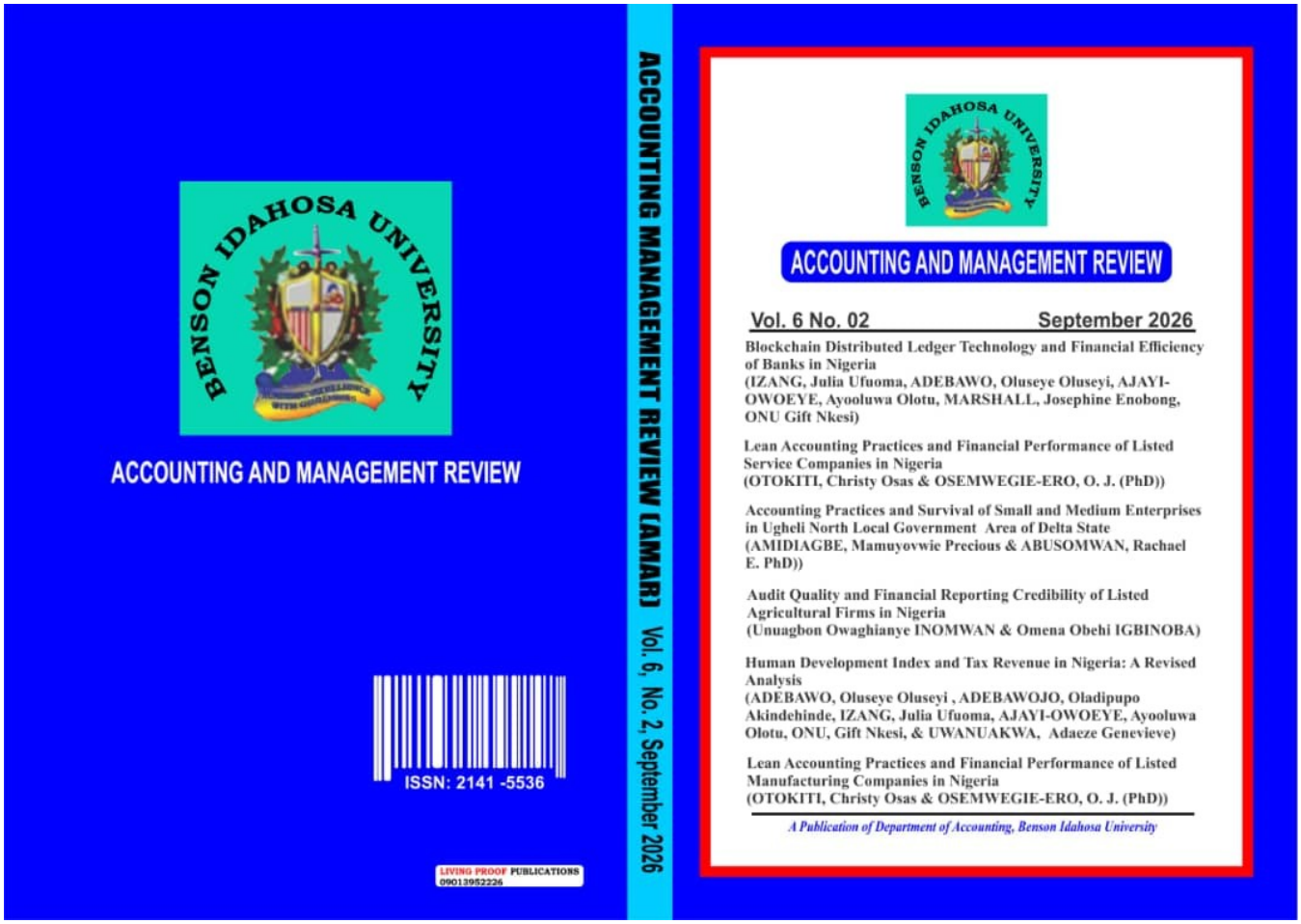


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Blockchain Distributed Ledger Technology and Financial Efficiency of Banks in Nigeria

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Abstract

The Nigerian banking sector plays a critical role in the economy by promoting financial inclusion, enabling transactions, and enhancing capital allocation. However, inefficiencies such as delayed transaction processing, fraud, and inconsistent reporting continue to reduce financial performance. This study investigated the effect of blockchain distributed ledger technology (BDLT) on the financial efficiency of banks in Nigeria. The study adopted a quantitative survey research design and utilized data collected through structured questionnaires administered to respondents selected using purposive sampling, which was justified as appropriate for targeting knowledgeable employees directly involved with banking operations, though this limits generalizability. The regression results showed that the overall models for net profit margin, return on assets, and return on equity were statistically significant ($p < 0.05$). However, at the individual variable level, reliability significantly influenced net profit margin ($p = 0.000$); reliability and timeliness significantly influenced return on assets ($p = 0.000$); but none of the three blockchain qualities transparency, reliability, or timeliness had a statistically significant effect on return on equity. Respondents perceived that blockchain contributes to improved accuracy, real-time transaction processing, and fraud reduction, leading to more efficient banking operations. However, challenges such as regulatory uncertainty and technological readiness still hinder full adoption. The study concludes that qualities of blockchain technology provide practical solutions to improve financial efficiency in Nigerian banks. It recommends banks prioritize blockchain integration to streamline operations, reduce fraud, and enhance reporting transparency. Policy reforms and investment in blockchain infrastructure are also advised to encourage sector-wide adoption and long-term sustainability.

KEYWORDS: Blockchain, distributed ledger technology, financial efficiency, fraud mitigation, transaction speed

Introduction

Despite significant technological advances, financial reporting errors remain a pervasive global issue, undermining stakeholder confidence and posing substantial risks to economic stability. These errors stem from complex accounting standards, outdated systems, and reliance on manual processes, as highlighted by corporate scandals like Enron and Wells Fargo (Bajaj & Bhattacharya, 2020). In Nigeria, persistent transparency and accountability gaps within the financial system have led to eroded trust and the revocation of 53 Deposit Money Bank licenses since 1994 (Legit.ng, 2023; Emefiele, 2022). The opacity and exclusivity

of traditional accounting where only managers and auditors fully grasp a firm's activities further diminish reliability, highlighting the need for transparent, real-time verification methods (Tapscott & Tapscott, 2019).

Blockchain technology is considered a transformative solution, offering a decentralized, transparent, and secure framework that could address these systemic flaws. By integrating distributive digital technologies, blockchain enables all network participants to hold real-time, immutable ledgers that enhance transparency, reliability, and timeliness in financial reporting (Milosavljevic et al., 2019; Dai et al., 2019). Scholars regard blockchain as a "mirror lens of future accounting," capable of curbing poor reporting practices and restoring investor confidence in an increasingly digital financial world (Ortman, 2018; Rahmawati et al., 2021). In Nigeria's banking sector, which struggles with inefficiencies, high transaction costs, and regulatory bottlenecks (Ojo, 2020; Udo, 2022), blockchain presents opportunities to streamline cross-border payments, enhance KYC processes, and prevent fraud (Akinyemi & Aderemi, 2021; Ogundipe, 2022). Initiatives like the Nigeria Interbank Settlement System's blockchain-based payment service demonstrate its potential for improving efficiency and security (NIBSS, 2021).

However, despite global adoption and proven benefits in other regions such as the U.S. and Europe, where blockchain reduces transaction costs and increases transparency (Catalini & Gans, 2016; EIB, 2021), academic research on blockchain's capacity to eliminate financial reporting errors in Nigerian banks remains limited. Existing technologies like AI and data analytics have only minimized errors, not eradicated them (Oseni et al., 2019). There is an urgent need for empirical research to explore blockchain's potential in eliminating errors of commission, omission, and timing errors that perpetuate financial misreporting and weaken stakeholder trust (Brock & Evans, 2018; Alqarni et al., 2019). Embracing blockchain could modernize accounting practices, enhance reporting accuracy and foster transparency and accountability in the financial ecosystem in Nigeria. Thus, the study aimed to examine the effect of blockchain distributed ledger technology on the financial efficiency of Nigerian banks.

LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Financial Efficiency

Financial efficiency, the strategic maximization of resources to achieve optimal outcomes with minimal waste, is a cornerstone of sound financial management. It is measured using key performance ratios that assess profitability and resource utilization. Return on equity (ROE) evaluates how effectively a company generates profit from shareholders' equity, serving as a crucial indicator of financial health and shareholder return (Brigham & Ehrhardt, 2020; Penman, 2022). Net Income Margin reveals the percentage of revenue remaining as profit after all expenses, directly reflecting operational efficiency and cost management (Graham et al., 2005; Laux & Leuz, 2022). Return on assets (ROA) measures the efficiency of using total assets to generate earnings, providing insight into management's effectiveness in leveraging the company's resource base (Brigham & Ehrhardt, 2020). Together, these metrics enable organizations to gauge performance, drive profitability, ensure long-term sustainability through practices like budgeting and forecasting (Moyer et al., 2017), and maintain a competitive edge, often enhanced by adopting technologies like data analytics for better decision-making (Moyer et al., 2017).

2.1.2 Blockchain Technology

Blockchain technology is a decentralized and distributed digital ledger in which transactions are recorded immutably and chronologically across a network of participant computers, known as nodes. Each node maintains an identical copy of the ledger, and transactions representing an exchange of value, rights, or ownership are only added after consensus is achieved among participants, eliminating intermediaries and reducing costs and processing times (Kwilinski, 2019; Deloitte, 2021). The technology's foundation lies in the secure digital timestamping concept introduced by Haber and Stornetta in 1991, which evolved into a cryptographically secured chain of blocks that prevents retroactive or prospective alteration of records (Moll & Yigitbasioglu, 2019; O'Leary, 2019). Although conceptualized earlier, blockchain gained widespread recognition with Satoshi Nakamoto's 2008 Bitcoin whitepaper, marking its first major application in digital currency, despite ongoing skepticism about its full potential (Raiborn & Sivitanides, 2015; Schmitz & Leoni, 2019).

Blockchain systems vary in design **and are primarily categorized as** public (open and transparent, e.g., Bitcoin), private (restricted access for control and privacy, e.g., Hyperledger Fabric), permissioned (balanced decentralization with controlled membership), and consortium (collaborative multi-organization networks, e.g., IBM Food Trust) (Sharma, 2023; Joannou et al., 2020).

Three core attributes define blockchain's operational value: timeliness, referring to the near-real-time processing and recording of transactions, which enhances efficiency despite variability across networks (Narayanan et al., 2016); transparency, whereby all participants have real-time access to an immutable transaction history, fostering trust, deterring fraud, and simplifying auditability (Tapscott & Tapscott, 2022; PwC, 2020); and reliability, ensured through decentralized data replication across nodes and consensus mechanisms like Proof of Work or Proof of Stake, which maintain data accuracy and resilience against failures or attacks (Nakamoto, 2008; Crosby et al., 2021). Together, these characteristics underpin blockchain's capacity to provide a secure, efficient, and trustworthy framework for diverse applications, from financial reporting to supply chain management.

2.2 Theoretical Review

The theoretical framework for this study integrates three key theories to analyze the adoption and impact of blockchain technology. Innovation Diffusion Theory (Rogers, 2003) provides a framework for understanding how blockchain spreads across a social system, moving through adopter categories (innovators, early adopters, early majority, late majority, and laggards) and influenced by factors such as its perceived relative advantage, compatibility, and complexity (Narayanan et al., 2020). Blockchain's benefits in transparency, security, and efficiency are key drivers of its adoption (Narayanan et al., 2020; Tapscott & Tapscott, 2022), though successful integration depends on compatibility with existing systems (Catalini & Gans, 2023). While the theory is critiqued for its linear assumption and underemphasis on social, political, and power dynamics (Fichman, 1992; Van de Ven et al., 2019; Greenhalgh et al., 2020), its focus on social systems and the influential role of early adopters in reducing perceived risks remains valuable for understanding blockchain's diffusion (Rogers, 2003; Gohar et al., 2021).

Agency Theory (Jensen & Meckling, 1976) explains how blockchain can mitigate the principal-agent problem by reducing information asymmetry through its immutable and transparent ledger, thereby minimizing managerial opportunism and aligning the interests of managers (agents) with shareholders (principals) (Eisenhardt, 1989). Blockchain's decentralized nature

enhances the integrity of financial records and fosters accountability (Catalini & Gans, 2023; Tapscott & Tapscott, 2021), while smart contracts automate compliance and performance evaluation, further aligning incentives (Nakamoto, 2008; Buterin, 2021). Critics argue the theory oversimplifies human behavior by focusing narrowly on self-interest and control, potentially fostering distrust and overlooking intrinsic motivations and modern business complexities (Donaldson, 2021; Shleifer & Vishny, 2020; Miller & Shamsie, 2019). Nonetheless, blockchain provides a powerful real-time monitoring mechanism that complements the theory's emphasis on verification and incentive alignment (Nakamoto, 2019; Buterin, 2021; Dai et al., 2019).

Contingency Theory (Fiedler, 1964) posits that organizational effectiveness depends on aligning practices with specific contextual factors. Applied to blockchain, this theory asserts that successful implementation is contingent on tailoring the technology to an organization's unique needs, size, regulatory environment, and operational complexity (Li et al., 2020; Mertens et al., 2021). Blockchain's potential to enhance financial reporting accuracy and reduce fraud is maximized when its deployment is aligned with specific reporting requirements and regulatory frameworks (Kshetri, 2021). Critics contend the theory can be overly deterministic, lack practical implementation guidance, and underestimate managerial agency and the dynamic nature of modern business environments (Donaldson, 2020; Lawrence & Lorsch, 1967; Fiedler, 2019). However, supporters emphasize its necessity for a contextualized approach, arguing that blockchain's benefits in transparency and security are contingent upon proper alignment with organizational strategy and infrastructure (Deveraj et al., 2018; Granados et al., 2020; Gohar et al., 2021; Catalini & Gans, 2023).

Collectively, these theories form a comprehensive analytical lens: Diffusion of Innovation explains the pattern of blockchain's adoption, Agency Theory elucidates its role in resolving governance and reporting conflicts, and Contingency Theory highlights the contextual factors determining the success of its implementation.

2.3 Empirical Review

Multiple studies confirm that blockchain adoption has a significant positive effect on core financial performance indicators. Research has shown it enhances net income (Wu et al., 2020; Bonson & Badnarova, 2022; Bashaer, 2023; Abu et al., 2023), earnings per share (Nguyen & Hoang, 2023; Rehab, 2023; Bonsón & Bednárová, 2019), return on equity (Seyed & Jafar, 2021; Schmitts & Leoni, 2019), and return on investment (Nguyen & Hoang, 2023; Dai & Vasarhely, 2017; Martinez, 2020). The primary mechanisms driving these improvements are the enhancement of information quality, accuracy, and timeliness (Wu et al., 2020; Bonson & Badnarova, 2022; Oleg & Volodymyr, 2023), which reduce errors and fraud, thereby leading to more reliable financial statements and better decision-making.

A dominant theme across the literature is blockchain's revolutionary potential for auditing. Studies consistently find that blockchain improves audit quality, efficiency, and security by enabling real-time or continuous auditing, providing immutable audit trails, and automating compliance through smart contracts (Sahlin & Levenby, 2018; Kim & Shin, 2019; Li et al., 2021; Kadir et al., 2022). This reduces audit costs, minimizes human error, and expands the scope for advisory services (Bonson & Badnarova, 2022; Rehab, 2023). However, this transformation necessitates the evolution of audit methods, standards, and auditor skills,

areas identified as critical gaps in current research (CPA Ireland, 2023; Brender & Gauthier, 2019; Hossain, 2025).

The adoption of blockchain is framed by several theoretical lenses, including the Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT), Agency Theory, and Contingency Theory. Drivers of adoption include its perceived usefulness and relative advantage in improving performance and transparency (Seyed & Jafar, 2021; Wu et al., 2020), as well as its capacity to mitigate principal-agent conflicts by reducing information asymmetry (Martinez, 2020; Sonia et al., 2021). Significant barriers persist, particularly technological complexity, integration challenges with legacy systems, and a lack of regulatory clarity (Pereraa & Abeygunasekera, 2022; Tapscott & Tapscott, 2021; Sundarasen et al., 2023). Crucially, Contingency Theory underscores that successful implementation is highly dependent on contextual factors like organizational size, IT infrastructure, and the regulatory environment (Nguyen & Hoang, 2023; Nidal & Hamza, 2024; Dai & Vasarhely, 2017).

Despite the volume of research, the review highlights several persistent gaps. A major shortcoming is the lack of generalizable empirical evidence, with many studies focused on single countries or sectors (Bashaer, 2023; Abu et al., 2023; Sonia et al., 2021). There is a pronounced need for more research on the practical implementation challenges, organizational adjustments, and the development of necessary legislative frameworks (Sahlin & Levenby, 2018; Rehab, 2023; Schmitz & Leoni, 2019). Other critical gaps include understanding the integration of blockchain with IoT and non-financial data (Dai & Vasarhelyi, 2017), its broader implications for accounting practices beyond technical ledger-keeping (Asuman & Göksal, 2021), and the ethical, regulatory, and cross-cultural dimensions of its adoption in auditing (Kim & Shin, 2019; Schmitz & Leoni, 2019; Natalia et al., 2024).

METHODOLOGY

This study employed a quantitative survey research design to investigate the impact of blockchain distributed ledger technology on financial efficiency within the Nigerian banking sector. The target population comprised 113,000 employees across ten purposively selected listed deposit money banks. Purposive sampling was adopted to target respondents with direct knowledge and involvement in banking operations, digital transformation, and financial reporting processes, thereby ensuring the relevance and quality of responses. However, this choice limits the generalizability of findings, using the Taro Yamane formula, a sample size of 382 respondents was determined, with data collected via a structured questionnaire distributed electronically. The questionnaire employed a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Validity was established through expert review (content validity), and reliability was tested using Cronbach's Alpha, with all constructs exceeding the acceptable threshold of 0.70. Data analysis was conducted using SPSS software, employing descriptive statistics and relevant inferential tests with respect to the research objectives. Diagnostic checks for multicollinearity (VIF), normality, and heteroskedasticity were conducted and met acceptable thresholds.

Model Specification

Y = f(X)

Y = Dependent variable (Financial Efficiency) (FIE)
X = Independent variable (Blockchain Distributed Ledger Technology) (BDL)

Y = y_1, y_2, y_3
y_1 = Net Profit Margin (NPM)
y_2 = Return on Assets (ROA)
y_3 = Return on Equity (ROE)

X = x_1, x_2, x_3
x_1 = Transparency (TRA)
x_2 = Reliability (REL)
x_3 = Timeliness (TIM)

Functional Relationships

NPM = f(TRA, REL, TIM) ..... equation 1
ROA = f(TRA, REL, TIM) ..... equation 2
ROE = f(TRA, REL, TIM) ..... equation 3

Therefore, the regression equations are:

$ROA = \beta_0 + \beta_1 TRA + \beta_2 REL + \beta_3 TIM + \mu$ ..... Model i
$ROE = \beta_0 + \beta_1 TRA + \beta_2 REL + \beta_3 TIM + \mu$ ..... Model ii
$NPM = \beta_0 + \beta_1 TRA + \beta_2 REL + \beta_3 TIM + \mu$ ..... Model iii

Where:
β_0 = Intercept
μ = Error Term
$\beta_1 - \beta_3$ = Coefficients of the Independent Variables

Results Presentation and Discussion of Findings

4.1 Descriptive Statistics

Variable (Construct)	Overall Mean ($\bar{x}$)	Overall Standard Deviation (SD)
Transparency (TRA)	2.18	1.084
Reliability (REL)	2.26	1.059
Timeliness (TIM)	2.3	1.028
Net Profit Margin (NPM)	2.21	1.038
Return on Assets (ROA)	2.26	0.974
Return on Equity (ROE)	2.16	0.933

Interpretation: On a Likert scale where 1 = Strongly Agree and 5 = Strongly Disagree, lower mean scores indicate stronger agreement. The analysis of respondent perceptions reveals a generally positive view, with mean scores ranging from 2.16 to 2.30 indicating agreement that blockchain distributed ledger technology (DLT) enhances financial efficiency and key performance metrics in Nigerian banks. The strongest agreement and highest consensus were observed for return on equity (ROE) (mean: 2.16, SD: 0.933), reflecting unified

confidence in blockchain's ability to improve profitability relative to shareholder capital. In contrast, while respondents agreed that transparency (TRA) (mean: 2.18) is beneficial, it showed the highest variability in responses (SD: 1.084), indicating less uniform opinions on its specific impact. The remaining constructs reliability (REL), timeliness (TIM), net profit margin (NPM), and return on assets (ROA) all received moderately positive ratings with standard deviations near or above 1.0, suggesting overall agreement tempered by some divergence in views regarding the extent of their influence on financial efficiency.

