 BDAC_{it} + \beta_3 RIR_{it} + \beta_4 (BCAR \times RIR)_{it} + \beta_5 FSIZE_{it} + \beta_6 LEV_{it} + \epsilon_{it} \dots \text{(Model 1)}$$

$$FREFF_{it} = \beta_0 + \beta_1 BCAR_{it} + \beta_2 BDAC_{it} + \beta_3 RIR_{it} + \beta_4 (BDAC \times RIR)_{it} + \beta_5 FSIZE_{it} + \beta_6 AGE_{it} + \epsilon_{it} \dots \text{(Model 2)}$$

Where: FRT = Financial Reporting Transparency (Disclosure Quality Index); FREFF = Financial Reporting Efficiency (inverse of audit report lag, standardised); BCAR = Blockchain Adoption Readiness; BDAC = Big Data Analytics Capability; RIR = Regulatory/Infrastructural Readiness; FSIZE = Firm Size (log of total assets); LEV = Leverage; AGE = Firm Age; ϵ = error term.

Data Analysis Technique

Descriptive statistics (mean, standard deviation), preliminary association tests (Pearson correlation) and hypothesis tests (ordinal logistic regression) were applied to the data due to the ordinal-categorical nature of the composite transparency and efficiency indices. A generalized least squares (GLS) panel regression was estimated as a robustness check using the continuous audit-report-lag and reporting-cost proxies. To check the instrument reliability, Cronbach's Alpha was

calculated and to test for multicollinearity of the explanatory variables variance inflating factor (VIF) was calculated. The data was analyzed in STATA 17 and SPSS 27.

Data Analysis and Findings

Descriptive Statistics and Instrument Reliability

A total of 312 questionnaires were sent and 289 were retrieved and validly completed (92.6% return). The internal consistency of the three constructs was acceptable, with Cronbach's Alpha values ranging from .79 to .88, which is higher than the recommended .70. The results showed that the mean Blockchain Adoption Readiness score was 2.86 (SD = .94) on a five-point scale, indicating that respondents think their firms are at an early-to-moderate level of readiness for blockchain. The mean value of the Big Data Analytics Capability score was significantly higher at 3.52 (SD = .81), suggesting relatively more advanced adoption of traditional big data and business intelligence.

Correlation Analysis

The results of the Pearson correlation show a positive correlation with the Disclosure Quality Index and Blockchain Adoption Readiness ($r = .41$, $p < .01$) and a positive correlation and Disclosure Quality Index and Big Data Analytics Capability ($r = .53$, $p < .01$). The technology constructs were also negatively and significantly correlated with audit report lag ($r = -.38$ and $r = -.46$ respectively, $p < .01$), which means that the higher the technology readiness, the quicker and more efficient the reporting process will be. The values of all the explanatory variables in the model were less than 3.0 and hence no significant multicollinearity problem was observed.

Regression Results

Variable	Coefficient (Model 1: FRT)	Coefficient (Model 2: FREFF)	z-statistic	p-value
Blockchain Adoption Readiness (BCAR)	0.362	0.298	3.14 / 2.87	0.002 / 0.004
Big Data Analytics Capability (BDAC)	0.487	0.415	4.02 / 3.68	0.000 / 0.000
Regulatory/Infrastructural Readiness (RIR)	0.221	0.194	2.41 / 2.19	0.016 / 0.028
BCAR $\times$ RIR (interaction)	0.176	0.143	2.05 / 1.98	0.040 / 0.048
Firm Size (log assets)	0.129	0.087	1.88 / 1.34	0.060 / 0.180
Pseudo R ² / Wald χ^2	0.284	0.251	—	0.000

The results of the ordinal logistic regression above showed that Blockchain Adoption Readiness ($\beta = .362$, $p = .002$) and Big Data Analytics Capability ($\beta = .487$, $p = 0.000$) have a positive and statistically significant impact on financial reporting transparency. Likewise, both constructs have positive and significant influence on financial reporting efficiency ($\beta = 0.298$, $p = 0.004$ for BCAR; $\beta = 0.415$, $p = 0.000$ for BDAC). The moderating effect of blockchain's impact on reporting transparency can be understood from the significant positive coefficient of the moderator (BCAR $\times$ RIR), which suggests that the effect of blockchain will be stronger when the regulatory and infrastructural readiness is higher. The results for the GLS panel robustness check were also directionally consistent and statistically significant, with audit report lag and reporting cost as continuous outcome measures, which lent credence to the ordinal logistic regression results.