4.2 Testing of Hypotheses

Table 4.2.1: Regression Analysis of Qualities of Blockchain and Net Profit Margin (NPM)

Model One				
Variable	**Coefficient**	**Std.Err**	**t-stat.**	**Probability**
(Constant)	1.287	0.135	9.527	0.000
TRA	-0.003	0.033	-0.09	0.929
REL	0.411	0.043	9.469	0.000
TIM	-0.001	0.037	-0.041	0.968
F-stat	31.941			
P-value	0.000			
Adjusted R^2	0.202			

Source: *Field Survey 2025*

Model 1

$$NPM = 1.287 - 0.003TRA + 0.411REL - 0.001TIM + \mu$$

Regression Estimate Interpretation

The regression analysis reveals a statistically significant positive effect of blockchain's reliability (REL) on net profit margin (NPM), with a coefficient of 0.411 (p = 0.000), indicating that a one-unit increase in reliability leads to a 0.411 unit increase in NPM. In contrast, the coefficients for transparency (TRA) and timeliness (TIM) were -0.003 (p = 0.929) and -0.001 (p = 0.968), respectively, showing no statistically significant impact on NPM. The overall model is significant (F-statistic = 31.941, p = 0.000), but the adjusted R^2 of 0.202 indicates that only 20.2% of the variation in NPM is explained by these blockchain qualities, implying other external factors are influential. Consequently, the null hypothesis ($H_{0\ 1}$) is partially rejected; reliability enhances profitability, while transparency and timeliness do not.

These findings align with studies highlighting blockchain reliability's role in improving data accuracy and cost efficiency (Cao et al., 2022; Olaleye et al., 2025) but contrast with research emphasizing transparency's direct link to performance (Lee & Li, 2021) or timeliness's impact on financial outcomes (Cardona-Montoya et al., 2019). The model's low explanatory power confirms that external elements such as regulation and market competition are major drivers of profitability. These findings indicate that while banks should focus on implementing reliable blockchain systems, these efforts must be part of a wider strategy to effectively enhance net profit margins.

Table 4.2.2: Regression Analysis of Qualities of Blockchain and Return on Assets (ROA)

Model Two				
Variable	**Coefficient**	**Std.Err**	**t-stat.**	**Probability**
(Constant)	1.332	0.116	11.489	0.000
TRA	-0.010	0.028	-0.341	0.734
REL	0.153	0.037	4.097	0.000
TIM	0.265	0.032	8.372	0.000
F-stat	31.134			
P-value	0.000			
Adjusted R^2	0.602			

Source: *Field Survey 2025*

Model 2 :

ROA = 1.332 − 0.010TRA + 0.153REL + 0.265TIM + μ

Regression Estimate Interpretation

Based on the regression analysis, blockchain's qualities have a differentiated impact on return on assets (ROA) in Nigerian banks. Both reliability (REL) and timeliness (TIM) show a statistically significant positive effect, with coefficients of 0.153 (p = 0.000) and 0.265 (p = 0.000), respectively. This indicates that improvements in financial reliability and faster transaction processing directly enhance asset utilization and efficiency. In contrast, transparency (TRA) has a negligible and statistically insignificant coefficient of -0.010 (p = 0.734), suggesting it does not meaningfully influence ROA.

The overall model is statistically significant (F-statistic = 31.134, p = 0.000) and demonstrates strong explanatory power, with an adjusted R^2 of 0.602, meaning that 60.2% of the variation in ROA is explained by these blockchain factors. Consequently, the null hypothesis ($H_{0\ 2}$) is partially rejected; reliability and timeliness positively impact ROA, while transparency does not.

These findings align with prior research emphasizing that blockchain's reliability improves financial accuracy and asset management (Wang & Kogan, 2019; Adebayo et al., 2021) and that its timeliness enhances asset turnover (Mol-Gómez-Vázquez et al., 2025). The non-significant role of transparency, however, contrasts with studies linking it to investor confidence (Khan et al., 2019), suggesting that in banking, operational efficiency factors may outweigh transparency's direct effect on asset returns. The substantial unexplained variance (nearly 40%) implies that external factors like regulation and market conditions also critically shape ROA.

Table 4.2.3: Regression Analysis of Qualities of Blockchain and Return on Equity (ROE)

Model Three				
Variable	**Coefficient**	**Std.Err**	**t-stat.**	**Probability**
(Constant)	2.201	0.121	18.201	0.000
TRA	-0.031	0.029	-1.046	0.296

REL	-0.023	0.039	-0.600	0.549
TIM	0.035	0.033	1.060	0.290
F-stat	31.134			
P-value	0.000			
Adjusted R^2	0.551			

Source: *Field Survey 2025*

Model 3

ROE = 2.201 − 0.031TRA − 0.023REL + 0.035TIM + μ

Regression Estimate Interpretation

Based on the regression analysis, none of the studied blockchain qualities transparency (TRA), reliability (REL), and timeliness (TIM) have a statistically significant effect on return on equity (ROE) in Nigerian banks at the 0.05 significance level. Their coefficients are -0.031 (p = 0.296), -0.023 (p = 0.549), and 0.035 (p = 0.290), respectively, all with p-values greater than 0.05. Consequently, the null hypothesis ($H_{0\ 3}$) that blockchain distributed ledger technology has no significant effect on ROE.

Despite the individual insignificance of the variables, the overall model is statistically significant (F-statistic = 31.134, p = 0.000) and has moderate explanatory power, with an adjusted R^2 of 0.551, indicating that 55.1% of the variation in ROE is explained by these factors collectively. The discussion suggests that ROE is influenced more by financial leverage, capital structure, regulatory policies, and macroeconomic conditions than by the operational efficiencies blockchain provides (such as fraud reduction and transaction speed). While blockchain may enhance banking processes, these improvements do not directly translate into higher shareholder returns, implying that banks should integrate blockchain adoption within broader financial and strategic frameworks to impact ROE meaningfully.

4.3 Implications of the Findings

The findings of this study, which examine the effect of the qualities of blockchain distributed ledger technology on financial performance in Nigerian banks, hold significant implications for various stakeholders, including bank management, policymakers, financial analysts, and researchers.

For bank management, the results indicate that while blockchain technology offers operational benefits such as increased transparency, reliability, and timeliness, these do not significantly impact financial performance metrics such as return on assets (ROA) and return on equity (ROE) at the individual variable level for ROE, though reliability and timeliness do affect ROA. This suggests that banks should not expect immediate financial gains solely from blockchain adoption. Instead, they should integrate blockchain solutions strategically, focusing on improving efficiency, preventing fraud, and enhancing transaction security. The finding that blockchain does not significantly influence ROE implies that banks must align its implementation with broader profitability strategies, such as improving lending models, optimizing capital allocation, and reducing costs. Furthermore, since blockchain did not show a strong direct impact on financial returns, management should assess whether the cost of

implementation outweighs its benefits, ensuring that investments in distributed ledger technology align with long-term growth objectives.

For policymakers, the study highlights the need to create regulatory frameworks that support blockchain adoption while ensuring financial stability. While blockchain has the potential to improve banking operations by reducing fraud, enhancing transaction speed, and increasing transparency, its lack of significant impact on some financial returns suggests that banks may be hesitant to adopt it on a large scale. Policymakers should therefore consider offering incentives, such as tax reductions or grants, to encourage banks to integrate blockchain technology while managing potential risks associated with data security and regulatory compliance. Additionally, as blockchain adoption increases globally, Nigerian financial regulators must ensure that domestic banks remain competitive by developing policies that facilitate the secure and efficient use of blockchain in financial transactions. This includes establishing standardized guidelines for blockchain-based banking operations and ensuring that data privacy regulations align with international standards.

For financial analysts, the findings suggest that blockchain implementation should not be viewed as a direct indicator of a bank's profitability. While blockchain may improve banking processes, its impact on key financial metrics like ROA and ROE is mixed positive for ROA (via reliability and timeliness) but insignificant for ROE meaning analysts should focus more on traditional performance drivers such as interest income, credit risk management, and cost-to-income ratios when assessing a bank's financial health. Additionally, the study suggests that blockchain may provide long-term operational advantages rather than immediate financial benefits. As such, analysts should consider the long-term strategic role of blockchain adoption when evaluating a bank's future growth potential, rather than expecting short-term profitability increases.

For researchers, this study presents opportunities for further exploration into how blockchain technology influences financial performance in different contexts. Given that blockchain did not significantly affect ROE and had mixed effects on ROA and NPM, future studies could investigate whether other performance indicators, such as cost efficiency, non-performing loan ratios, or customer acquisition rates, are more directly impacted by blockchain implementation. Additionally, comparative studies between banks that have fully integrated blockchain solutions and those that have not could provide deeper insights into the specific conditions under which blockchain contributes to financial growth. Researchers may also explore the long-term effects of blockchain adoption, particularly its role in financial risk management, cybersecurity, and regulatory compliance, to understand whether its impact on banking profitability evolves over time.

Ultimately, the findings suggest that while blockchain technology enhances operational aspects of banking, it does not automatically translate into higher financial returns. Stakeholders should therefore view blockchain as a tool for improving efficiency and security rather than expecting it to be a primary driver of profitability. For blockchain to have a more significant impact on financial performance, banks may need to integrate it with other strategic initiatives, such as digital banking expansion, cost optimization, and enhanced financial product offerings.

Conclusion and Recommendations

5.1 Conclusion

This study investigated the impact of blockchain distributed ledger technology on key financial performance indicators return on assets (ROA) and return on equity (ROE) in Nigerian banks. The regression analysis found that at the individual variable level, reliability and timeliness had statistically significant positive effects on ROA, while reliability alone significantly influenced NPM. However, none of the three blockchain qualities (transparency, reliability, and timeliness) had a statistically significant effect on ROE. The overall models for NPM, ROA, and ROE were statistically significant, indicating that these blockchain-related factors collectively explain meaningful portions of the variance in these metrics. The findings challenge the assumption that blockchain is a direct driver of profitability. Instead, they position it as a strategic tool for enhancing long-term operational efficiency, security, and structural integrity within banks. Consequently, for blockchain to impact financial performance, it must be integrated as part of a broader strategic transformation rather than as a standalone financial solution.

5.2 Recommendations

Based on the study's findings that blockchain distributed ledger technology has mixed effects on financial efficiency indicators (significant for ROA and NPM via reliability and timeliness, but insignificant for ROE) in Nigerian banks, the following interconnected recommendations are proposed to harness its potential. First, banks Directors should prioritize the strategic implementation of blockchain for operational efficiency, targeting areas like cross-border payments and fraud detection to yield long-term cost and security benefits. To ensure effectiveness, investment in employee training and capacity building is essential to bridge knowledge gaps and foster innovation in blockchain applications. Concurrently, collaboration with regulatory bodies is needed to develop clear, supportive frameworks that mitigate adoption risks and encourage industry-wide integration. Furthermore, to enhance its impact, blockchain should be integrated with complementary technologies like AI and big data analytics to unlock new revenue streams and improve decision-making, thereby indirectly supporting financial performance over time.

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Lean Accounting Practices and Financial Performance of Listed Service Companies in Nigeria

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Abstract

The research problem of this paper investigated the relationship between lean accounting practices and financial performance of listed service companies in Nigeria. Lean accounting practices were disintegrated into cash conversion cycle and Kazien costing while financial performance was measured using return on asset. The study adopted *ex post facto* research design in exploring the link between lean accounting practices and financial performance of listed service companies in Nigeria. The study used secondary data assembled from the annual reports of the companies under investigation for the period of twelve (12) years from 2013 to 2024. The data were analyzed using panel least squares regression technique. This was conducted with the aid of the E-view 10.0 software and Excel package. Findings from the study revealed that cash conversion cycle has a negative and significant relationship with financial performance while kaizen costing has a positive and significant relationship with financial performance of listed service companies in Nigeria. Thus, the study concluded that cash conversion cycle and kaizen costing are good predictors of financial performance of listed service companies in Nigeria. Based on these findings, this study recommends that companies should re-evaluate and re-investigate the specific aspects of cash conversion cycle that might be contributing to such negative effects and recognize possible drawbacks associated with cash conversion cycle, discover other cash management policies that might be more operational in enhancing financial performance, and perform industry-specific investigation to determine if the adverse impacts hold across diverse companies. Companies should also focus on the implementation of kaizen costing system to ensure uninterrupted progress as well as cost decline plans so as to maintain better financial performance.

Keywords: Lean accounting practices, Financial performance, Cash conversion cycle, Kaizen costing, Firm age

INTRODUCTION

In today's competitive and dynamic business environment, Nigerian companies face increasing pressure to enhance efficiency, reduce costs, and improve financial performance (Kristina, 2025). Traditional accounting systems, with their emphasis on standard costing and functional reporting, have often been criticized for being slow, bureaucratic, and misaligned with operational realities, thereby limiting their usefulness in guiding strategic decision-making and performance improvement. According to Kristina (2025), lean accounting is an approach that aligns accounting practices with lean principles such as waste elimination, value-stream costing, cash conversion cycle, and kaizen costing (continuous improvement) which has been proposed as a more effective

alternative because it provides clearer, more actionable financial information tied to operational performance drivers.

However, empirical evidence on lean accounting practices and their effects on financial outcomes is still limited in Nigeria (Abubakar et al., 2024). Although some studies (Abubakar et al., 2024; Etale & Sawyerr, 2024; Otuya & Eginiwin, 2024) have indicated a significant positive relationship between lean accounting adoption and financial performance among quoted manufacturing companies in Nigeria, others (Abubakar & Muniru, 2023; Afum et al., 2024) have shown mixed results or focused on related management practices without isolating the unique contribution of lean accounting techniques (cash conversion cycle and kaizen costing) to financial indicators such as profitability, return on assets (ROA), and return on equity (ROE).

Gap in Extant Literature

Nevertheless, there is a knowledge gap regarding the effectiveness of these practices in the Nigerian listed companies. This knowledge gap further outline the necessity for an intensive examination into how lean accounting practices influence the financial performance of listed companies in Nigeria,

Another motivation was the conflicting research outcomes of prior studies necessitated the conduct of this current study to explore the link between lean accounting practices and financial performance of listed service companies in Nigeria. Investigating this link is important not only for advancing theoretical understanding but also for informing managerial practices and policy frameworks that can enhance competitiveness and sustainability of Nigerian firms in a challenging economic environment. Therefore the study has the objective of examining the relationship between lean accounting practices and financial performance of listed service companies in Nigeria. The specific objectives were to:

- Examine the relationship between cash conversion cycle and financial performance of listed service companies in Nigeria; and
- Ascertain the relationship between kaizen costing and financial performance of listed service companies in Nigeria.

Against the backdrop of knowledge gap identified, this study seeks to answer how the lean accounting practice affects financial performance of listed service companies in Nigeria. Consistent with this, the resulting specific questions were formulated for the study:

- What is the relationship between cash conversion cycle and financial performance of listed service companies in Nigeria?
- What is the relationship between kaizen costing and financial performance of listed service companies in Nigeria?

LITERATURE REVIEW

Financial Performance

Financial performance is generally defined as a gauge of the extent to which a firm uses its assets to run the business activities to earn revenues (Steward, 2019). It represents a measure of a company's overall state of the economy over a given period of time. It can be used to compare a company's performance to that of similar organizations in related industries or to that of other businesses. Amahi (2023) postulates that return on assets is a significant measure of financial performance that is regularly used in gauging a company’s performance as it can disclose how well a company generates income. Return on asset

(ROA) is a metric that is typically used to measure a company's historical profitability in order to predict its future profitability.

Myšková and Hájek (2017) argued that ROA makes it possible to compare businesses with varying debt-to-financial-resource ratios. While a low ROA percentage suggests that the company is ineffective at converting its assets into revenue, a high ROA percentage indicates that the company is primarily successful at doing so (Anozie et al 2023).
However, a company's ability to offset its current liabilities (which is mostly determined by its liquidity ratio) affects its return on assets (ROA). The asset management ratio shows how well the company uses its resources. A company's ability to satisfy its non-current obligations, to finance its corporate endeavors, is assessed using the asset management ratio. In light of this, ROA was calculated in this study as the ratio of EAT to the firm's total assets.

Lean Accounting Practices

Lean accounting is an accounting approach that supports lean management and lean manufacturing by focusing on waste elimination, continuous improvement in corporate operations, simplified financial reporting, value stream performance measurement, and real-time operational decision support (Afum et al., 2024). Lean accounting simplifies management reporting and coordinate financial metrics with lean principles (Kristina, 2025). Instead of traditional cost allocation methods, lean accounting emphasizes efficient cash conversion cycle, value stream costing, kaizen costing, inventory turnover ratio, operational metrics, and clear financial visibility. Arguably, lean accounting system is adopted by Nigerian firms purposely to decrease excessive paperwork, complex financial reports, redundant approval processes, as well as unnecessary cost allocations (Abiodun, 2023). In this study, lean accounting practice was decomposed into cash conversion cycle and kaizen costing system due to high production costs, inflation rate, and energy instability. These lean accounting variants were discussed thus:

1. Cash Conversion Cycle and Financial Performance

Doan and Bui (2020) and Stewart (2019) argues that the cash conversion cycle (CCC) is a composite metric describing the average dollar investment in inventory into a dollar collected from a customer. While Besley and Brigham (2023) describe cash conversion cycle as the period from the payment for the purchase of raw materials to manufacture a product up-to the collection of account receivables (debtors) associated with high profitability. Hossain (2020) emphasized that because it results from an optimistic association between the CCC and operating profit, the impact of the CCC decision on gross profit (GP) is a measure of business performance.

Nwokoye (2024) investigated the link between cash conversion cycle and performance of listed firms in Nigeria for the period of 11 years from 2010 to 2020. Cash conversion cycle was decomposed into days inventory turnover (DIO), days payables outstanding (DPO) and days sales outstanding (DSO) while performance was measured using ROA. The data gathered were analysed using pooled OLS and multivariate panel regression technique and showed a negative and significant link between DIO and DSO and performance. Nevertheless, the literature showed an insignificant link between DPO and performance. Abubakar and Muniru (2023) examined the link between credit management and performance of 10 listed banks in Nigeria. The literature utilized ex-post facto research design and the data sourced were analysed using ordinary least square (OLS) regression technique. Credit management was captured using nonperforming loans (NPLN), total bad debts written-off (TBDW), capital adequacy (CPAD), and the liquidity level which is measured by the acid-test ratio (LQDL) while performance was measured using return on

equity (ROE). Findings revealed that non-performing loans, Total bad debt written-off, capital adequacy and liquidity level have positive and substantial link with performance of quoted banks in Nigeria. Base on the above, the study posits the hypothesis,

Ho_1. that *Cash conversion cycle has no significant relationship with financial performance of listed service companies in Nigeria.*

1. Kaizen Costing and Financial Performance

According to Adeniji (2021) and Imai (2019), Kaizen is a fundamental concept in management sciences which originated from Japan and which covers most Japanese management practices since the 1950s through 1980s. Kaizen, otherwise called continuous improvement, is a continuous process of improvement carried out by the person who is doing the job in the day-to-day workplace. It involves everyone, managers and worker alike, for ongoing improvements (Khan, 2020). Blocher et al. (2019) define Kaizen costing technique as the application of continuous improvement specifically to reduce costs; it focuses on making production and service delivery processes more efficient. Against the backdrop, Nderi (2024) explored the link between kaizen operations and performance improvement of 13 quoted manufacturing companies in Kenyan. The study employed primary data through questionnaire and the data obtained were analysed using regression technique. The outcomes revealed kaizen costing has changing levels of execution among Kenyan manufacturing companies. However, the finding showed a significant link between Kaizen costing and performance improvement in Kenya.

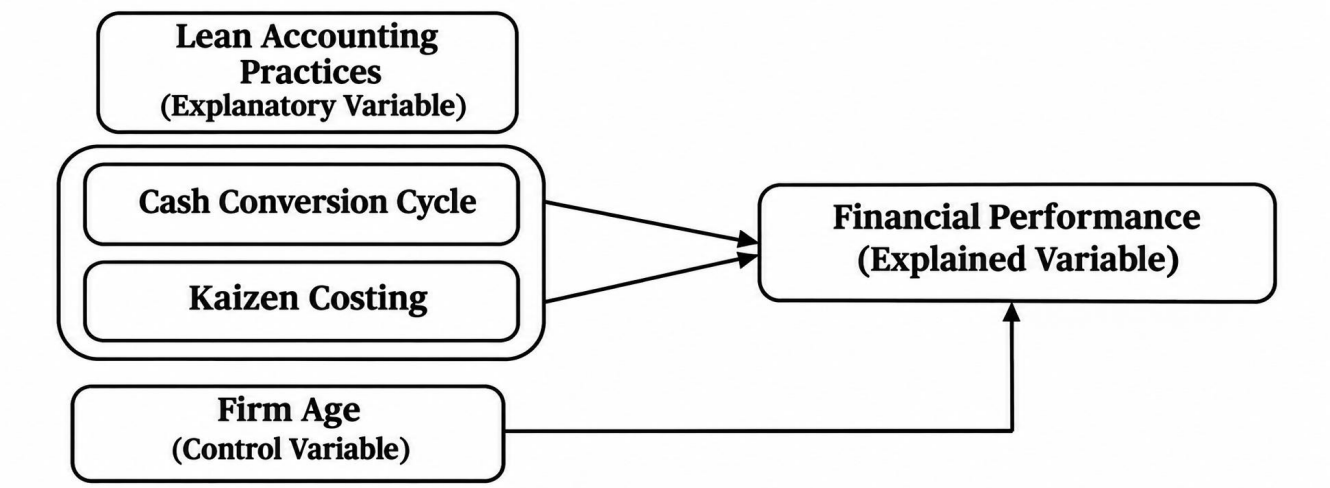
Dibiku (2024) examined the mediating role of customer-supplier connections on organizational culture, continuous improvement, and productivity. The literature utilized a sample of 240 listed manufacturing companies in Ethiopia. The data sourced were analysed using Partial least squares-based structural equation modeling (PLS-SEM). The literature found a positive and substantial link between the mediating role of customer-supplier on the link between kaizen costing and productivity in Ethiopia.

Omotayo et al. (2024) examined the critical success factors for Kaizen implementation in the Nigerian construction industry. Exploratory factor analysis statistical test categorized the CSF identified in the literature review section. A comprehensive sampling method was adopted in synthesizing 135 five-point Likert scale questionnaire from a higher population in Nigeria. Construction management role, corporate productivity, corporate ethics and cost management were the critical success factors reviewed using an exploratory factor analysis test. It was observed that kaizen costing can be implemented among the Nigerian construction firms with considerations on the principal drivers for the critical success factors.

Jibrin and Ine-Tonbarapa (2023) examined the link between kaizen costing and financial performance of 9 quoted consumer goods firms in Nigeria. Kaizen costing was measured as the product of actual cost of production in the previous year and estimated production for the current year while financial performance was measured using return on asset. The literature adopted a sample size of one hundred and eighty-three (183) respondents as well as secondary data collected from the annual reports of companies for the respective years. The data assembles were analysed using multiple regression technique. The literature ascertained an inconsequential link between kaizen costing (KAC) and return on asset (ROA) of quoted consumer goods firms in Nigeria. However, the study established a substantial link between kaizen costing (KAC) and return on equity (ROE) of listed consumer goods companies in Nigeria. Based on the above review, the study posits the hypnosis's

Ho_2: that *Kaizen costing has no significant relationship with financial performance of listed service companies in Nigeria.*

Figure 1: Schema on the Relationship between Lean Accounting Practices and Financial Performance



Source: Researcher's Idea (2026)

2.4 THEORETICAL FRAMEWORK

2.4.1 Contingency Theory

The theory on which this study is anchored is the contingency theory which is credited to Fred Fiedler in the 1960s. The theory emphasizes that the effectiveness of leadership depends upon the link between a leader's style and the specific situational factors. The theory suggests that the effectiveness of management practices, including cost management practices, depends on the alignment between the characteristics of the organization and the external environment (Akinleye & Oluyori, 2023). In the context of standard / cost, the contingency theory implies that the use of standard cost should be contingent upon the specific characteristics of the listed companies and the Nigerian market. The effectiveness of standard cost in improving financial performance may vary depending on factors such as company size, industry dynamics, competitive pressures, and customer preferences. For instance, larger companies may benefit from standard cost by having a standardized approach to cost estimation, control, and analysis across multiple products or divisions. On the other hand, smaller companies with more niche products may find it challenging to establish accurate standard costs due to the variability and uniqueness of their offerings (Ochigbo & Emeti, 2019).

METHODOLOGY AND METHOD SPECIFICATION

The study adopted *ex post facto* research design in investigating the relationship between lean accounting practices and financial performance of listed companies in Nigeria for a period of twelve (12) years from 2013 to 2024. 2013 was chosen due to the fact that it was the second stage of the adoption of International Financial Reporting Standards (IFRS) for the preparation of financial statements by listed companies in Nigeria. Also, the choice of 2024 was made to enable the researcher consider more recent data. The total population of the study was restricted to three (3) sectors on the Nigerian Exchange Group (NGX) as at 31st December, 2024. It involved 34 companies disintegrated into 22 service companies, 8 construction/real estate companies and 4 natural resources companies. The choice of

these sectors was made because these sectors tend to ensure job creation, infrastructural development, economic diversification, and improved government revenue. Due to the smallness of the population of the study, the entire companies were taken as sample using the census technique.

The Panel Least Squares (PLS) regression technique was adopted in investigating the relationship between lean accounting practices and financial performance of listed companies in Nigeria. PLS was chosen because it assisted in adjusting for unseen determinants that are constant over time for a specific company but may change across diverse companies. This was conducted with the aid of the E-views software and Excel package. In interpreting the PLS regression model, some statistics were generated among which are the Hausman statistic, F-Statistic, Jarque-Bera (J-B) statistic, Durbin-Watson (D-W) statistic, t-statistics, coefficient of determination (R-Squared), and the adjusted R-Squared which represents the goodness-of-fit measures. Inference drawn from the PLS regression analysis was based on the mentioned statistics. Nevertheless, it was very vital to ascertain whether the model was capable of predicting the financial performance of listed service companies in Nigeria.

Premised on contingency theory, this study adapted the model by Jibrin and Ine-Tonbarapa (2022) and improved on the model by using cash conversion cycle (CCC) and kaizen costing (KZC) instead of just-in-time costing (JTC) and value stream mapping (VSMC) to suit the study. The model used by Jibrin and Ine-Tonbarapa (2022) is shown thus:

$NLROE_{it} = {}_0 + {}_1(NLJITC) + ŏ\ (.05)$ …….. (1)

$NLROE_{it} = {}_0 + {}_1(NLVSMC) + ŏ\ (.05)$ …….. (2)

Where NLROE = Natural Log of Return on Equity; NLJITC = Natural Log of Just-in-Tim Costing; NLVSMC = Natural Log of Value Stream Mapping; and ŏ = Erro Term. Therefore, the functional model formulated in this study is stated as follows:

Financial performance = f (Lean Accounting Practices)……(3)

Financial performance = f (CCC,KZC))……..……(4)

Flowing from the functional model and integrating the control variable, the econometric model is specified thus:

$A = 0 + {}_1CCC + {}_2KZC + {}_3FAGE + ų_{it}$.....(5)

Where ROA = Return on Assets; CCC = Cash Conversion Cycle; KZC = Kaizen Costing; FAGE = Firm Age; ų = The Stochastic Error Term; i = Firm; t = Period

Considered; β_0 = Intercept; β_1, β_2, β_3 = Parameter Estimates; *a priori* expectations are $\beta_1<0$, $\beta_2>0$ and $\beta_3>0$which suggests that the variables are expected to be good predictors of financial performance, specifically to be consistent with existing theory (contingency theory) on which this study is anchored.

Operationalisation of Variables

The explained and explanatory variables, as shown in Table 1 below, were measured as follows:

Table 1: Measurement of Variables

S/N	Variables	Acronyms	Measurements	Apriori Sign	Sources
	Dependent				
1	Financial Performance	ROA	This was computed as the proportion of earnings after tax to total assets i.e ( ) / ( )		Mandipa and Sibindi (2022)
	Independent				
2	Cash Conversion Cycle	CCC	This was measured as the ratio of average inventory to cost of goods sold multiplied by 365 days i.e g ( ) X 365	-	Ukehinakachi et al. (2023)
3	Kaizen Costing	KZC	This was captured as the logarithm of the product of actual cost of production in the previous year and estimated production for the current year i.e Logarithm of actual cost of production X estimated production for the current year	+	Titu (2020)
	Control				
4	Firm Age	FAGE	This was measured as number of years of incorporation of a firm	+	Akenroye et al. (2022)

Source: Researcher's Compilation (2026)

Data Presentation and Interpretation of Results

Pre-Diagnostic Tests Descriptive Analysis

Descriptive analysis helps in expounding the statistical features of any dataset. In this study, significance was placed on values of the mean, minimum, maximum, and standard deviations, as these are the statistics often used by most researchers.

Table 2: Descriptive Statistics

	ROA	CCC	KZC	FAGE
Mean	0.266	1.959	2.01E	35.977
Median	0.021	1.845	6.22E	32.500
Maximum	221.366	7.751	3.04E	76.000
Minimum	-1146.513	-1.045	0.000	0.000
Std. Dev.	59.301	1.611	1.86E	20.144
Skewness	-17.644	0.898	13.051	0.125

Kurtosis	346.158	4.005	191.203	1.701
Jarque-Bera	2013133.	71.705	610722.3	29.601
Probability	0.000	0.000	0.000	0.000
Sum	-108.282	795.726	8.17E	14607.00
Sum Sq. Dev.	1424266.	1052.222	1.40E	164342.8
Observations	406	406	406	406

Researcher's Compilation (2026)

The result of the descriptive statistics is presented in Table 2 and financial performance (measured using return on assets [ROA]) is the main variable of interest as it is the dependent variable. The mean statistic of ROA is 0.266; the median value is 0.021 while the maximum and minimum statistics are 221.366 and -1146.513 which shows that financial performance is relatively impressive. The standard deviation statistic is 59.301 with a negative skewness of -17.644 indicating that the values of ROA are geared towards the left thus signifying low skewness. The Jarque-Bera (J-B) statistic of 2013133.0 and probability value (p-value) of 0.000 show that the value of ROA is not normally distributed.

Looking at other variables, it can be observed that the maximum and minimum values of CCC are 7.751 and -1.045, and maximum and minimum values of KZC are 3.04E and 0.000. From the maximum and minimum values of CCC and KZC, it is observed that CCC has the maximum value of 7.751 thus signifying that the companies under investigation spent average of 8 days in selling and converting its inventory into cash. The J-B statistics and the associated p-values of the independent variables (CCC and KZC) are 71.705 (0.000) and 610722.3 (0.000) respectively. It can be said that the variables are not generally dispersed at 5% significant level. This implies that robust results would be ascertained. In relation to the control variable, maximum and minimum values of FAGE are 76.000 and 0.000 while its Jarque-Bera statistics and the associated p-value are 29.601 and 0.000 which suggest that the variable is not generally dispersed at 5% significant level.

Table 3: Correlation Matrix

Correlation				
Probability	ROA	CCC	KZC	FAGE
ROA	1.000			
	---.			
CCC	-0.000	1.000		
	0.990	-----		
KZC	0.000	-0.020	1.000	
	0.991	0.684	-----	
FAGE	-0.006	0.036	0.079	1.000
	0.903	0.467	0.110	-----

Source: Researcher's Compilation (2026)

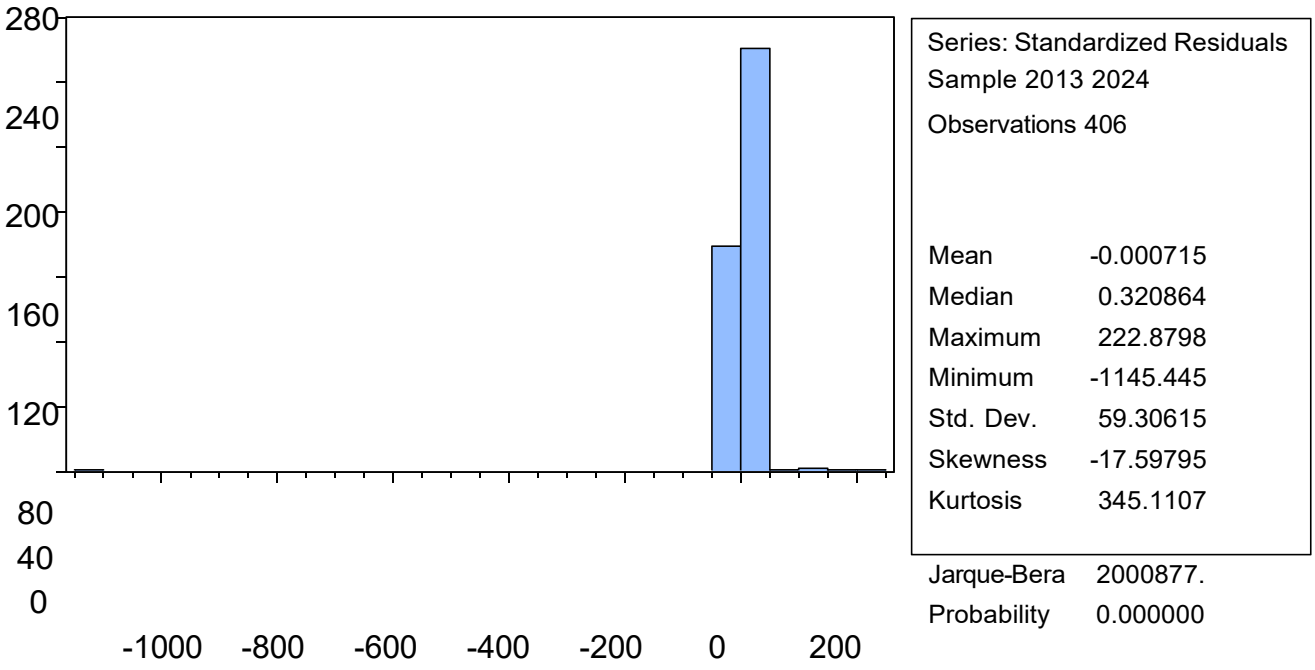
The correlation matrix presented in Table 3 showed the degree of association between the explanatory variables (CCC and KZC), the explained variable (ROA), and the control variable (FAGE). Incontrovertibly, the relationship between a variable and itself is one (1). Additionally, Table 3 revealed that the relationship between ROA and CC is negative and weak based on a correlation coefficient of -0.000. Also, the relationship between ROA and KZC is positive and weak based on the correlation coefficient of 0.000. In relation to the control variable, the relationship between ROA and FAGE is negative and weak based on

a correlation coefficient of -0.006. Based on these values, it is evidenced that there is absence of multicollinearity in the model as the correlation coefficients are less than 0.90 (90%). In terms of the relationship amongst the variables, the study perceived that the strongest relationship is between FAGE and KZC with correlation coefficient of 0.079 while the least is between KZC and CCC with correlation coefficient of -0.020.

Post Diagnostic Tests

In this study, the following post diagnostic tests were carried out:

Figure 2: Histogram Normality Test



Source: Researcher's Computation (2026)

The normality and other mean statistics of the residuals presented in Figure 2 showed a Jarque-Bera statistic of 2000877.0 with a related p-value of 0.000 which signifies that the variables are standard and not normally dispersed. The kurtosis value of 345.110 showed a positive kurtosis in excess of 3.00 which shows a leptokurtic kurtosis. The skewness statistic of -17.597 means the residual from the model is skewed to the left and the average standard deviation of 59.306 showed that the nonconformity from the mean is relatively high.

Table 4: Test of Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.262	Prob. F(3,403)	0.852
Obs*R-squared	0.795	Prob. Chi-Square(3)	0.850
Scaled explained SS	135.443	Prob. Chi-Square(3)	0.000

Source: Researcher's Computation (2026)

The test of heteroscedasticity was carried out using Breuch-Pagan-Godfrey panel cross-section LR test. The test showed an Obs*R-squared value of 0.795 and a p-value of 0.850. This is consistent with the homoscedastic residuals as the Chi-Square p-value is more than the benchmark of 0.05. This indicates that there is no evidence of heteroscedasticity in the model.

Table 5: Test of Multicollinearity

Variance Inflation Factors		
	Coefficient	Uncentered
Variable	Variance	VIF
CCC	2.547	1.887
KZC	2.53E	1.018
FAGE	0.009	1.911

Source: Researcher's Computation (2026)

The test of multicollinearity was conducted using Breuch-Pagan-Godfrey test. The test showed that the centered variance inflation factor (VIF) of the respective independent variables is not up to the rule of the thumb of 10. This indicates lack of multicollinearity in the model.

Table 6: Cross-Sectional Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	2373.912	561	0.000
Pesaran scaled LM	54.122		0.000
Pesaran CD	-0.135		0.892

Source: Researcher's Computation (2026)

The cross-sectional dependence was conducted using Breuch-Pagan-Godfrey test. The test showed a Pesaran CD statistic of -0.135 and a p-value of 0.892. This is consistent with the null hypothesis residuals. In addition, the result revealed that there is absence of cross-sectional dependence (correlation) in residuals in the hypotheses.

Table 7: Correlated Random Effects-Hausman Test

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.399	3	0.093

Source: Researcher's Computation (2026)

The correlated Hausman test showed a Chi-Squares statistic of 6.399 with an associated p-value of 0.093. The result showed that the random effect model is more efficient as the p-value is more than 5% i.e 0.093>0.05 residuals in the hypotheses.

Table 8: Panel Least Squares (PLS) Regression Output

Variable	Fixed Effect Model (FEM)		Random Effect Model (REM)	
	Coefficient	Prob.	Coefficient	Prob.
C	78.896	0.016	2.018	0.803
CCC	-0.379	0.190	-0.404	0.038
KZC	0.31E	0.747	0.38E	0.029
FAGE	0.019	0.020	0.041	0.008
R-squared	0.922		0.980	
Adjusted R-squared	0.836		0.967	
S.E. of regression	58.212		58.454	
Sum squared resid	1250415.		1373589.	
Log likelihood	2206.713		-	
F-statistic	1.425		0.033	
Prob(F-statistic)	0.058		0.019	
Durbin-Watson stat	2.362		1.976	

Source: Researcher's Computation (2026)

Flowing from the correlated Hausman test Chi-Squares statistic of 6.399 and a p-value of 0.093, the random effect model is more efficient as the p-value is more than 5% i.e 0.093>0.05 residuals in the hypotheses. Premised on the random effect panel least squares (PLS) regression result, the R-Squared of the model is 0.922 (92.2%) with an adjusted R-Squared of 0.836 (83.6%). This showed that the independent variables explained approximately 84% dissimilarity in the dependent variable (ROA). The F-statistic value of 0.033 with a related p-value of 0.019 that is significant at 1% reveals that there is a significant linear relationship between the dependent variable (ROA) and the independent variables. The Durbin-Watson (DW) statistics of 1.976 revealed the absence of autocorrelation in the model. The coefficients and p-values of the two (2) independent variables (CCC and KZC) are specified thus: -0.404 (0.038) and 0.38E (0.029) respectively. The result revealed that CCC has a negative and significant relationship with ROA. Also, KZC has a positive and significant relationship with ROA. Looking at the control variable, the coefficient and p-value of FAGE is 0.041 (0.008) which suggests that FAGE has a positive and significant relationship with ROA.

4.1 Discussion of Findings

Cash conversion cycle (CCC) revealed a negative and significant relationship with financial performance (ROA) which denotes that as CCC increases, there is a significant decrease in financial performance. This does align with the *a priori* expectation ($\beta_1<0$). This indicates that companies with shorter CCC tend to quickly convert inventory to cash, collect receivables, and manage payables, thus resulting in an improved financial performance. The implementation of shorter CCC indicates efficient working capital management, faster cash flows, reduced financing costs, and improved liquidity. This research outcome is consistent with the findings of Nwokoye (2024) that shortening the average collection period and enhancing inventory levels increases corporate profitability. Largely, effective CCC is crucial for maintaining liquidity and profitability, as mismanagement can result in insolvency as well as low operational efficiency. However, this outcome negates the findings of Abubakar and Muniru (2023) thus implying that Nigeria operates in a highly competitive markets where customers depend solely on trade credit, expensive/inaccessible bank financing, and limited cash liquidity.

Kaizen costing (KZC) was revealed to have a positive and significant relationship with financial performance (ROA), which implies that as KZC increases, there is a significant rise in financial performance. This supports the *a priori* expectation ($\beta_2>0$). Following from the finding, it can be argued that companies with more implementation of continuous improvement and cost reduction, waste elimination, and efficiency enhancement efforts tend to have better financial performance, therefore signifying efficient inventory management. Also, companies that implement kaizen costing system tend to be effective in reducing costs and improving efficiency, become well-integrated into corporate culture and contribute better to financial outcomes. The result supports the empirical findings of Dibiku (2024), and Omotayo et al. (2024), that in a high-cost setting, even minor cost savings significantly improve margins, decrease operating expenses as well as profitability.

4.2 Conclusion and Recommendations

Flowing from the results of analysis and hypotheses tested, it was shown that cash conversion cycle (CCC) has a negative and significant relationship with financial performance while kaizen costing has a positive and significant relationship with financial performance of listed companies in Nigeria. In relation to the control variable, firm age has a positive and significant relationship with financial performance of listed companies in Nigeria. Contingent upon the empirical findings, the study concludes that cash conversion

cycle, kaizen costing, and firm age are good predictors of financial performance of listed companies in Nigeria. Thus, it recommends that:

1. Companies should re-evaluate and re-investigate the specific aspects of cash conversion cycle that might be contributing to such negative effects. Firms should also recognize possible drawbacks associated with cash conversion cycle, discover other cash management policies that might be more operational in enhancing financial performance, and perform industry-specific investigation to determine if the adverse impacts hold across diverse companies.
2. Companies should focus on the implementation of kaizen costing system to ensure uninterrupted progress as well as cost decline plans so as to maintain better financial performance. Also, kaizen costing system helps to reduce holding costs, increase sales, constantly monitor inventory turnover ratios, and regulate inventory management policies to sustain optimal performance.

4.3 Contributions to Knowledge

Contribution to Literature : The study adds to existing literature by examining the link between lean accounting practices and financial performance of listed service companies

Contribution to Management Performance:- This study will increase management performance by assisting management with policies that will be more operational in enhancing financial performance.

Industry-specific contribution :- This study adds to knowledge by exploring the link between lean accounting and financial performance. Thus, taking advantage of lean accounting in minimizing inventory levels, reducing carrying costs and freeing up capital that can be reinvested in other areas of the business.

4.4 Recommendations for Further Studies

1. Further studies should explore other counties outside Africa such as the United Kingdom (UK), Canada and China. This will enable us to thoroughly assess the extent of the link between lean accounting practices and financial performance in diverse nations and regions across the globe.
2. Studies should be carried out in relation to other sectors such as financial sector and the conglomerate.