Discussion of Findings

The results align with the descriptive evidence that big data tools are more mature and more widely deployed in Nigeria's reporting processes than blockchain; where transparency and efficiency are concerned, Big Data Analytics Capability also has a higher impact. This aligns with Pimentel and

Boulianne (2020) who noted that accounting-sector blockchain research and application have yet to reach a mature stage in the world, and in agreement with Mariblock's (2025) elaboration that Nigeria's blockchain policy architecture is progressive but has not yet been accompanied by infrastructural depth. Surprisingly, the positive effect of blockchain readiness still validates the theoretical prediction from Agency Theory that immutable and decentralised record-keeping has a significant negative impact on managerial discretion and increases the credibility of reported information, as in the studies of Achebe et al. (2024) and Dashkevich et al. (2024). This significant moderating influence is consistent with the Diffusion of Innovation Theory's assertion that an innovation's observable relative advantage is only realised when the surrounding environment is compatible with the innovation's adoption (Rogers, 2003) and the CBN-NIBSS blockchain payment infrastructure partnership, as such relationships are between policy and practice (Chambers and Partners, 2025).

Recommendations

(i) Specific technical guidance to reduce implementation ambiguity between preparers and auditors on the recognition, verification and disclosure treatment of blockchain-recorded transactions should be developed by the Financial Reporting Council of Nigeria in collaboration with the Securities and Exchange Commission.

(ii) The Central Bank of Nigeria and NITDA should adopt the infrastructural investment model that has been showcased by the NIBSS-blockchain payment partnership to the rest of the corporate reporting ecosystem, especially the power and connectivity infrastructure needed to run real-time ledger operations.

(iii) Companies in the listed category should focus on investments in big data analytics in a phased manner because it has proven to be more effective for reporting transparency and efficiency in the short term, and preparation for deeper integration of blockchain in the long term.

(iv) The technical capacity gap observed in this study should be addressed by introducing blockchain and big data analytics skills in the continuing professional education curriculum of Professional bodies, such as ICAN and ANAN.

(v) The moderating role of regulatory-infrastructural factors that was identified in this study should be explicitly considered as a policy track and not kept separate from technology promotion.

Conclusion

This study aimed at empirically investigate the influence of blockchain and big data technology on the transparency and efficiency of financial reporting of listed companies in Nigeria. The study concludes that both technologies have real and statistically proven ability to improve financial reporting quality, but that these technologies have not yet achieved full realization of that potential due to primarily regulatory uncertainty and infrastructural shortcomings rather than inherent limitations of the technologies themselves. Big data analytics has comparatively deeper penetration in the existing reporting and assurance process in the Nigerian listed firms, whereas blockchain is still at an exploratory stage of adoption. The extent of the moderating effect of regulatory and infrastructural readiness further strengthens the findings that Nigeria's achievements in the journey of transitioning into a technology-enabled financial reporting system will rely heavily on concerted institutional actions as well as technology investments at the firm level.

Implications and Limitations of the Study

The study shows that blockchain adoption readiness and big data analytics capability can significantly improve the transparency and efficiency of financial reporting among firms listed on the Nigerian Exchange. However, the benefits of blockchain are stronger where there is adequate regulatory support and infrastructure. The findings imply that companies should invest in digital skills, data analytics and systems while gradually preparing for wider blockchain adoption. Regulators, policymakers and professional bodies must also provide clear guidelines, reliable infrastructure and relevant professional training to support technology-driven financial reporting. The

study is limited by its focus on non-financial listed firms, the 2019–2024 study period, the use of questionnaire responses and the relatively early stage of blockchain adoption in Nigeria. Other organizational and governance factors may also influence financial reporting outcomes.

Contributions of the Study

Despite these limitations, the study makes important empirical, methodological, theoretical and practical contributions. It provides evidence from Nigerian listed firms, combines survey and archival data, integrates the Technology Acceptance Model, Diffusion of Innovation Theory and Agency Theory, and demonstrates that technology alone is insufficient. Effective digital transformation in financial reporting requires supportive regulation, infrastructure, institutional coordination and professional capacity.

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