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Accounting Practices and Survival of Small and Medium Enterprises in Ughelli North Local Government Area of Delta State

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Abstract

The study examined the relationship between accounting practices and the survival of small and medium enterprises (SMEs) in Ughelli North Local Government Area of Delta State, Nigeria. It was motivated by the continuing vulnerability of SMEs to liquidity pressures, weak financial records, constrained access to finance and limited use of digital accounting tools, notwithstanding the importance of MSMEs to employment, entrepreneurship and inclusive economic growth. A cross-sectional survey design with retrospective measurement of business survival was employed. Structured questionnaires were administered to SME owners and managers, and 320 usable responses were analysed using descriptive statistics, chi-square tests and multivariable logistic regression. The results showed that bookkeeping significantly increased the odds of SME survival (OR = 2.15, 95% CI = 1.28–3.62, p = .004), while financial statement preparation produced the strongest significant association (OR = 2.43, 95% CI = 1.22–4.85, p = .011). Budgeting (OR = 1.61, p = .067) and computerized accounting (OR = 1.89, p = .083) were positive but not statistically significant at the 5% level. The model recorded a pseudo R^2 of 0.21 and an AUC of 0.77. The study concluded that basic, disciplined accounting practices were particularly important to SME continuity in the study area. It recommended practical bookkeeping and financial-reporting training, affordable digital accounting solutions and stronger credit linkages for SMEs.

Keywords: Accounting practices, SME survival, bookkeeping, financial reporting, computerized accounting

1. Introduction

Small and medium enterprises (SMEs) are central to employment creation, entrepreneurship, innovation and local economic resilience, while accounting practices provide the financial information needed to plan, control cash flows, evaluate performance and make financing decisions. In Nigeria, MSMEs account for a substantial share of businesses, employment and economic activity, yet they operate amid inflationary pressures, constrained finance, regulatory burdens and rapidly changing technology. PwC's 2024 MSME survey highlights access to finance, macroeconomic headwinds, regulation, market change and digital transformation as major issues shaping MSME performance. These concerns also connect directly with Sustainable Development Goal 8, particularly Target 8.3, which calls for policies that support entrepreneurship and the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services (United Nations, 2015; PwC Nigeria, 2024).

SME survival refers to the ability of a business to remain operational over time, withstand financial and market shocks and preserve the capacity to continue trading. In Ughelli North, the importance of SME survival extends beyond individual owners because closures can reduce household income, weaken local supply chains and diminish employment

opportunities. Contemporary Nigerian evidence increasingly shows that financial-management capability, record keeping and digital accounting matter for SME performance and sustainability (Aderinto, 2025; Elom & Atah, 2025; Garba & Mohammed, 2026; Musa et al., 2026). The present study focuses on a 24-month retrospective survival indicator and on four accounting practices: bookkeeping, budgeting/cash-flow forecasting, financial statement preparation and computerized accounting.

Accounting practices are the routines and systems through which business transactions are recorded, classified, summarized, analysed and communicated for decision-making. Recent Nigerian studies show that record keeping improves business performance, computerized accounting can strengthen accuracy and timely reporting, and digital accounting adoption can support sustainability, although adoption is constrained by cost, skills and infrastructure (Aderinto, 2025; Nwankwo et al., 2025; Olaoye et al., 2025; Garba & Mohammed, 2026). Evidence from Delta State also suggests that automated accounting systems can improve daily transaction management and firm performance (Imasuen, 2026). These developments make it necessary to move beyond older discussions of manual bookkeeping and examine accounting practice in a contemporary environment that increasingly combines basic records with digital tools.

Policy attention to SMEs has expanded through national MSME programmes, financial-inclusion initiatives and local enterprise-support activities. Nevertheless, broad support programmes may not resolve firm-level weaknesses in record keeping, budgeting and financial reporting. Where owners cannot generate credible financial information, access to finance, cash-flow planning and evidence-based decision-making may remain weak even when support schemes exist. This implementation gap provides the practical motivation for examining whether specific accounting practices are associated with survival among SMEs operating in a semi-urban local economy.

Prior Nigerian studies have largely examined SME performance, financial reporting quality or technology adoption at national or state level. Comparatively little quantitative evidence isolates survival outcomes at the local-government level in Ughelli North. The study therefore addresses a contextual and outcome gap by estimating the association between specific accounting practices and the probability that an SME remains operational. Its contribution lies in linking routine accounting behaviour to a direct survival measure in a semi-urban setting and in distinguishing practices that are statistically significant from those whose effects remain positive but uncertain.

1.1 Objective of the Study

The main objective of the study was to examine the effect of accounting practices on the survival of SMEs in Ughelli North Local Government Area of Delta State. Specifically, the study examined the effects of bookkeeping, budgeting, financial statement preparation and computerized accounting on SME survival.

1.2 Research Hypotheses

H_{o1}: Bookkeeping has no significant effect on the survival of SMEs in Ughelli North Local Government Area.

H_{o2}: Budgeting has no significant effect on the survival of SMEs in Ughelli North Local Government Area.

H_{o3}: Financial statement preparation has no significant effect on the survival of SMEs in Ughelli North Local Government Area.

H_{o4}: Computerized accounting has no significant effect on the survival of SMEs in Ughelli North Local Government Area.

2. Literature Review

2.1 Conceptual Review

2.1.1 SME Survival

SME survival is the continued operation of a business despite competitive, financial and institutional pressures. It is narrower than general performance because a firm may record weak profitability in a particular period and still remain operational. For this study, survival is operationalized as continued operation without permanent closure during the preceding 24 months. Recent Nigerian research links survival and sustainability to financial-management skills, access to finance, managerial capability and the ability to adapt to technological and market change (PwC Nigeria, 2024; Aderinto, 2025; Garba & Mohammed, 2026). This framing is consistent with SDG 8.3, which recognizes the growth and formalization of MSMEs and access to financial services as part of inclusive economic development (United Nations, 2015).

2.1.2 Accounting Practices

Accounting practices comprise the procedures used to capture transactions and transform them into information for planning, control and external reporting. In SMEs, the practices range from basic cashbooks and supporting receipts to budgets, cash-flow forecasts, periodic financial statements and computerized accounting systems. Record keeping creates an audit trail and supports monitoring of receivables, payables, income and expenses. Budgeting translates plans into financial targets and can reveal expected cash deficits. Financial statements summarize performance and financial position, while computerized accounting can improve processing speed, accuracy, data retrieval and reporting timeliness. Recent studies in Nigeria report positive performance consequences from record keeping and digital accounting, although cost, technical capacity, electricity and infrastructure can constrain adoption (Aderinto, 2025; Elom & Atah, 2025; Nwankwo et al., 2025; Olaoye et al., 2025; Garba & Mohammed, 2026; Musa et al., 2026).

2.2 Theoretical Framework

2.2.1 Contingency Theory

Contingency Theory is associated with Burns and Stalker (1961) and Lawrence and Lorsch (1967) and was later applied to management accounting by Otley (1980). The theory holds that there is no single management or accounting system that is universally effective.

The major tenets of the theory are that organisational practices should fit the circumstances of the organisation; effectiveness depends on factors such as firm size, technology, managerial competence, resources and environmental uncertainty; and practices that are effective in one organisation may not produce the same results in another.

In relation to this study, Contingency Theory explains that the effectiveness of bookkeeping, budgeting, financial statement preparation and computerised accounting in enhancing SME

survival may depend on the specific conditions of each firm. The theory therefore provides a basis for explaining how different accounting practices may influence the survival of SMEs in Ughelli North Local Government Area of Delta State.

2.2.2 Resource-Based View

The Resource-Based View (RBV) was developed by Barney (1991), building on earlier work by Wernerfelt (1984). The theory explains that firms can achieve sustained competitive advantage through the possession and effective utilisation of valuable internal resources and capabilities.

The major tenets of the theory are that firm resources should be valuable, rare, difficult to imitate and non-substitutable (VRIN); firms possess different resources and capabilities; and the effective use of these resources can enhance performance and long-term survival.

In relation to this study, accounting knowledge, reliable financial records and the ability to use accounting information represent important organisational capabilities. Therefore, effective bookkeeping, budgeting, financial statement preparation and computerised accounting can strengthen financial planning, cost control and decision-making, thereby enhancing the survival of SMEs in Ughelli North Local Government Area of Delta State.

2.2.3 Dynamic Capabilities Theory

Dynamic Capabilities Theory was propounded by Teece, Pisano and Shuen (1997). The theory explains how firms develop the capacity to adapt their resources and capabilities in response to changing business environments.

The major tenets of the theory are that firms must be able to sense changes and opportunities, seize available opportunities, and reconfigure their resources and capabilities to respond effectively to environmental changes and sustain performance.

In relation to this study, timely accounting information obtained through bookkeeping, budgeting, financial statement preparation and computerised accounting can help SMEs identify financial problems, manage resources and respond to changing business conditions. The theory therefore explains how effective accounting practices can strengthen the ability of SMEs in Ughelli North Local Government Area of Delta State to adapt to financial and environmental challenges and enhance their survival.

2.3 Empirical Review

Aderinto (2025) surveyed SMEs across Nigeria and reported that accounting record keeping significantly improved business performance. The study reinforces the importance of basic records but focused on performance rather than a direct survival outcome.

Elom and Atah (2025) examined computerized accounting systems among SMEs in Cross River State and found that automated transaction recording, financial-report generation and income/expense tracking improved financial performance. The study demonstrates the value of automation but does not establish whether these gains translate into continued operation.

Nwankwo et al. (2025) reported that automated accounting software significantly improved the accuracy, reliability, timeliness and efficiency of Nigerian SMEs' financial operations, while also identifying adoption challenges. This evidence suggests that technology can strengthen accounting processes, but affordability and implementation remain important constraints.

Olaoye et al. (2025) found that digital accounting techniques improved the timeliness, accuracy and reliability of SME financial reporting in Nigeria. Their findings support the information-quality channel through which accounting systems may enhance decisions and external credibility.

Garba and Mohammed (2026) found positive relationships between awareness, use and perceived benefits of digital accounting systems and SME performance and sustainability in Nigeria. Their results extend the literature from operational efficiency to sustainability, although the study did not isolate Ughelli North or a binary survival outcome.

Musa et al. (2026), studying SMEs in Bauchi metropolis, reported that technology and cost considerations significantly influenced SME performance in the context of computerized accounting systems. The study highlights the contingency surrounding digital adoption: technology can enhance performance, but resource constraints shape its practical value.

Imasuen (2026) examined automated accounting systems among SMEs in Delta State and reported improvements in daily transaction management and firm performance. This evidence is geographically closer to the present study, but a Delta-State-wide design cannot capture the specific institutional and market conditions of Ughelli North.

Earlier Nigerian studies established the foundational relevance of record keeping and accounting information to SME continuity (Ademola et al., 2012; Ezejiofor et al., 2014). These studies remain useful as background, but contemporary digitalization, macroeconomic pressures and financial-inclusion challenges justify updated local evidence.

2.4 Gap in the Literature

Three gaps emerge. First, much of the contemporary literature measures financial performance, reporting quality or operational efficiency rather than actual business survival. Second, most evidence is national, state-wide or metropolitan, leaving limited peer-reviewed evidence at the Ughelli North LGA level. Third, recent studies emphasize digital accounting, whereas many micro and small firms still depend on basic bookkeeping and financial statements. The present study addresses these gaps by jointly testing basic and computerized accounting practices against a direct 24-month survival indicator in Ughelli North.

3. Methodology

The study adopted a cross-sectional survey research design with retrospective measurement of SME survival. The design was appropriate because information on accounting practices and business status was obtained from owners/managers at a defined period and the probability of survival was estimated using a binary-response model.

3.1 Population, Sample and Sampling Technique

The population of the study comprised 320 eligible SME operators within Ughelli North Local Government Area of Delta State. Given the manageable size of the accessible population, the study adopted a census (total enumeration) approach, whereby all 320 eligible SME operators were included in the survey. Consequently, no statistical sample-size determination was required because the entire accessible population constituted the study sample. The use of total enumeration was considered appropriate because it ensured complete coverage of

the identified population and avoided sampling error that could arise from selecting only a subset of the accessible population.

3.2 Instrument and Measurement

Data were collected with a structured questionnaire administered to SME owners/managers. The instrument captured firm characteristics, owner/manager characteristics, accounting practices and survival status. The principal explanatory variables were bookkeeping, budgeting/cash-flow forecasting, financial statement preparation and computerized accounting, each coded as a binary indicator. SME survival was coded 1 where the business remained operating without permanent closure during the preceding 24 months and 0 where permanent closure occurred within that period. Control variables included firm age, firm size, sector, owner education, legal form and revenue band. The questionnaire is attached as an appendix, in line with the reviewer's request.

3.3 Method of Data Analysis and Model Specification

Descriptive statistics were used to summarize firm characteristics, accounting-practice adoption and survival. Pearson correlation analysis was used to examine the direction and degree of association among SME survival, bookkeeping, budgeting, financial statement preparation and computerized accounting. Because the principal variables were coded dichotomously (0/1), the resulting Pearson coefficients are equivalent to phi coefficients for pairs of binary variables. Multivariable logistic regression was used to test the four hypotheses because the dependent variable was binary. Statistical significance was evaluated at the 5% level.

The logistic model was specified as:

$$\text{logit}(P(SURV_i = 1)) = \beta_0 + \beta_1 BOOK_i + \beta_2 BUDG_i + \beta_3 FS_i + \beta_4 COMP_i + \gamma' X_i + \varepsilon_i$$

where SURV denotes SME survival; BOOK = bookkeeping; BUDG = budgeting/cash-flow forecasting; FS = financial statement preparation; COMP = computerized accounting; X is the vector of control variables; β_0 is the intercept; β_1–β_4 are coefficients of the accounting-practice variables; γ represents coefficients of controls; and ε is the error term.

4. Results and Discussion

4.1 Descriptive Statistics

Indicator	Result
Usable responses	320 SMEs
Trade/commerce	48%
Services	28%
Manufacturing	14%
Agriculture	10%
Mean firm age	7.8 years (SD = 5.3)
Mean employees	9
Micro firms (<10 employees)	72%
Bookkeeping records	68%
Budgeting/cash-flow forecasts	41%
Formal financial statements	29%

Indicator	Result
Computerized accounting	18%
Mean accounting-practice index	1.56 of 4 (SD = 0.87)
Survived/operating	76%
Closed within prior 24 months	24%

The descriptive results show a clear adoption gradient: basic bookkeeping was relatively common, while formal financial statements and computerized accounting were much less prevalent. This pattern is consistent with recent Nigerian evidence that digital accounting can improve reporting and performance but remains constrained by cost, infrastructure and skills (Nwankwo et al., 2025; Garba & Mohammed, 2026; Musa et al., 2026).

4.2 Correlation Analysis

The correlation results indicated generally weak positive associations between SME survival and the accounting practices examined. Bookkeeping recorded the strongest correlation with SME survival (r = 0.162), followed by financial statement preparation (r = 0.150), budgeting (r = 0.076) and computerized accounting (r = 0.039). Among the explanatory variables, the highest correlation was between bookkeeping and financial statement preparation (r = 0.372), followed by bookkeeping and budgeting (r = 0.315). Budgeting and computerized accounting showed a negligible negative association (r = -0.016). The highest intercorrelation among the explanatory variables was 0.372, indicating no evidence of serious multicollinearity. This was consistent with the reported VIF values below 2.0.

Table 2. Correlation Matrix

Variable	Survival	Bookkeeping	Budgeting	Financial Statements	Computerized Accounting
Survival	1.000				
Bookkeeping	0.162	1.000			
Budgeting	0.076	0.315	1.000		
Financial Statements	0.150	0.372	0.098	1.000	
Computerized Accounting	0.039	0.150	-0.016	0.040	1.000

Source: Authors' computation from survey data (N = 320).

4.3 Inferential Statistics and Test of Hypotheses

Variable	Odds ratio	95% CI lower	95% CI upper	p-value	Decision at 5%
Bookkeeping	2.15	1.28	3.62	.004	Reject H01
Budgeting	1.61	0.97	2.68	.067	Fail to reject H02
Financial statements	2.43	1.22	4.85	.011	Reject H03
Computerizedaccounting	1.89	0.92	3.89	.083	Fail to reject H04

Model diagnostics showed pseudo R^2 = 0.21, ROC/AUC = 0.77 and VIF values below 2.0. The accounting-practice index robustness check indicated that each additional practice adopted was associated with 48% higher odds of survival (OR = 1.48, $p < .001$). The propensity-score-matching check indicated a 17-percentage-point higher survival probability among bookkeeping firms after matching on firm size, age and owner education ($p < .05$).

4.4 Discussion of Findings

Bookkeeping had a positive and statistically significant relationship with SME survival (OR = 2.15, p = .004). SMEs maintaining bookkeeping records had more than twice the odds of survival relative to those without such records, holding the included controls constant. This finding is consistent with Aderinto (2025), who reported a significant positive effect of accounting record keeping on SME performance in Nigeria. The result is also theoretically consistent with the RBV because routine records constitute an internal information capability that can strengthen cash monitoring, cost control and decisions.

Financial statement preparation produced the strongest significant association with survival (OR = 2.43, p = .011). Formal statements can improve the owner's understanding of financial position and performance while providing external stakeholders with more credible information. This interpretation is consistent with recent evidence that digital accounting and outsourced accounting functions can improve the quality, timeliness and reliability of SME financial reporting (Adekoya & Ojediran, 2024; Olaoye et al., 2025). The result also supports dynamic-capabilities reasoning because timely financial information can help firms identify pressure points and reallocate resources.

Budgeting was positive but not significant at the 5% level (OR = 1.61, p = .067). The direction suggests potential value for planning and liquidity management, but the evidence is insufficient to conclude that budgeting independently predicts survival in this sample. Its relatively low adoption rate (41%) may partly explain the imprecision, but this remains an interpretation rather than a tested mechanism. The finding underscores the contingency perspective: a budgeting tool may create value only where owners possess the skills and discipline to update and use it.

Computerized accounting was also positive but statistically insignificant (OR = 1.89, p = .083). This contrasts with recent studies reporting significant performance benefits from computerized or automated accounting systems (Elom & Atah, 2025; Nwankwo et al., 2025; Garba & Mohammed, 2026; Musa et al., 2026). A plausible explanation is the very low adoption rate in the present sample (18%), combined with cost, skills and infrastructure constraints. The result does not imply that computerized accounting is unimportant; rather, the study does not establish an independent survival effect at the conventional 5% level.

Overall, the findings distinguish between foundational practices and more advanced practices. Bookkeeping and financial statements were statistically significant, whereas budgeting and computerization were not. For Ughelli North SMEs, this suggests that strengthening basic financial discipline may be an immediate priority while digitalization is pursued alongside training, affordability and infrastructure support.

5. Conclusion and Recommendations

The study concluded that accounting practices are relevant to SME survival in Ughelli North, but their effects are not uniform. Bookkeeping and financial statement preparation were significant predictors of survival, while budgeting and computerized accounting were positive but not statistically significant at the 5% level. The findings provide localized evidence that the quality and availability of financial information matter for business continuity in a semi-urban Nigerian setting.

Based on the findings, SME-development agencies, professional accounting bodies, financial institutions and local enterprise associations should prioritize practical training in cashbooks, receivables/payables records and periodic financial statement preparation. Affordable cloud-based or mobile accounting solutions should be promoted together with user training rather than software adoption alone. Banks and microfinance institutions should strengthen credit-linkage programmes that reward credible record keeping. SME owners should institutionalize regular budgeting and cash-flow forecasting and progressively migrate from informal records to structured digital systems. These measures are consistent with SDG 8.3's emphasis on MSME growth, formalization and access to financial services.

5.1 Contribution to Knowledge

The study contributes localized evidence from Ughelli North by using a direct survival outcome rather than relying only on profitability or perceived performance. It also compares four accounting practices within one model and shows that foundational record keeping and financial reporting have stronger statistical relationships with survival than budgeting and computerization in the study sample.

5.2 Limitation

The cross-sectional design and retrospective survival measure limit causal interpretation, while self-reported accounting practices may be affected by response bias. The study was also restricted to SME operators in Ughelli North Local Government Area; consequently, the findings should be generalized beyond the study area with caution. Future studies should use longitudinal data, independently verified accounting records and wider geographical coverage where feasible.

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Appendix: Survey Instrument

Section A: Identification and consent

A1. Interview ID: _____ A2. Date: _____ A3. Community: _____

A4. Do you consent to participate? 1 = Yes, 0 = No

Section B: Firm characteristics

B1. Year business started: ____ B2. Number of paid employees: ____

B3. Sector: 1 = Trade, 2 = Manufacturing, 3 = Services, 4 = Agriculture, 5 = Other

B4. Legal form: 1 = Sole proprietorship, 2 = Partnership, 3 = Limited liability, 4 = Cooperative, 5 = Informal/unregistered

B5. Average monthly revenue band: _____

Section C: Owner/manager characteristics

C1. Sex: 1 = Male, 2 = Female C2. Age: ____ C3. Highest education: _____

C4. Prior accounting/business training? 1 = Yes, 0 = No

Section D: Accounting practices

D1. Do you keep written financial records such as a cashbook, receipts or invoices? 1 = Yes, 0 = No

D2. Do you prepare a budget or cash-flow forecast? 1 = Yes, 0 = No

D3. Do you prepare formal financial statements such as an income statement or statement of financial position? 1 = Yes, 0 = No

D4. Do you use computerized accounting software or structured spreadsheets for accounting? 1 = Yes, 0 = No

Section E: Survival and finance

E1. Has the business remained in operation without permanent closure during the last 24 months? 1 = Yes, 0 = No

E2. Has the business obtained formal credit in the last three years? 1 = Yes, 0 = No

E3. Has the business experienced a serious cash shortage in the last 12 months? 1 = Yes, 0 = No

Section F: Barriers

F1. Which barriers limit adoption of formal/computerized accounting? Cost / electricity / internet / skills / perceived irrelevance / other: _____

Audit Quality and Financial Reporting Credibility of Listed Agricultural Firms in Nigeria

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ABSTRACT

Financial reporting credibility matters because investors, lenders, regulators and other users make decisions from figures they cannot verify on their own. Concerns arise when reported earnings contain large discretionary adjustments or when published accounts do not appear to reflect the economic position of the firm. This study examined whether selected audit quality attributes were associated with the financial reporting credibility of listed agricultural firms in Nigeria. The study adopted an ex post facto design and used secondary data from the audited annual reports of Ellah Lakes Plc, FTN Cocoa Processors Plc, Livestock Feeds Plc, Okomu Oil Palm Company Plc and Presco Plc for 2016–2025. Financial reporting credibility was measured as the negative absolute value of discretionary accruals estimated with the Modified Jones model. Audit firm size, audit tenure, relative audit fee intensity and audit committee effectiveness were the explanatory variables. After the lagged information required for the accrual model was taken into account, 48 firm-year observations were available for the regression. Descriptive statistics, correlation, variance inflation factors and panel diagnostics were examined before the final estimation. The panel-effect test supported pooled ordinary least squares. The model was significant overall, $F(4, 43) = 3.662$, $p = 0.012$, with $R^2 = 0.254$ and adjusted $R^2 = 0.185$. Audit firm size and audit committee effectiveness had negative but insignificant effects, while audit tenure had a positive but insignificant effect. Relative audit fee intensity was negative and significant ($\beta = -122.4947$, $p = 0.011$). The study concludes that the audit-related attributes considered did not influence reporting credibility in the same way. Particular attention should be given to the economic weight of the auditor-client fee relationship, while audit quality assessments should also consider how the engagement is actually carried out than relying only on visible structural attributes.

Keywords: Audit quality; financial reporting credibility; audit firm size; audit tenure; relative audit fee intensity; audit committee effectiveness; agricultural firms; Nigeria.

1. Introduction

Financial statements are expected to give users a dependable account of what has happened in a business. That expectation becomes difficult to sustain when the reported numbers contain adjustments that users cannot easily explain or when accounting choices make the underlying performance of the firm less clear. Investors may misjudge profitability, lenders may assess risk from distorted information, and regulators may have to respond after confidence has already been weakened. Financial reporting credibility is therefore not simply a matter of compliance. It affects the usefulness of published accounts and the level of trust placed in the company that produces them.

Recent research continues to show that credible reporting depends on more than the preparation of financial statements in accordance with accounting rules. Rao et al. (2025)

linked external assurance with earnings quality, while Li and Liu (2024), in a meta-analysis, showed that unusual audit-fee relationships can be associated with weaker financial reporting quality. Daryaei et al. (2024) also reported that the connection between audit fees and earnings management may be non-linear. In another setting, Alhazmi et al. (2024) found that auditor-related characteristics did not affect reporting quality in one uniform way. These studies suggest that the credibility of reported figures can be shaped by the conditions surrounding the audit as well as by the accounting choices made by management.

The issue is important in both developed and emerging markets. Santos-Jaén et al. (2023), using United States evidence, examined audit fees and auditor tenure in relation to earnings management and showed that the auditor-client relationship remains relevant to the quality of reported earnings. Graschitz and Steller (2025), working with Austrian public-interest entities, found that changes in the audit market after European Union reforms did not produce one simple audit-fee or audit-quality outcome. In emerging markets, Tran et al. (2025) found that Vietnamese firms audited by Big Four auditors recorded lower discretionary accruals than firms audited by non-Big Four auditors. Yousefi Nejad et al. (2024) similarly showed that audit quality characteristics can matter for financial statement fraud. The variation in these results makes it unsafe to assume that one audit feature will produce the same reporting outcome in every country or industry.

Nigeria has also introduced rules intended to strengthen corporate reporting and the monitoring role of auditors and boards. Listed companies are required to publish audited financial statements and are subject to oversight through the Nigerian corporate governance and capital-market framework. These requirements are meant to improve accountability, but formal rules cannot by themselves remove every reporting concern. The practical quality of an audit still depends on the people involved, the auditor-client relationship, the resources devoted to the engagement and the willingness of those charged with governance to question management where necessary.

Recent Nigerian evidence reflects this uncertainty. Muhammad et al. (2024) found that audit quality attributes did not affect financial reporting quality among listed manufacturing firms in exactly the same way. Amadi et al. (2024), using listed breweries, also reported that some audit committee characteristics mattered while others did not. Yayangida et al. (2023) showed that audit fees required careful interpretation when financial reporting quality was examined among listed non-financial service firms. The evidence is useful, but most of it comes from manufacturing, brewery, banking, insurance or broad non-financial samples. Agricultural firms receive less direct attention even though their reporting environment includes biological assets, agricultural produce and fair-value estimates under IAS 41 (IFRS Foundation, 2026). These features can increase the importance of judgement and make credible reporting particularly valuable.

Audit quality is one mechanism through which financial reporting credibility may be strengthened. A capable auditor can challenge aggressive accounting choices, while an effective audit committee can support this process from within the governance structure. Yet the common indicators of audit quality raise different questions. A Big Four auditor may bring more resources and reputation to an engagement, but firm size does not guarantee that every engagement will be strong. Longer audit tenure can improve knowledge of the client, but it can also create familiarity. A larger audit fee may reflect greater audit effort, or it may signal a financially important relationship. Audit committee structures may appear strong on paper without showing how actively members perform their oversight duties.

The problem addressed in this study is therefore the uncertainty surrounding the factors that help to explain financial reporting credibility among listed agricultural firms in Nigeria. Existing

evidence does not provide a settled conclusion, and findings from other sectors cannot simply be carried over to agriculture. The study was motivated by the need to examine the sector with a consistent accrual-based measure and to consider several audit-related attributes in the same model. Specifically, it examined audit firm size, audit tenure, relative audit fee intensity and audit committee effectiveness over the period 2016–2025. Financial reporting credibility was represented by the negative absolute value of discretionary accruals, so values closer to zero indicated lower unexplained accrual adjustment and, by implication, stronger credibility.

The following null hypotheses were tested:

H_{o1}: Audit firm size has no significant effect on the financial reporting credibility of listed agricultural firms in Nigeria.

H_{02}: Audit tenure has no significant effect on the financial reporting credibility of listed agricultural firms in Nigeria.

H_{03}: Relative audit fee intensity has no significant effect on the financial reporting credibility of listed agricultural firms in Nigeria.

H_{04}: Audit committee effectiveness has no significant effect on the financial reporting credibility of listed agricultural firms in Nigeria.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Conceptual Review

Financial Reporting Credibility

Financial reporting credibility describes the extent to which users can place reasonable confidence in the information contained in published financial statements. Credibility is wider than the absence of a qualified audit opinion. It also concerns whether reported earnings and other accounting figures are supported by the underlying transactions of the business and are not unduly shaped by managerial discretion. Because credibility cannot be observed directly, empirical studies commonly use indicators such as accrual quality, restatements, disclosure quality or earnings management.

This study uses discretionary accruals because accrual accounting naturally requires estimates and timing choices that can be used either for legitimate reporting purposes or for earnings management. Dechow et al. (1995) refined the Jones model by adjusting changes in revenue for changes in receivables. The resulting Modified Jones approach estimates the level of accruals expected from normal operations and treats the unexplained portion as discretionary. More recent studies, including Burlacu and Robu (2024) and Rao et al. (2025), show that accrual-based measures remain useful in current reporting-quality research, even though they capture only one part of the wider idea of credibility.

For the present study, the absolute discretionary accrual was multiplied by minus one. This coding is important for interpretation. A value closer to zero represents a smaller unexplained accrual and therefore stronger accrual-based financial reporting credibility. A movement farther below zero represents a larger discretionary accrual and weaker credibility. The measure does not claim to capture every aspect of a credible financial report, but it gives a consistent basis for comparing the sampled firm-year observations.

Audit Firm Size and Financial Reporting Credibility

Audit firm size is commonly represented by the distinction between Big Four and non-Big Four auditors. The reasoning is that larger audit firms usually have deeper staff resources, more specialised support and greater reputational exposure. DeAngelo (1981) argued that an

auditor with more reputational capital at risk has a stronger incentive to protect audit quality. That argument remains influential, although contemporary audit-quality frameworks place more attention on the quality of the particular engagement rather than on firm name alone.

The empirical evidence is mixed. Tran et al. (2025) found lower discretionary accruals among Vietnamese firms audited by Big Four auditors, which supports the view that larger firms may constrain reporting discretion. In Nigeria, Muhammad et al. (2024) reported a negative but insignificant relationship between audit firm size and financial reporting quality among listed manufacturing firms. The different findings suggest that the value attached to audit firm size may depend on the sector, the engagement team and the institutional setting. This uncertainty justifies examining the relationship separately among listed agricultural firms.

Audit Tenure and Financial Reporting Credibility

Audit tenure is the number of consecutive years the same audit firm serves a client. A longer relationship can improve the auditor's knowledge of the company's accounting system, internal controls and areas where reporting risk is more likely to arise. Payne and Williamson (2021) noted that continuing relationships can provide useful client-specific knowledge. In the same direction, Kim and Son (2024) associated longer auditor tenure with better-quality non-GAAP earnings disclosures.

The concern is that familiarity can develop alongside knowledge. An auditor who has worked with the same management for many years may find it harder to maintain the professional distance required when difficult accounting choices have to be challenged. Carcello and Nagy (2004), however, did not find that long tenure necessarily increased fraudulent reporting and observed greater fraud risk in the early years of some auditor-client relationships. Yousefi Nejad et al. (2024) also reported evidence consistent with the view that stronger audit relationships can reduce reporting problems. The competing arguments make the direction of the tenure effect an empirical question rather than a conclusion that can be assumed beforehand.

Relative Audit Fee Intensity and Financial Reporting Credibility

Audit fees compensate the external auditor for the time, expertise and risk involved in an engagement. A higher fee can therefore be consistent with better audit work when it reflects a more demanding assignment. The same fee can raise a different concern where it becomes economically important in relation to the size of the client. The issue is not the absolute amount alone, but what the fee may represent about audit effort, client complexity and the financial relationship between the auditor and the company.

Recent studies underline this ambiguity. Daryaei et al. (2024) reported a non-linear association between audit fees and earnings management, while Li and Liu (2024) found through meta-analysis that higher abnormal audit fees were generally associated with lower financial reporting quality. Yayangida et al. (2023) also showed in Nigeria that the meaning of audit fees depends on the way the variable is specified. The present study does not estimate abnormal fees. Instead, relative audit fee intensity is measured as audit fee divided by total assets. The ratio therefore shows the economic weight of the fee relative to the client rather than providing a direct measure of auditor independence.

Audit Committee Effectiveness and Financial Reporting Credibility

The audit committee forms part of the internal monitoring structure around financial reporting. Its role includes reviewing the reporting process, considering audit findings and supporting communication among management, the board and the external auditor. The committee is more likely to perform this role well where members are sufficiently independent, financially knowledgeable and active in their meetings.

Research does not show that every committee characteristic matters equally. Gerayli et al. (2021) found that financial expertise improved financial reporting quality in Iran, whereas committee independence was not significant. In Nigeria, Amadi et al. (2024) similarly reported that some audit committee characteristics were significant among listed breweries while others were not. The present study therefore treats effectiveness as a composite index based on independence, financial expertise, meeting frequency and committee size rather than relying on one characteristic in isolation.

2.2 Theoretical Review and Framework

Agency Theory

Agency Theory, associated with Jensen and Meckling (1976), starts from the separation between ownership and control. Managers run the company and normally possess more detailed information than shareholders. This creates room for differences in interest and for reporting choices that outside owners may find difficult to observe directly. External auditing and audit committee oversight can reduce this problem by providing monitoring around the financial reporting process. The theory fits the present study because audit firm size, tenure, fee intensity and audit committee effectiveness can each affect the strength or independence of that monitoring role.

Stakeholder Theory

Stakeholder Theory broadens the discussion beyond shareholders. Freeman (1984) argued that companies have relationships with several groups whose interests can be affected by corporate decisions. Creditors, employees, regulators, suppliers and investors all depend on information from the firm. Credible financial reporting therefore has value because misleading information can impose costs on people who are not involved in preparing the accounts. The theory supports the study by explaining why reporting credibility is important to a wider group of users.

Signalling Theory

Signalling Theory is associated with Spence (1973). The basic idea is that a party with better information can send observable signals to people who face uncertainty. In financial reporting, the appointment of a reputable auditor, the maintenance of an active audit committee and the publication of credible audited statements can act as signals about the seriousness with which a company treats reporting and governance. The value of the signal, however, depends on whether the underlying audit and oversight are genuinely strong. This makes the theory useful for explaining why visible audit characteristics may influence user confidence but may not always produce the expected reporting outcome.

Information Asymmetry Theory

Information asymmetry arises where one party to a transaction possesses information that another party does not have. Akerlof (1970) showed how differences in information can affect market decisions. The same difficulty exists in corporate reporting because managers know more about the company's operations and accounting choices than outside users. External auditing can reduce some of this gap by providing independent assurance, while an effective audit committee can improve the quality of the monitoring process. The theory therefore gives another explanation for the connection between audit quality and financial reporting credibility.

Institutional Theory

Institutional Theory explains how organisations respond to pressures from regulators, professions and accepted practices in their environment. DiMaggio and Powell (1983) described coercive, mimetic and normative pressures that can make organisations adopt similar structures and practices. Listed Nigerian firms operate under accounting, auditing, governance and capital-market requirements that encourage particular reporting and

oversight arrangements. The theory helps to explain why firms appoint external auditors and establish audit committees, but it also raises an important point: formal adoption of these structures does not automatically mean that they are equally effective in practice.

Theoretical Anchor

Although the five theories contribute different explanations, Agency Theory provides the main anchor for the study. The central empirical question concerns whether monitoring arrangements around the audit are associated with more credible financial reporting. Agency Theory addresses this issue directly by linking information differences, managerial incentives and monitoring. Stakeholder and Signalling theories explain why credible audited reports matter to users, Information Asymmetry Theory clarifies the information gap that assurance is intended to reduce, and Institutional Theory places the reporting and governance structures within the wider regulatory environment.

2.3 Empirical Review

Audit Firm Size and Financial Reporting Credibility

Tran et al. (2025) examined audit firm size and audit quality using Vietnamese listed companies. Audit quality was measured with discretionary accruals and audit firms were classified as Big Four or non-Big Four. Their panel evidence showed lower discretionary accruals among firms audited by Big Four auditors. The study is relevant because its measures are close to those used here, but the institutional setting differs from Nigeria.

Muhammad et al. (2024) studied audit quality attributes and financial reporting quality among listed manufacturing firms in Nigeria. Their findings did not show that audit firm size produced a strong improvement in reporting quality. This Nigerian evidence is useful to the present study but comes from manufacturing rather than agriculture, where biological-asset accounting and fair-value estimates create a different reporting environment.

Audit Tenure and Financial Reporting Credibility

Santos-Jaén et al. (2023) examined audit fees, auditor tenure and earnings management in the United States Big Four market. Their evidence showed that the tenure relationship could not be separated from the wider conditions of the audit engagement. Kim and Son (2024) later found that longer auditor tenure was associated with better-quality non-GAAP earnings disclosures. Both studies support the view that accumulated client knowledge can matter, although neither removes the familiarity concern that motivates auditor-rotation policies.

Yousefi Nejad et al. (2024) used panel data to examine audit quality and financial statement fraud. Their findings further indicated that audit-related characteristics can affect reporting problems. The study is useful because it moves beyond a simple assumption that longer tenure must automatically weaken reporting quality. The present study brings the question into the Nigerian agricultural setting.

Relative Audit Fee Intensity and Financial Reporting Credibility

Li and Liu (2024) synthesised prior evidence on abnormal audit fees and financial reporting quality. Their meta-analysis generally associated higher abnormal fees with weaker reporting quality. Daryaei et al. (2024), however, showed that the relationship between audit fees and earnings management could be non-linear. Together, the studies suggest that the fee-quality relationship is sensitive to measurement and to the economic circumstances surrounding the engagement.

Yayangida et al. (2023) examined audit fees and financial reporting quality among listed non-financial service firms in Nigeria and also considered the role of audit committee independence. The study is close to the present work because it uses Nigerian non-financial

firms, but it does not focus on agriculture and it approaches the fee relationship differently. The present study uses audit fee divided by total assets as a relative intensity measure.

Audit Committee Effectiveness and Financial Reporting Credibility

Gerayli et al. (2021) examined audit committee characteristics and financial reporting quality in an emerging market. Financial expertise had a positive contribution, while committee independence was not significant. The finding shows that the practical value of an audit committee may come more from what members can do than from formal structural independence alone.

Amadi et al. (2024) examined listed brewery companies in Nigeria and found that some audit committee characteristics affected financial reporting quality while others did not. The mixed evidence supports the use of a broader effectiveness index and also leaves room for sector-specific evidence from listed agricultural firms.

Collectively, the reviewed studies do not provide a single conclusion. Results vary with country, sector, period, variable measurement and estimation method. Nigerian evidence is particularly concentrated outside the agricultural sector. The present study responds to this gap by examining four audit-related attributes together, using a single accrual-based measure of financial reporting credibility for listed agricultural firms over 2016–2025.

3. Methodology

The study adopted an ex post facto research design because the events and accounting figures had already occurred before the analysis was carried out. The researchers did not manipulate the audit arrangements or the financial results of the firms. Instead, information was obtained from published annual reports and audited financial statements.

The study focused on listed firms because they are required to publish audited financial statements and provide a reasonably consistent source of historical information for investors and regulators. Attention was restricted to the agricultural sector so that the analysis could reflect the reporting conditions of firms dealing with biological assets, agricultural produce and other sector-specific accounting estimates. The firms covered were Ellah Lakes Plc, FTN Cocoa Processors Plc, Livestock Feeds Plc, Okomu Oil Palm Company Plc and Presco Plc.

The period covered 2016–2025, giving a theoretical maximum of 50 firm-year observations. The calculation of the discretionary-accrual measure required lagged accounting information. Two observations could not satisfy this requirement, leaving 48 usable observations for the regression model. The panel was therefore unbalanced after the financial reporting credibility measure was computed.

Financial reporting credibility (FRC) was measured as the negative absolute value of discretionary accruals estimated with the Modified Jones model of Dechow et al. (1995). Total accruals were computed from profit after tax and operating cash flow. Lagged total assets, changes in revenue adjusted for changes in receivables, and property, plant and equipment were used to estimate normal accruals. The unexplained component was treated as discretionary accruals.

Audit firm size (AFS) was coded one where the external auditor was a Big Four firm and zero otherwise. Audit tenure (ATEN) was the number of consecutive years the same audit firm served the company. Relative audit fee intensity (RAFI), labelled AIND in the original dataset, was computed as audit fee divided by total assets. Audit committee effectiveness (ACE) was a composite index based on committee independence, financial expertise, meeting frequency and committee size.

The relationship was expressed as FRC = f(AFS, ATEN, RAFI, ACE). The econometric model was specified as FRCit = β0 + β1AFSit + β2ATENit + β3RAFIit + β4ACEit + εit, where i represents the firm and t represents the year. The data were analysed with descriptive statistics, correlation analysis, variance inflation factors and regression. Panel effects, heteroskedasticity and first-order serial correlation were checked before the final estimator was selected. The hypotheses were tested at the 5 per cent level of significance.

4. RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
FRC	48	-0.165	0.214	-0.802	-0.001
AFS	50	0.500	0.505	0.000	1.000
ATEN	50	4.320	2.645	1.000	10.000
RAFI (AIND)	50	0.000703	0.000667	0.000089	0.003809
ACE	50	0.385	0.405	0.000	1.000

Source: Researcher's computation using Stata 17 (2026).

Financial reporting credibility had a mean value of -0.165 and ranged from -0.802 to -0.001. Because the measure is the negative absolute value of discretionary accruals, values closer to zero represent lower unexplained accruals and stronger credibility. The spread of the values shows that the reporting outcome was not the same across the sampled firm-years. Exactly half of the observations were audited by Big Four firms. Average audit tenure was 4.32 years, while the longest recorded tenure was 10 years. Relative audit fee intensity was small because audit fees were scaled by total assets. The audit committee effectiveness index averaged 0.385, showing that the combined committee characteristics also varied across the firms and years.

4.2 Correlation and Multicollinearity Results

Variable	FRC	AFS	ATEN	RAFI	ACE
FRC	1.000	-0.352	0.174	-0.455	0.155
AFS	-0.352	1.000	-0.274	0.337	-0.386
ATEN	0.174	-0.274	1.000	-0.250	0.095
RAFI	-0.455	0.337	-0.250	1.000	-0.293
ACE	0.155	-0.386	0.095	-0.293	1.000

Source: Researcher's computation using Stata 17 (2026).

The correlation coefficients were moderate. Financial reporting credibility was negatively associated with audit firm size and relative audit fee intensity, while its simple associations with audit tenure and audit committee effectiveness were positive. The strongest absolute correlation involving FRC was -0.455 with relative audit fee intensity. Among the explanatory variables, none of the coefficients was close to a level that would normally suggest that two variables were measuring almost the same thing.

Variable	VIF	Tolerance (1/VIF)
AFS	1.315	0.760
ATEN	1.117	0.895
RAFI (AIND)	1.208	0.828
ACE	1.220	0.820
Mean VIF	1.215	—

Source: Researcher's computation using Stata 17 (2026).

The VIF results confirm the same point. The mean VIF was 1.215 and the individual values were all close to one. Serious multicollinearity was therefore not evident in the model.

4.3 Diagnostic Tests

Test	Reported result	Interpretation
Breusch-Pagan LM panel-effect test	chibar²(01) = 0.076; p = 0.783	Panel effect not significant
Mean VIF	1.215	No serious multicollinearity
Breusch-Pagan heteroskedasticity test	χ^2 = 0.452; p = 0.978	No serious heteroskedasticity
Wooldridge serial-correlation test	F = 0.282; p = 0.599	No serious first-order autocorrelation
Final estimator	Pooled OLS	Selected from the reported diagnostics

Source: Researcher's computation using Stata 17 (2026).

The Breusch-Pagan LM test did not show a significant panel effect, with p = 0.783. On the basis of the reported model-selection result, there was no statistical reason to prefer a random-effects specification to pooled OLS. The heteroskedasticity and Wooldridge tests were also insignificant. Together with the low VIF values, these results supported the use of pooled OLS for the final hypothesis tests.

4.4 Regression Results and Hypotheses Tests

Variable	Coefficient	Std. Error	t-statistic	p-value	Decision
AFS	-0.1004	0.0641	-1.57	0.124	Not significant
ATEN	0.0014	0.0114	0.12	0.903	Not significant
RAFI (AIND)	-122.4947	45.9294	-2.67	0.011	Significant
ACE	-0.0267	0.0762	-0.35	0.727	Not significant
Constant	-0.0231	0.0909	-0.25	0.801	—

Source: Researcher's computation using Stata 17 (2026).

The model was statistically significant overall, $F(4, 43) = 3.662$, $p = 0.012$. The R-squared value was 0.254 and the adjusted R-squared was 0.185. Thus, the four explanatory variables accounted for about 25.4 per cent of the observed variation in financial reporting credibility, while the adjusted measure shows a more conservative explanatory level of 18.5 per cent after allowing for the number of predictors in the model.

Hypothesis	p-value	Decision
H01: Audit firm size has no significant effect on FRC	0.124	Do not reject H01
H02: Audit tenure has no significant effect on FRC	0.903	Do not reject H02
H03: Relative audit fee intensity has no significant effect on FRC	0.011	Reject H03
H04: Audit committee effectiveness has no significant effect on FRC	0.727	Do not reject H04

Source: Researcher's computation using Stata 17 (2026).

4.5 Discussion of Findings

Audit firm size had a negative coefficient of -0.1004, but the result was not statistically significant at the 5 per cent level ($p = 0.124$). The evidence therefore does not show that the use of a Big Four auditor improved financial reporting credibility among the sampled agricultural firms. This should not be read as evidence that large audit firms are unimportant. Rather, Big Four status on its own did not distinguish the accrual-based reporting outcome in this small sectoral sample. The finding is close to Muhammad et al. (2024), who did not report a strong positive audit-firm-size effect in Nigerian manufacturing firms, but it differs from Tran et al. (2025), who found lower discretionary accruals among Vietnamese firms audited by Big Four auditors. The contrast supports the view that audit firm reputation and resources still have to be translated into engagement-level audit work before they affect reporting outcomes.

Audit tenure produced a positive coefficient of 0.0014 with $p = 0.903$. The direction suggests a very small movement towards stronger financial reporting credibility as tenure increased, but the effect was far too weak to support a statistical conclusion. The result leaves both sides of the tenure argument open. Continued service may improve client knowledge, yet any benefit

can be offset by familiarity or by the limited variation in tenure within the sample. The finding is consistent with the wider evidence that tenure does not operate in one fixed direction. Carcello and Nagy (2004) did not find that long tenure necessarily increased fraudulent reporting, while Kim and Son (2024) associated longer tenure with better-quality non-GAAP disclosures.

Relative audit fee intensity was the only explanatory variable with a significant individual effect. Its coefficient was -122.4947 and p = 0.011. Because FRC was coded as the negative absolute value of discretionary accruals, a negative coefficient represents movement farther from zero and therefore weaker accrual-based credibility. The result means that higher audit fees relative to total assets were associated with higher discretionary accrual magnitude. The large numerical coefficient should not be interpreted without regard to the very small scale of the fee ratio. It also does not prove that auditor independence was impaired. Higher fee intensity may reflect economic dependence, but it may also arise because an engagement is more complex or risky. The direction is broadly consistent with Li and Liu (2024), who found that abnormal audit fees were generally associated with lower reporting quality, although their measure is not the same as the ratio used in this study. Daryaei et al. (2024) likewise cautioned against treating the fee-quality relationship as a simple linear one.

Audit committee effectiveness had a negative coefficient of -0.0267, but the result was insignificant (p = 0.727). The composite index therefore did not show a measurable individual effect on financial reporting credibility in the sampled firms. One possible explanation is that annual reports capture the visible structure of the committee more easily than the quality of its actual work. A company can disclose independence, financial expertise, committee size and meeting frequency without those indicators showing whether members challenged management or followed up difficult audit issues. This interpretation is consistent with Gerayli et al. (2021) and Amadi et al. (2024), whose findings show that audit committee characteristics do not contribute to reporting quality in the same way.

The overall result is therefore more useful when read as a mixed pattern than as a general statement that audit quality either improved or failed to improve financial reporting credibility.

The model was significant jointly, but three individual variables were not significant. Financial reporting credibility in this sector is likely to reflect additional factors that were not included in the model, such as management incentives, internal control quality, ownership structure, financial pressure and the quality of the specific audit engagement.

5. Conclusion and Recommendations

The study examined the relationship between selected audit quality attributes and the financial reporting credibility of listed agricultural firms in Nigeria from 2016 to 2025. The evidence did not support a uniform effect across the four variables. Audit firm size, audit tenure and audit committee effectiveness were not significant individually. Relative audit fee intensity, however, had a significant negative relationship with the accrual-based measure of credibility. The model as a whole was statistically significant, but its explanatory power also shows that a substantial part of the variation in reporting credibility lies outside the audit characteristics considered.

The findings suggest that regulators, boards and audit committees should avoid treating visible audit characteristics as automatic evidence of strong reporting credibility. The appointment of a large audit firm or the existence of a formally structured audit committee remains important, but attention should also be paid to the quality of the engagement itself, including the competence of the audit team, the depth of challenge applied to significant estimates and the way audit issues are resolved with management.

The significant fee-intensity result deserves closer monitoring. Audit committees should review audit fees in relation to the size, complexity and risk of the company and should be satisfied that unusual movements are properly explained. The finding should not be used to conclude that high fees automatically weaken independence. It instead supports closer scrutiny of situations in which the financial weight of the auditor-client relationship becomes unusually large.

Audit tenure should continue to be managed in line with applicable rotation and independence requirements even though it was not significant in this sample. Similarly, audit committees should go beyond formal compliance with membership and meeting requirements by documenting how major accounting judgements, internal control issues and external-audit findings are considered and followed through. These actions are more closely connected with the substance of oversight than with the existence of committee structures alone.

6. Contribution, Limitations and Future Research

The study contributes sector-specific evidence to the Nigerian literature by concentrating on listed agricultural firms. This is useful because agricultural reporting includes biological assets and other estimates that may create reporting risks different from those found in banking, manufacturing or service firms. The study also brings audit firm size, tenure, relative audit fee intensity and audit committee effectiveness into one model and uses a consistent accrual-based measure of financial reporting credibility.

The main limitation is the small number of listed agricultural firms. Only five companies were covered and the final regression contained 48 usable firm-year observations. This limits statistical power and means that the findings should not be generalised to every listed firm in Nigeria. The dependent variable is also limited to accrual-based credibility. It does not directly measure disclosure quality, restatements, regulatory compliance, accounting conservatism or real earnings management.

Future studies can extend the sample to other sectors or compare agricultural firms with companies operating in less estimation-intensive industries. Alternative audit-fee measures, including abnormal fees and client importance, may help to clarify why relative audit fee intensity was significant. Researchers may also examine audit partner tenure, auditor industry specialisation, non-audit services and engagement-level indicators where reliable data can be obtained. Using more than one measure of financial reporting credibility would also make it easier to determine whether the present result is specific to discretionary accruals or reflects a wider reporting pattern.

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Human Development Index and Tax Revenue in Nigeria: A Revised Analysis

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Abstract

This research examines the impact of tax revenues on human development in Nigeria, focusing on Company Income Tax (CIT), Personal Income Tax (PIT) and Value Added Tax (VAT). The study is motivated by persistent fiscal challenges, including overdependence on oil receipts, weak tax administration, low tax compliance, and inefficient public expenditure. Annual data from 2005 to 2024 were obtained from the Central Bank of Nigeria, National Bureau of Statistics, and the International Monetary Fund. The Autoregressive Distributed Lag (ARDL) bounds testing approach was employed to analyse the relationship between tax revenue, economic growth and human development. Government expenditure and inflation were included as control variables. The results reveal that tax revenue significantly explains economic growth, accounting for 80.6% of the variation in GDP ($F= 11.694$, $p < 0.001$). However, tax revenue has no significant effect on the Human Development Index (HDI), explaining only 13% of its variation ($F = 1.385$, $p = 0.302$). CIT and PIT exhibit positive but insignificant effects on HDI, while VAT is negatively associated with human development. The study concludes that Improving tax administration, broadening the tax base to include the informal sector, reforming the VAT system, and prioritizing public investment in health, education, and infrastructure are essential for translating tax revenue into improved human development outcomes in Nigeria.

Keywords: Tax revenues; company income tax; personal income tax; value added tax; human development index

1 Introduction

1.1 Background to the Study

Sustainable growth is a global concept which refers to economic activities that improve the quality of life and societal welfare, while not compromising the ability of future generations to meet their own needs, and is a key indicator of long-term prosperity and development for nations around the world. Despite the importance of sustainable growth, countries around the world are still facing key challenges such as income inequality, inflation, resource depletion, and economic volatility.

But since then, inflation has risen higher, income inequality has increased more widely, and natural resources are put under even greater pressure, which has made it difficult for an

economy to be stable enough as well as inclusive or sustainable development. Although some countries in Africa have advanced considerably over the last few decades (Onyemaechi & Chiamaka 2025), persistent issues such as inflation, unemployment, and infrastructural deficits still constrain growth and development prospects of many economies on the continent. On a more positive note, it has been found that federal government taxes also impact economic growth, which is a necessary component for sustainable development possibilities in each country, albeit with varying degrees of significance (Azubike et al. 2024).

However, although Nigeria has significant natural resources, its economic growth is weak and uneven due to poor policy implementation, corruption, and overdependence on volatile sectors such as oil, which has led to a narrow tax base and low domestic revenue generation (Onyemaechi & Chiamaka, 2025). Nigeria also faces widespread tax evasion and perceptions of unfair distribution of the tax burden, which are particularly challenging in a large informal sector where the ability to tax is weak, and taxpayer education and record-keeping are poor (Aina, 2025).

According to Ogbonna *et al.* (2020), Nigeria faces significant and multifaceted challenges that hinder its sustainable growth and development. Primarily, it has been challenging for Nigeria to broaden its tax base, which is closely linked to the inability to diversify the economy. The effect of this is the inadequate and suboptimal utilisation of tax revenue, which has deepened the infrastructural deficit. Despite significant socio-economic progress over the last two decades, Nigeria's infrastructure remains severely inadequate and has shown little substantive improvement, representing a significant barrier to economic growth and sustainable development, with the country's infrastructure deficit attributed to chronic under-investment, corruption, and weak institutional support (Asaju, 2023). It is normally expected that HDI should be enhanced when tax revenue increases, especially by having a direct effect on (i) Public health expenditure, which will improve life expectancy; (ii) education financing, which will increase the number of students enrolled in schools and literacy; and (iii) enabling social transfers that raise living standards. However, despite rising tax revenues post-2005 in Nigeria, the HDI has continued to be stagnant at 0.535 in 2022, behind Ghana (0.632) and South Africa (0.713), with comparable tax-to-GDP ratios, suggesting poor and inefficient revenue utilisation (UNDP, 2024). Previous research on how tax revenue relates to sustainable growth have produced a mixed result and inconclusive findings (Adegbie et al., 2023), this study steps in to provide clearer evidence for Nigeria by addressing three key gaps that past research has left unexplored, namely, the overreliance on GDP without considering broader measures like the Human Development Index (HDI), the lack of attention to how different tax structures shape human development, and the neglected role of unemployment in the growth equation. In this study, economic sustainability is shaped by tax revenue. It includes forms such as Value Added Tax, Personal Income Tax and Company Income Tax, which are aimed at funding development projects.

The primary sources of funding for development are tax revenue, including Value Added Tax, Personal Income Tax, and Company Income Tax, although taxation issues like significant losses in government revenues due to the issue of evasion, as well as inconsistencies with policy and weak compliance mechanisms, continue to be a challenge (Adefunke & Ivie 2024; Okoh and Ofor 2024).

This study will investigate the tax revenue effect on sustainable growth in Nigeria and propose recommendations for its enhancement.

The main objective of this study is to investigate the effect of tax revenue on sustainable growth in Nigeria. The specific objectives are to:

I. Analyse the tax revenue effect on Gross Domestic Product in Nigeria.
II. Examine the tax revenue effect on the Human Development Index in Nigeria.

The research questions that guide this study are;

I. What is the tax revenue effect on Gross Domestic Product in Nigeria?
II. To what extent does tax revenue affect the Human Development Index in Nigeria?

While the research hypotheses are;

$H_{0\ 1}$: Tax revenue has no significant effect on Gross Domestic Product in Nigeria.

$H_{0\ 2}$: Tax revenue has no significant effect on the Human Development Index in Nigeria.

2 Literature Review

2.1 Conceptual Framework

2.1.1 Sustainable Growth

Sustainable growth is explained as economic activities that improve the quality of life and the welfare of society while ensuring the long-term capacity of a nation to meet its future needs (Pearce & Barbier, 2020; Todaro & Smith, 2020). This kind of growth rests on a simple but powerful idea that economic gains should not be at the expense of our planet or our people. This balance of the need to grow the economy with the desire to protect the environment while ensuring that everyone has a chance at improved living standards in ways that do so wisely using resources in ways which ensure we take no more than nature can replace and leave nothing but a cleaner legacy for our children, grandchildren (Pearce and Barbier 2020; Sadiq et al. 2025), does not imply giving up prosperity to embrace responsibility. It is about realising that we can have both, but only if we are wise enough to plan for the long haul, respect our natural limits, and care as much about the future as we do about the present.

2.1.2 Gross Domestic Product

Since World War II, GDP has been seen by economists as a measure of a country's macroeconomic performance. Other social science researchers and Policymakers have long recognised the use of GDP to gauge the well-being and economic welfare of people living in a geographical area (Agrawal et al., 2025)

In another context, the World Bank defined Gross Domestic Product GDP as the gross aggregate of the worth of goods and services internally generated by all resident producers in a particular geographical setting of an economy, adding any taxes on products, minus subsidies not included in the value of output (World Bank, 2023). According to the IMF, GDP stands as the monetary value attached to all finished goods and services produced within a country during a specific period and which can be used for the assessment of macroeconomic stability (IMF, 2022). GDP gives a global assessment of the economy of a particular region by focusing on its expansion, contraction, or stagnation.

2.1.3 Human Development Index

The evaluation and the ability of a country to progressively utilise the three key pillars of education, life expectancy and standard of living, according to the United Nations Development Programme (UNDP, 2023), is the Human Development Index. The UNDP describes and focuses on the utilisation of resources for human wellbeing rather than focusing on income and development alone. Ranis (2020) explains the Human Development Index as "a broad mirror of national wellbeing"; in his view, he opined that capabilities and freedoms of people should be considered alongside what they earn. Klugman (2021) notes that HDI provides a balanced picture of human progress by combining social and economic dimensions into a single, understandable figure.

2.1.4 Tax Revenue

Tax revenue is the consolidation of various money collected by the government from individual and corporate bodies using various tax collection methods. The process allows the government to exert control over tax collection. Tax revenue redistributes wealth from the private sector to the public sector of the economy; it is through tax revenue that the government can achieve some of its social and economic objectives, which include the provision of essential facilities and services (Abomaye-Nimenibo et al., 2018). According to Smith and Turner (2023), a study stated that tax revenue is the obligatory transfer of financial resources from private individuals and firms to the government without any direct or immediate benefit.

Table 2.1: Theoretical Transmission from Tax Revenue to HDI Components

Tax Type	Primary Channel	Expected HDI Component	Condition for Effectiveness
CIT	Public infrastructure & business environment	Standard of living (GNI)	Low corruption, competitive procurement
PIT	Social transfers & public services	Education & health	Progressivity, effective targeting
VAT	General government revenue	All three (indirectly)	Non-regressivity, exemption for essentials

Source: Author's Compilation (2026)

2.2 Theoretical Review

2.2.1 Endogenous Growth Theory

The theory of Endogenous Growth offers a compelling answer to what drives long-term economic growth: the most important factors don't come from outside the economy; they emerge from within the economy. In this sense, economic policies, human capital investment, innovation, and the accumulation of knowledge are the lead characters, not supporting actors, in the play of sustained growth, unlike older models that often treated technological progress as something that happened offstage. This focus on internal dynamics is particularly valuable when we consider how taxation affects long-run economic performance, especially in developing countries such as Nigeria.

It is also closely aligned with the work of influential economists such as Paul Romer, who emphasized the role of ideas and innovation, because while physical goods are subject to diminishing returns, knowledge is not (Aghion and Howitt, 2015), Robert Lucas, who saw human capital as the primary driver of growth, and Robert Barro, who showed how to integrate fiscal policy into growth models. More recent work has built on these foundations, reinforcing the point that internal economic factors shaped largely by policy are critical in determining long-term growth outcomes (Odhiambo & Olashala, 2018; Nwaiwu, 2024).

The theory assumes that sustained growth is not an accident, but rather the result of intentional investments in human capital, innovation, and knowledge creation (education, healthcare, and workforce training) and research and technological development that increase what an economy can actually produce (Odhiambo and Olashala, 2018; Nwaiwu, 2024).

For Nigeria, this is important because the Nigerian economy has been heavily dependent on oil revenue and the economy has been struggling to diversify, an issue made more urgent by that dependence. A well-designed tax system can play a role here, too: If revenue is invested in ways that build up human capital, that can enhance productivity and provide a foundation for more robust, long-term economic growth.

2.3 Empirical Review

2.3.1 Tax Revenue and Gross Domestic Product

Adewale et al. (2022) used the autoregressive distributed lag (ARDL) model and found that personal income tax (PIT), company income tax (CIT), and value-added tax (VAT) are positive contributors to economic growth in both the short and long run, while Yahaya et al. (2018) using Fully Modified Ordinary Least Squares (FMOLS) found that CIT increased GDP, but PIT and VAT significantly increased GDP, while CIT had a significant negative effect.

2.3.2 Tax Revenue and Human Development Index

Ibadin and Oluwatuyi (2021) found a positive and significant long-run relationship between tax revenue, GDP, and the Human Development Index (HDI), with VAT having the strongest influence. Okolo (2024) reported that tax revenue and government expenditure jointly explain a significant proportion of variations in HDI. Fadipe et al. (2025) found that tax policy instruments such as tax incentives and harmonisation positively influence HDI. However, Ayano (2022) found that CIT and education tax negatively affect life expectancy, although they positively influence education enrolment. Halim and Rahman (2022) found that various tax types positively contribute to achieving sustainable development goals in a panel study of emerging economies,

2.4 Institutional Quality as a Moderator of Tax Revenue Effectiveness

A growing body of evidence suggests that tax revenue affects human development not directly, but conditionally on institutional quality. Omodero (2019) found that in Nigeria, corruption and weak public financial management completely negated the positive potential of CIT and VAT on health outcomes. Asiedu (2022) carried out studies on Ghana's tax system; these studies found that tax revenues only made a significant difference to the Human Development Index when they were earmarked specifically for health or education. Similarly, in Kenya, Wambui and Kipchumba (2023) discovered in their research work that giving local governments more control over tax collection actually made education spending more responsive to revenue changes at the regional level. Combining these results, it appears that the weak relationship between tax revenue and HDI in Nigeria may not be due to the tax system per se, but rather to how things are run (see $H_{0\ 2}$), so this study examines the direct statistical relationship between tax revenue and HDI (see Section 5.3).

3 Methodology

This study used an ex-post facto design, which was appropriate for this study, as the existing data will be analysed to determine the relationships between taxation and sustainable growth without the manipulation of any variables. The population for this study included all tax revenue and macroeconomic data records for Nigeria from 2005 to 2024. The twenty years from 2005 to 2024 were selected using a purposive sampling technique because the researcher could select a timeframe that would include complete and reliable data sets for all variables of interest.

The primary or secondary dataset used for this study was sourced from IMF, CBN, NBS, and FIRS between 2005–2024. Two control variables, government expenditure (GEX) as a

percentage of GDP obtained from CBN data, and the inflation rate (INF), measured by the consumer price index taken from NBS records, were included to improve model specification; these secondary data are considered reliable because they have been checked and cross-verified periodically on account of the regular checks that such national and international agencies undertake.

Model Specification

The study adapted the empirical models from earlier work in the literature to the specific objective of this study: to examine the impact of tax revenue on sustainable growth in Nigeria. We controlled for government expenditure and inflation, which have been shown by previous research to matter for growth outcomes, to avoid omitted variable bias.

Model 1 (GDP with Control Variables):

$$GDP_t = \beta_0 + \beta_1 CIT_t + \beta_2 PIT_t + \beta_3 VAT_t + \beta_4 GEX_t + \beta_5 INF_t + \varepsilon_t$$

Model 2 (HDI with Control Variables):

$$HDI_t = \beta_0 + \beta_1 CIT_t + \beta_2 PIT_t + \beta_3 VAT_t + \beta_4 GEX_t + \beta_5 INF_t + \varepsilon_t$$

Where:

β_0 = intercept

$\beta_1 - \beta_5$ = explanatory variable coefficients

GEX_t = Total Government expenditure (% of GDP)

INF_t = annual inflation rate of the Consumer Price Index (%)

ε_t = error term

t = period of time (2005–2024)

Method of Data Analysis

Autoregressive Distributed Lag (ARDL) bounds testing framework was considered for the long-run dynamics between tax revenue and sustainable growth indicators, as our variables had a combination of integration orders: some variables were integrated at levels and others were integrated in first differences. We performed all estimations in EViews 10 and conducted a battery of diagnostic checks for normality, serial correlation and heteroskedasticity, as well as a check for stability using the CUSUM procedure. Given that VAT showed signs of non-stationarity with a possible structural break, we ran an additional Zivot–Andrews unit root test (results are provided in Appendix A). Lastly, we calculated the error correction model to determine how quickly any short-run deviations return to the long-run equilibrium.

4 Data Analysis, Results, and Discussion of Findings

4.1 Descriptive Statistics

Table 4.1.1 Descriptive Statistics (2005–2024)

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
CIT (₦ billion)	1398.18	1068.47	6544.09	170.2	1442.65	2.49	9.28
PIT (₦ billion)	450.92	151.78	1965.72	0	571.18	1.09	3.39
VAT (₦ billion)	1325.17	802.82	6721.36	192.7	1525.95	2.5	9.05
GDP (₦ billion)	62749.2	68314.95	80606.53	38777.01	12702.79	-0.57	2.09

HDI	0.523	0.527	0.56	0.484	0.025	-0.03	1.69
GEX (% of GDP)	12.4	11.8	18.3	8.9	2.8	0.45	2.21
INF (%)	13.7	12.4	29.7	5.4	6.9	1.12	3.45

Source: Researcher's Computation (2026)

Interpretation: The results of this study show that CIT, PIT, and VAT all have mean values lower than their individual standard deviations, indicating high variability and volatility in tax revenues. The GDP and HDI show more stability. CIT and VAT are highly leptokurtic (kurtosis > 3), indicating the presence of extreme values or outliers; the extreme values were reported in the 2011 data for CIT and VAT. However, GEX and INF show moderate variability consistent with Nigerian macroeconomic history.

4.2 Unit Root Test

Table 4.1.2 Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Level (I(0)) p-value	First Difference (I(1)) p-value	Order of Integration
CIT	0.9289	0.0358	I(1)
PIT	0.8475	0.0059	I(1)
VAT	1	0.9393	**Non-stationary (see note below)**
GDP	0.0044	0.3053	I(0)
HDI	0.7566	0.0201	I(1)
GEX	**0.0321**	**0.2187**	**I(0)**
INF	**0.8923**	**0.0112**	**I(1)**

Source: Researcher's Computation (2026)

Interpretation: The test result shows that there are mixed orders of integration (I(0) and I(1)), justifying the appropriateness of the use of the ARDL bounds testing approach. However, the Augmented Dickey-Fuller test indicates that VAT remains non-stationary even after first differencing (p = 0.9393). This suggests the presence of structural breaks or extreme volatility. Following Pesaran and Shin (1999), we address this by: (i) applying the Zivot-Andrews unit root test allowing for one structural break, and (ii) re-estimating the model with log-differenced VAT. The main ARDL results presented here assume that the bounds test remains valid given the mixed integration order of other variables.

4.3 Test of Hypothesis One ($H_{0\ 1}$): Tax revenue and GDP

Table 4.2.1.2 ARDL Bound Test (Dependent Variable: GDP)

Test Statistic	Value	K	Significance	I(0) Bound	I(1) Bound
F-statistic	22.05	3	5%	2.79	3.67

Source: Researcher's Computation (2026)

There is a long-run relationship between tax revenue and GDP, with the F-statistic (22.05) exceeding the upper bound critical value of (3.67) at 5%.

Table 4.2.1.3 Long-Run Regression Results (Dependent Variable: GDP)

Variable	Coefficient	Std. Error	t-Statistic	Probability
CIT	0.208	0.137	1.519	0.156
VAT	0.055	0.14	0.397	0.698
PIT	-0.014	0.011	-1.251	0.236
GEX	**0.187**	**0.092**	**2.033**	**0.062**
INF	**-0.031**	**0.018**	**-1.722**	**0.108**
C	4.108	0.072	57.053	0.000
Statistic				**Value**
Adjusted R-squared				0.806
F-statistic				11.694
Prob(F-statistic)				0.000
Durbin-Watson				2.482

Source: Researcher's Computation (2026)

Regression Equation:

$GDP_t = 4.108 + 0.208CIT_t + 0.055VAT_t - 0.014PIT_t + 0.187GEX_t - 0.031INF_t$

Interpretation: CIT has a positive but insignificant effect on GDP (β = 0.208, p = 0.156). VAT also exhibits a positive but statistically insignificant effect (β = 0.055, p = 0.698). PIT shows a negative and insignificant effect (β = -0.014, p = 0.236). **GEX shows a positive and marginally significant effect (β = 0.187, p = 0.062), while INF shows a negative but insignificant effect (β = -0.031, p = 0.108).** 80.6% of the variation in GDP is explained by CIT, PIT, VAT, GEX, and INF following the adjusted R-squared of 0.806, while the overall model is significant with the F-statistic (11.694, p = 0.000).

Table 4.2.1.4: Error Correction Model (ECM) – Dependent Variable: ΔGDP

Variable	Coefficient	Std. Error	t-Statistic	Probability
ECT(-1)	-0.473	0.112	-4.223	0.001
ΔCIT	0.186	0.098	1.898	0.079
ΔPIT	-0.011	0.009	-1.222	0.241
ΔVAT	0.048	0.101	0.475	0.642
ΔGEX	0.165	0.088	1.875	0.083
ΔINF	-0.028	0.016	-1.75	0.102

Source: Researcher's Computation (2026)

ECM results: The error correction term is negative and statistically significant (-0.473, p = 0.001), meaning about 47.3% of the disequilibrium in GDP is corrected in one year, and there is a stable long-run relationship between tax revenue and GDP, as the earlier ARDL bounds test results had indicated.

Decision: $H_{0\ 1}$ is rejected. There is a joint significance of tax revenue in affecting Gross Domestic Product in Nigeria.

Discussion: The results show that the Company Income Tax (CIT) has a positive, but statistically insignificant effect on economic growth, which aligns with the findings of Nwosu et al. (2023) and Osamor et al. (2021), but contradicts the findings of Omuya (2025), who found a negative CIT-GDP relationship. Likewise, the positive, but statistically weak VAT effect in this study provides partial support for the findings of Nwanakwere (2021) and Nwosu et al. (2023). Personal Income Tax (PIT) results are negative, consistent with the argument that direct taxes tend to slow down the economy, discouraging income generation and consumption (Omuya 2025). The overall lack of statistical significance across these tax variables also hints that tax revenues are not being directed to growth-oriented sectors, which is consistent with the premises of Endogenous Growth Theory.

4.4 Hypothesis Two ($H_{0\ 2}$) Test: Tax revenue and HDI

Table 4.2.2.2 ARDL Bound Test (Dependent Variable: HDI)

Test Statistic	Value	K	Significance	I(0) Bound	I(1) Bound
F-statistic	9.55	3	5%	2.79	3.67

Source: Researcher's Computation (2026)

The long-run relationship between tax revenue and HDI was further confirmed by the F-statistic (9.55), which exceeds the upper bound critical value (3.67) at 5%.

Table 4.2.2.3 Long-Run Regression Results (Dependent Variable: HDI)

Variable	Coefficient	Std. Error	t-Statistic	Probability
CIT	1.074	12.024	0.089	0.93
VAT	-1.089	12.699	-0.085	0.933
PIT	0.024	0.199	0.125	0.902
GEX	0.312	0.421	0.741	0.471
INF	-0.087	0.113	-0.77	0.454
C	0.155	2.49	0.062	0.951
Statistic				Value
Adjusted R-squared				0.13
F-statistic				1.385
Prob(F-statistic)				0.302
Durbin-Watson				2.564

Source: Researcher's Computation (2026)

Regression Equation:

$$HDIt = 0.155 + 1.074CITt - 1.089VATt + 0.024PITt + 0.312GEXt - 0.087INFt$$

Interpretation: The results of the regression indicate that CIT has a positive effect on HDI but is not statistically significant (β = 1.074, p = 0.930), while VAT has a negative sign that is also not statistically significant (β = -1.089, p = 0.933), and PIT shows a positive and negligible effect (β = 0.024, p = 0.902). Government expenditure and inflation are not statistically significant and are not meaningful determinants of HDI either. The adjusted R-squared of 0.130 (13%) is also low and indicates the explanatory power of the model is still weak, with the included tax measures still explaining little. Furthermore, the overall fit of the model, as

measured by the F-statistic of 1.385 (p = 0.302), shows that the regression is not jointly statistically significant, indicating that the chosen fiscal indicators are not reliable predictors of changes in HDI during the period under consideration.

Conclusion: The null hypothesis ($H_{0\ 2}$) is not rejected. The Human Development Index in Nigeria is not statistically affected by tax revenue.

Discussion of HDI Findings:

The absence of a statistically significant relationship between tax revenue and HDI is further emphasized by the overall model fit: F-statistic = 1.385 (p = 0.302) and an adjusted R^2 of only 0.13, or a meager 13 percent of the variation in human development explained by the combination of CIT, PIT, and VAT, compared to an adjusted R^2 of 0.806 for the GDP model, which suggests a clear division in Nigeria's fiscal architecture: the tax system produces growth in output, but that growth is not reflected in better human welfare.

CIT does not come out significant (p = 0.93), a result that Omodero (2019) attributes to chronic evasion and weak administrative capacity. A more convincing reason, however, is the way in which revenues are spent: Nearly 44 per cent of the 2023 budget went to debt servicing, and another 28 per cent to administrative and recurrent expenses (BudgIT, 2024). Even if CIT collections rise, they are not likely to be channelled into HDI-related outcomes under these conditions.

VAT has a negative coefficient (-1.089), but it fails to meet conventional levels of statistical significance, although the sign is economically suggestive. Because VAT is a regressive tax, which places the heaviest burden on those with the lowest incomes (who spend a greater proportion of their incomes on consumption), that burden can reduce household spending on health and schooling, reducing human development in an indirect way, which might be softened by exempting basic goods from VAT.

The insignificant results for the tax variables overall in an Endogenous Growth framework suggest a broken transmission channel from public revenue to human capital formation, which institutional factors like weak governance, corruption, and systematic misallocation of funds are most likely to blame.

4.5 Summary of Empirical Findings

The findings make a clear distinction between economic growth and human welfare: about 80.6 per cent of the variation in GDP can be explained by tax revenue, but only 13 per cent of the variation in HDI. This finding suggests that fiscal expansion, as designed, does not necessarily translate into gains in education, health, or overall living standards: perhaps the tax system is good at stimulating output, but that output is not being channelled into the public goods that lead to higher human development.

Hypothesis	Finding	Decision
$H_{0\ 1}$: Tax revenue has no significant effect on GDP	F-statistic = 11.694 (p = 0.000); Adjusted R^2 = 0.806	**Rejected**
$H_{0\ 2}$: Tax revenue has no significant effect on HDI	F-statistic = 1.385 (p = 0.302); Adjusted R^2 = 0.130	**Not rejected**

Furthermore, empirically, the paper investigates the impact of tax revenue on sustainable growth in Nigeria, focusing on Company Income Tax, Personal Income Tax, and Value Added Tax, from 2005 to 2024, using GDP and HDI as twin indicators of sustainable growth. The three tax types, as a group, have a statistically significant impact on GDP, but they do not, as a group, have a statistically significant impact on HDI. The disaggregated results show that CIT and PIT have positive growth effects while VAT has a negative impact.

These results can be interpreted through the lens of Endogenous Growth Theory. When tax policy is complemented by strong institutional frameworks, improved compliance, and spending on human capital and infrastructure, then tax policy can act as a catalyst for sustainable growth, but the consistently low correlation between tax revenue and HDI underscores the fact that the fiscal system in Nigeria has yet to find a way to translate higher levels of revenue into greater levels of welfare.

5 Conclusion and Recommendations

5.1 Conclusion

The present study analyses the impact of tax revenue on the sustainable growth of Nigeria, focusing on three main types of tax: Company Income Tax, Personal Income Tax, and Value Added Tax, and employing both GDP and HDI as proxy indicators over the period 2005–2024.

The findings indicate that tax revenue has a statistically significant joint effect on GDP, but not on HDI. Specifically, the results indicate that CIT and PIT have a positive effect on growth, while VAT has a dampening effect.

As per Endogenous Growth Theory, tax revenue can contribute to sustainable development if accompanied by good policy design, enhanced compliance, and targeted investment in productivity-enhancing sectors such as education and health; however, the low correlation between revenue collection and HDI implies that in practice, Nigeria's tax system has not yet developed a consistent mechanism to convert fiscal gains into tangible human development indicators.

5.2 Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. **Strengthen Tax Administration:** The Federal Inland Revenue Service (FIRS) should ensure that the tax administration systems in Nigeria are modernised by digitalizing the tax collection platforms to reduce tax evasion and improve compliance, particularly in the informal sector, which remains largely untaxed in Nigeria.
2. **Prioritise Human Capital Investment:** The Nigerian government should ensure that the allocation of more tax revenues is directed towards education, health services and infrastructure development. Specifically, the Nigerian government should allocate not less than 50% of its incremental tax revenue to human development sectors.
3. **Strengthen Institutional Frameworks:** To improve the effectiveness of tax revenue utilisation, Nigerian institutional mechanisms for accountability, transparency, and anti-corruption, like the Independent Corrupt Practices and Other Related Offences Commission (ICPC), and the Economic and Financial Crimes Commission (EFCC) should be strengthened to ensure that revenues are efficiently deployed.
4. **Broaden the Tax Base:** The Nigerian government, through the Federal Inland Revenue Service (FIRS), should implement policies that would intentionally integrate the informal sector into the tax net through simplified tax regimes, taxpayer education, and incentives for voluntary compliance.

5. **Establish Earmarked Funds:** Based on the findings from Ghana (Asiedu, 2022) and Kenya (Wambui & Kipchumba, 2023), Nigeria should consider establishing earmarked tax funds for specific human development outcomes, ensuring that revenues are directly linked to measurable improvements in HDI components.
6. **Reform the VAT System:** Given the negative association between VAT and HDI, policymakers in Nigeria should consider exempting necessities from VAT or introducing a progressive VAT system to reduce the regressive impact on low-income households.

The above recommendations to the Nigerian government should be implemented within a medium-term framework of 3 to5 years with clear performance indicators to track progress.

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Lean Accounting Practices and Financial Performance of Listed Manufacturing Companies in Nigeria

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Abstract

Good financial performance determines the good health, going concern and motivating factor for stakeholders in business organisations. Evidence from literature showed that manufacturing companies listed in Nigeria are suffering from business growth and sustainability because of poor financial performance. Research has shown that manufacturing companies listed in Nigeria have not embraced the practice of lean accounting for business transformation. The study adopted *ex post facto* research design in investigating the relationship between lean accounting practices and financial performance of listed manufacturing companies in Nigeria. The study employed secondary data collected from the financial statements of the companies under investigation for the period of twelve (12) years from 2013 to 2024. The data were analyzed using panel least squares (PLS) regression technique. This was carried out with the aid of the E-view 10.0 software and Excel package. Findings from the study showed that just-in-time costing has a negative and significant relationship with financial performance while inventory turnover ratio has a positive and significant relationship with financial performance of listed manufacturing companies in Nigeria. Thus, the study concluded that just-in-time costing and inventory turnover ratio are good predictors of financial performance in Nigeria. Based on these findings, this study recommended that attempt should be made to conduct a comparative analysis of Nigeria and other countries like America, Asia, Europe, and the UK. Firm are advised to prioritize qualitative implementation and dynamic inventory management to optimize efficiency,

Keywords: Lean accounting practices, Financial performance, Just-in-time costing, Inventory turnover ratio, Firm size, Return on assets.

1. Introduction

Contemporarily, the cost of doing business in Nigeria has been very expensive. This has equally affected cost of raw materials, production costs of manufactured goods as well as costs of service production. This has led to several goods produced in the nation to maintain little patronage from users due to increases in prices of goods and, consequently, becomes spoilt without being sold to customers (Ine-Tonbarapa, 2017). Some companies ultimately utilize substandard materials in making their products so as to decrease production costs and increase profit (Aziz et al., 2017). To a large extent, Nigerians tend to suffer the outcomes of this action due to purchase or consumption of ;these substandard goods and services that have saturated the market. So as to maintain favourable market share in the long-run, listed manufacturing companies need to concentrate, emphasis and implement diverse

organisational cost control, design sound service provision strategies as well as reduction practices, such as programme crashing, budgetary control, performance budgeting, and inventory control techniques.

However financial performance is a crucial metric in evaluating the effectiveness of lean accounting practices within organizations. Financial performance enhances the future economic growth of businesses in Nigeria and helps to fulfill the shareholders' wealth maximisation objective (Lambe et al, 2025).

Flowing from the preceding section, lean accounting system (such as just-in-time costing and inventory turnover ratio) has arisen in response to these constraints and to offers a competitive edge at both the corporate and national levels by identifying inefficiencies and proposing more effective operational methods (Tugce, 2023). Lean accounting is the process of guiding, evaluating, and keeping an eye on methods that reflect lean production and thinking and facilitate thoughtful decision-making by providing precise, understandable, and pertinent data and removing unnecessary steps related to traditional cost control and reduction. By offering criteria and information reporting, this kind of accounting promotes long-term activity optimization. Just-in-time costing minimizes inventory levels, reduces carrying costs and frees up capital that can be reinvested in other areas of the business. Also, inventory turnover ratio is a metric that captures how efficiently a company manages its inventory, indicating the effectiveness of lean practices in reducing excess stock and optimizing supply chain management (Veech, 2023).

Nigerian authors (Adeyemi & Akanbi, 2020; Nwankwo & Umeh, 2021; Ojo & Olanrewaju, 2019; Okafor & Omole, 2022; Onyekachi, 2018) have contributed significantly to understanding how these practices affect financial outcomes in Nigeria. Also, cross-country analyses by Johnson (2018), Ogunleye et al. (2022), Suzuki (2019), and Zhang (2020) have underscored the pivotal role lean accounting practices play in shaping financial performance. Despite these collective investigations, several deficiencies and gaps exist that this present study seeks to bridge. For instance, while prior studies (Adeyemi & Ak anbi 2020; Nwankwo & Umeh 2021; Ojo & Olanrewaju 2019; Okafor & Omole 2022; Onyekachi, 2018) highlight the importance of lean accounting, they often lack comprehensive empirical investigations into the intricate dynamics between lean accounting practices and financial performance within Nigeria's diverse industries.

This scarcity is particularly notable in studies such as Afolayan (2019), Bello and Yusuf (2020), and Coker (2021). Although, Adebanjo (2021) and Akinola (2018) have examined the impact of lean accounti,.ng practices on financial performance in various settings, there is still a dearth of research specifically tailored towards understanding financial performance in Nigeria's unique business environment. Also, prior studies (Adebayo, 2022; Ajibade, 2021; Aluko, 2019; Daniels & Smith, 2020; Patel & Desai, 2021) on the link between lean accounting practices and financial performance documented mix findings. While Ajibade (2021), and Aluko (2019), revealed positive and significant link, Adebayo (2022), Daniels and Smith (2020), and Patel and Desai (2021) showed negative and significant link. Flowing from these conflicting outcomes, there is a knowledge gap regarding the effectiveness of these practices in the Nigerian listed manufacturing companies which further outlines the necessity for an intensive examination into how lean accounting practices affect the financial performance of listed manufacturing companies in Nigeria, given their critical role in the country's economic landscape. Therefore, the objective of this study does investigate the relationship between lean accounting practices and financial performance of listed manufacturing._The specific objectives are:

1. Examine the relationship between just-in-time costing and financial performance of listed manufacturing companies in Nigeria; and

2. Ascertain the relationship between inventory turnover ratio and financial performance of listed manufacturing companies in Nigeria.

Against the backdrop of knowledge gap identified, this study gives answer to how the lean accounting practices affects financial performance of listed manufacturing companies in Nigeria? Consistent with this, the following specific questions was raised for the study:

1. What is the relationship between just-in-time costing and financial performance of listed manufacturing companies in Nigeria?

2. What is the relationship between inventory turnover ratio and financial performance of listed manufacturing companies in Nigeria?

2.0 Literature Review

Conceptual Review

Financial Performance

Financial performance represents the general economic condition of a firm over a specified time frame and can be utilised for comparison with the performance of similar companies in related businesses or between businesses in general. Performance measurement is a technique of evaluating the efficacy of a company's initiatives in reaching the company's overall goal on a regular basis (Scherr, 2019).

Return of Asset

ROA is a metric that is usually used in estimating a firm's impending profitability by measuring its past profitability. Consistent with this, ROA is defined as the ratio of earnings after tax to total assets of the company (Rene et al., 2018). Okobo et al. (2022) posit that ROA denotes the company's return on all assets (or funding) provided to the company. According to Myšková and Hájek (2017), ROA enables us to compare companies with diverse proportions of debt in financial resources. A high proportion of ROA shows that the company is mostly effective at turning its assets into revenue, whereas, a low proportion of ROA implies that the company is not effective at turning its assets into revenue (Anozie et al., 2023). Against the backdrop, this study measured ROA as the ratio of earnings after tax (EAT) to total assets of the firm.

Lean Accounting Practices

Lean accounting is the process of directing, assessing, and monitoring of techniques that mirror lean thought and production and enable cognizant decision-making by supplying accurate, comprehensible, and relevant information and eliminating pointless steps associated with conventional cost management and reduction. The application of quick-response manufacturing can be greatly strengthened by lean accounting techniques, despite their primary focus on cutting waste and increasing efficiency (Kaire et al., 2023). In this study, lean accounting techniques are decomposed into just-in-time costing and inventory turnover ratio. Thus:

Just-in-Time Costing and Financial Performance

Just-In-Time (JIT) costing represents a fundamental component of lean accounting systems that originated in Japanese manufacturing during the 1970s (Akbar et al., 2023). The implementation of JIT costing enables companies to significantly reduce inventory waste while improving working capital efficiency, as demonstrated through measurable improvements in inventory turnover ratios and other key financial metrics (Fred-Horsfall & Imo, 2024). When properly implemented within lean accounting systems, JIT costing serves as both a

performance measurement tool and a driver of continuous improvement, aligning production processes with actual demand while minimizing resource expenditure (Akbar et al., 2023). Adeniran et al. (2024) examined the link between just-in-time and financial performance of listed manufacturing companies in Nigeria. The data assembled were analysed using multiple regression technique and revealed a positive and substantial link between just-in-time costing and financial performance of quoted manufacturing firms in Nigeria.

Ukehinakachi et al. (2023) surveyed the link between lean accounting and financial performance of 9 quoted industrial goods firms in Nigeria. Lean accounting was decomposed into value stream mapping and just-in-time costing while financial performance was captured using return on asset. The study utilised a triangulation of primary and secondary data as well as correlational research design. The study used a sample of one hundred and eighty-three (183) knowledgeable respondents sourced from the 9 quoted industrial goods companies in Nigeria for a period of one (1) year i.e 2021. The data sourced were analysed using multiple regression technique and ascertaind a positive and substantial association between just-in-time costing (JITC) and return on asset (ROA) in Nigeria. Jibrin and Ine-Tonbarapa (2023) examined the nexus between lean accounting practices and financial performance of 9 quoted consumer goods firms in Nigeria. Lean accounting practices were decomposed into just-in-time costing and value stream mapping while financial performance was measured using and return on equity (ROE). The study utilised firm size as a moderating variable. The data collected were analysed using multiple regression technique and revealed a positive and significant association between JITC and ROE in Nigeria.

Okpala (2023) also observed lean manufacturing from the six sigma methodologies against profitability from manufacturing small and medium enterprises in Nigeria, and found that it had no influence on profit levels. This observation was attributed to unwilling leadership support, followers' buy-in, and poor documentation of the lean success evidences. The divergence observed from Okpala's study (2013) was previously established by Panizzolo et al. (2012) with evidence from Indian SMEs which discovered that lean manufacturing system did not affect profitability due to restrictions that dwelt on culture, skills and knowledge gaps, and top management lack of commitment. Karanja et al. (2022) studied the association between lean production and business performance in Kenya. Lean production was decomposed into target costing, activity-based costing (ABC), and Just-in-Time (JIT) costing while business performance was measured using ROA. The data assembled were analysed using regression technique and showed a positive and substantial link between lean production and business performance in Kenya. Against the backdrop, the first hypothesis of the study is stated thus:

H_{O1}: Just-in-Time costing has no significant relationship with financial performance of listed manufacturing companies in Nigeria.

Inventory Turnover Ratio and Financial Performance

Inventory turnover ratio is a component of inventory management technique which is a set of controls and guidelines that monitor inventory levels and determine the quantity of stock, when to replenish or stock up, and how much to order (Bhargav, 2016). The idea of inventory management system or method has been of immense concern and significance to several scholars in the past years. Inventory management is a framework that businesses employ to govern their interest in inventory. It entails keeping track of and monitoring supply levels, projecting future demand, and deciding when and how to make arrangements (Atnafu & Balda, 2018).

Abubakar et al. (2024) examined the impact of inventory management on financial performance of ten (10) quoted firms in Nigeria for a period of seven (7) years from 2012 to 2018. Inventory management was captured using inventory turnover ratio while financial

performance was measured using ROA. The data collected were analysed using multiple regression technique and revealed a positive and substantial link between inventory turnover ratio and financial performance of quoted firms in Nigeria. Otuya and Eginiwin (2024) examined the influence of inventory management on profitability of SMEs in Nigeria. The literature utilised a descriptive research design and employed a stratified random sample of 10 out of a total of 30 SMEs. The study utilized primary data through a well-structured questionnaire to elicit information from respondents. The data collected were analysed using a multiple regression technique and ascertained a positive and substantial link between inventory turnover ratio and financial performance of SMEs. The study also showed an adverse and substantial link between inventory conversion period and financial performance.

Etale and Sawyerr (2024) surveyed the link between inventory management and financial performance of listed industrial goods firms in Nigeria for the period of 8 years from 2011 to 2018. Inventory management was captured using inventory to assets ratio and inflation while financial performance was measured using return on assets. The data sourced were analysed using descriptive statistics and multiple regression technique and ascertained a positive and substantial link between inventory management and return on assets. Ali and Showkat (2022) examined the link between inventory management and operating profits of 4 listed pharmaceutical firms in Pakistan for the period of 9 years from 2009 to 2017. The data gathered were analysed using regression technique and ascertained an insignificant link between inventory turnover ratio and operating profits in Pakistan. Flowing from findings from erstwhile studies, this study presents the following hypothesis thus:

H_{O2}: Inventory turnover ratio has no significant relationship with financial performance of listed manufacturing companies in Nigeria.

Firm Size

Firm size of a company in a certain industry at a given point in time, as determined by its revenue, profit, workforce, and even facility size, is the optimum firm size. According to Esan, et al., 2023 Firm size has been explored by extant literatures as total assets, revenue, scale of operation and number of employees.

2.1 Theoretical Review and Framework

Production Theory

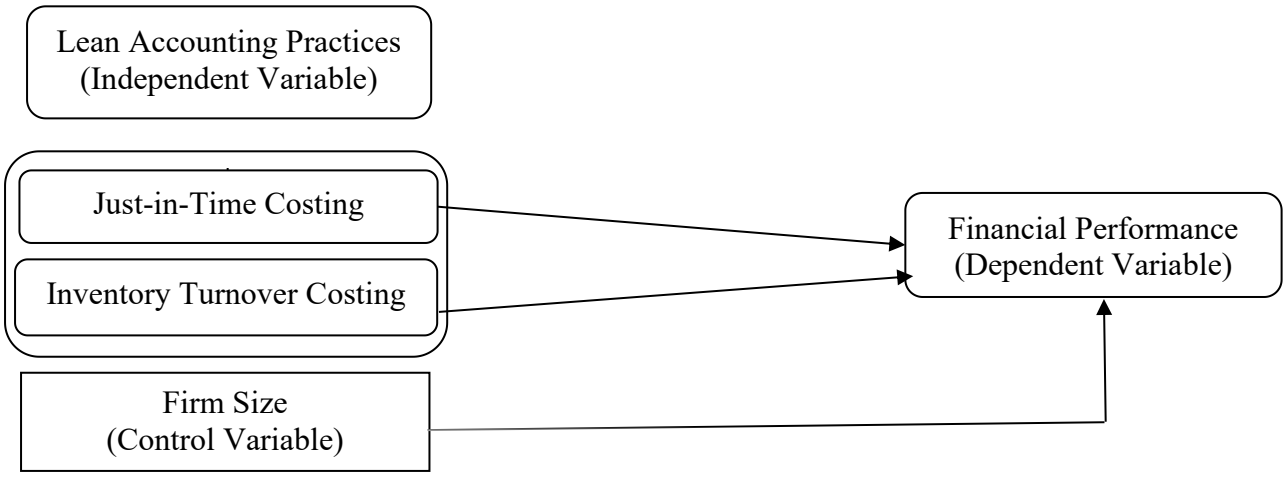
The theory on which this study is anchored is the production theory which is credited to Charles, Cobb, and Paul in 1928. The theory of production is an attempt to explicate the philosophies that a corporate entity uses to determine how much of each commodity it sells (its "outputs" or "products") and how much of each type of labor, raw material, and fixed capital good it uses (its "inputs" or "factors of production"). In relation to production theory, earlier studies have shown how diverse lean accounting practices such as just-in-time costing (Adeniran et al., 2024) and inventory turnover ratio (Jonah et al., 2023) can affect the financial performance of listed manufacturing companies.

Contingency Theory

Owning to the companies been listed in the capital market hence contingency theory was explore in the curse of the study. Contingency theory was primarily developed by Fiedler in the 1960”s. Fiedler introduced this theory in his work “A Theory of Leadership Effectiveness,” published 1967, The theory emphasized that the effectiveness of leadership was contingent upon the fit between leader’s style and the specific situational factors. The Contingency Theory suggests that the effectiveness of management practices, including cost management practices depends on the alignment between the characteristics of the organisation and the external environment (Donaldson, 2001).

Conceptual Framework

Figure 1: Schema on the Relationship between Lean Accounting Practices and Financial Performance



Source: Researcher's Idea (2026)

3.0 Methodology

The *ex post facto* research design was utilised to investigate the relationship between lean accounting practices and financial performance of listed manufacturing companies in Nigeria for a period of twelve (12) years from 2013 to 2024. The choice of 2013 was made as it was the second phase of the implementation of International Financial Reporting Standards (IFRS) for the preparation of annual reports by listed companies in Nigeria. Also, 2024 was considered to enable the researcher include current available data. The total population of the study was restricted to two (2) manufacturing companies listed on the Nigerian Exchange Group (NGX) as at 31st December, 2024. It comprised 20 companies decomposed into 13 industrial goods and 7 oil and gas companies. The choice of this sector was made because this sector tends to ensure the turning of inputs (raw materials, resources, and services) into outputs (finished products and services) so as to guarantee higher national outputs and improved economic growth and development. Owing to the smallness of the population of the study and due to the fact that the manufacturing companies operate in the real sector of the economy and the contribution to national Gross Domestic Product can not be undermined the entire companies were taken as sample using the census technique.

The Panel Least Squares (PLS) regression technique was utilised to explore the relationship between lean accounting practices and financial performance of listed manufacturing companies in Nigeria. The PLS was preferred because it helped to control for unobserved factors that are constant over time for a specific firm but may vary across different firms. This was conducted with the aid of the E-views software and Excel package. In interpreting the PLS regression model, some statistics were generated among which are the Hausman statistic, Jarque-Bera (J-B) statistic, F-Statistic, Durbin-Watson (D-W) statistic, t-statistics, coefficient of determination (R-Squared), and adjusted R-Squared which represents the goodness-of-fit measures. Inference drawn from regression result was premised on these statistics. However, it was very important to determine whether the model was efficient in forecasting the financial performance of listed manufacturing companies in Nigeria.

Flowing from production theory on which this study is anchored, this study adapted the model by Nwokoye (2024) and improved on the model by replacing cash conversion cycle (CCC) and value stream mapping (VSM) with JIT to suit the study. Nwokoye 2024) model is presented as follows:

$A_c = {}_0 + {}_1CCC_1 + {}_2VSM_2 + {}_3ITP_3 + \varepsilon_{ut}$.....(1)

$A_m = {}_0 + {}_1CCC_1 + {}_2VSM_2 + {}_3ITP_3 + \varepsilon_{ut}$.....(2)

Thus, the functional model formulated in this study is stated therefore:

Financial Performance = f(Lean Accounting Practices) ----------(3)

Financial Performance = f(JIT, ITR) ----------(4)

Arising from the functional model and incorporating the control variable, the econometric model is indicated therefore:

$A = {}_0 + {}_1 T + {}_2ITR + {}_3FSIZE + \mu_{it}$.....(5)

Where:

ROA = Return on Assets; JIT = Just-In-Time Costing; ITR = Inventory Turnover Ratio; FSIZE = Firm Size; μ = The Stochastic Error Term; i = Firm; t = Period Considered; β_0 = Intercept; β_1, β_2 = Parameter Estimates; *a priori* expectations are $\beta_1>0$ and $\beta_2>0$ which suggests that the independent variables are anticipated to have positive and significant association with financial performance (i.e good predictors of financial performance), precisely to align with prevailing theory (production theory) on which this study is fixed.

Operationalisation of Variables

The measurement of the dependent variable and independent variables is presented in Table 1 as follows:

Table 1: Measurement of Variables

S/N	Variables	Codes	Measurements	Apriori Sign	Sources
	Dependent				
1	Financial Performance	ROA	This was computed as the proportion of earnings after tax to total assets i.e $\frac{Earnings\ After\ Tax\ (EAT)}{Total\ Assets\ (TA)}$		Mandipa and Sibindi (2022)
	Independent				
2	Just-In-Time Costing	JIT	This was measured as a ratio of the absolute difference between opening and closing balances of finished goods (FG) to cost of goods sold i.e $\frac{Opening\ FG - Closing\ FG}{Cost\ of\ Goods\ Sold}$	+	Tugce (2023)
3	Inventory Turnover Ratio	ITR	This was measured as the ratio of cost of goods sold and average inventory i.e $\frac{Cost\ of\ Goods\ Sold}{Average\ Inventory\ (AI)}$	+	Udo (2023)
	Control				
4	Firm Size	FSIZE	This was computed as the logarithm of total assets	+	Akenroye et al. (2022)

Source: Researcher's Compilation (2026)

4.0 Data Presentation and Interpretation of Results

4.1 Pre-Diagnostic Tests

Descriptive Analysis

Descriptive analysis helps in clarifying the statistical characteristics of any dataset. In this study, importance was attached to values of the mean, minimum, maximum, and standard deviations, as these are the statistics regularly employed by most scholars.

Table 2: Descriptive Statistics

	ROA	JIT	ITR	FSIZE
Mean	0.045	-0.009	-156.079	9.781
Median	0.040	-0.000	-17.751	9.483
Maximum	1.762	10.807	2119.468	13.391
Minimum	-1.799	-10.395	-29714.78	7.116
Std. Dev.	0.230	1.025	1958.156	1.598
Skewness	0.075	0.367	-14.456	0.242
Kurtosis	34.362	97.092	218.256	2.016
Jarque-Bera	9836.169	88538.61	471714.0	12.022
Probability	0.000	0.000	0.000	0.002
Sum	10.935	-2.383	-37459.03	2347.441
Sum Sq. Dev.	12.747	251.119	9.16E	610.325
Observations	240	240	240	240

Researcher's Compilation (2026)

The outcome of the descriptive statistics is displayed in Table 2 and financial performance (captured using return on assets [ROA]) constitutes the key variable of concern as it is the dependent variable. The mean statistic of ROA is 0.045; the median value is 0.040 while the maximum and minimum statistics are 1.762 and -1.799 which indicates that financial performance is relatively impressive. The standard deviation statistic is 0.230 with a positive skewness of 0.075 signifying that the values of ROA are geared towards the right therefore suggesting high skewness. The Jarque-Bera (J-B) statistic of 9836.169 and probability value (p-value) of 0.000 show that the value of ROA is not normally distributed.

Looking at other variables, it can be observed that the maximum and minimum values of JIT are 10.807 and -10.395, and maximum and minimum values of ITR are 2119.468 and -29714.78. From the maximum and minimum values of JIT and ITR, it is observed that ITR has the maximum value of 2119.468 thus suggesting that the companies under investigation spent average of 2120 days in selling and replacing its inventory. The J-B statistics and the associated p-values of the independent variables (JIT and ITR) are 88538.61 (0.000) and 471714.0 (0.000) respectively. It can be said that the variables are not generally dispersed at 5% significant level. This implies that robust results would be ascertained. In relation to the control variable, maximum and minimum values of FSIZE are 13.391 and 7.116 while its Jarque-Bera statistics and the associated p-value are 12.022 and 0.002 which suggest that the variable is not generally dispersed at 5% significant level.

Table 3: Correlation Matrix

Correlation				
Probability	ROA	JIT	ITR	FSIZE
ROA	1.000			

JIT	-0.058	1.000		
	0.369	-----		
ITR	0.003	0.002	1.000	
	0.958	0.974	-----	
FSIZE	0.119	0.008	0.077	1.000
	0.063	0.899	0.232	-----

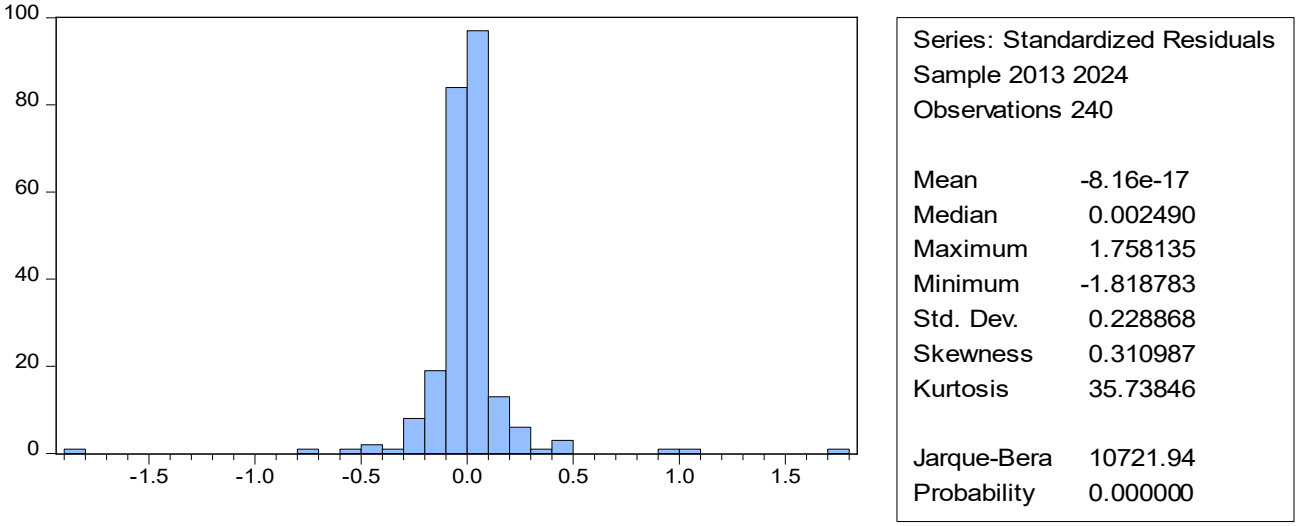
Source: Researcher's Compilation (2026)

The correlation matrix showed in Table 3 revealed the extent of association between the explanatory variables (JIT and ITR), the explained variable (ROA), and the control variable (FSIZE). Indisputably, the connection between a variable and itself is one (1). Furthermore, Table 3 disclosed that the association between ROA and JIT is negative and weak based on a correlation coefficient of -0.058. Also, the association between ROA and ITR is positive and weak based on the correlation coefficient of -0.003. In relation to the control variable, the association between ROA and FSIZE is positive and weak based on a correlation coefficient of 0.119. Based on these values, it is evidenced that there is absence of multicollinearity in the model as the correlation coefficients are less than 0.90 (90%). In terms of the association amongst the variables, the study perceived that the strongest association is between FSIZE and ITR with correlation coefficient of 0.077 while the least is between ITR and JIT with correlation coefficient of 0.002.

Post-Diagnostic Tests

In this study, the following post diagnostic tests were carried out:

Figure 2: Histogram Normality Test



Source: Researcher's Computation (2026)

The normality and other mean statistics of the residuals presented in Figure 2 revealed a Jarque-Bera statistic of 10721.94 with a related p-value of 0.000 which denotes that the variables are standard and not normally dispersed. The kurtosis value of 35.738 showed a

positive kurtosis in excess of 3.00 which shows a leptokurtic kurtosis. The skewness statistic of 0.310 means the residual from the model is skewed to the right and the average standard deviation of 0.228 revealed that the nonconformity from the mean is relatively high.

Table 4: Test of Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.112	Prob. F(3,236)	0.344
Obs*R-squared	3.345	Prob. Chi-Square(3)	0.341
Scaled explained SS	56.231	Prob. Chi-Square(3)	0.000

Source: Researcher's Computation (2026)

The test of heteroscedasticity was carried out using Breuch-Pagan-Godfrey panel cross-section LR test. The test showed an Obs*R-squared value of 3.345 and a p-value of 0.341. This is consistent with the homoscedastic residuals as the Chi-Square p-value is more than the benchmark of 0.05. This shows that there is no evidence of heteroscedasticity in the model.

Table 5: Test of Multicollinearity

Variance Inflation Factors			
	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
C	0.008	8.932	NA
JIT	0.000	1.000	1.000
ITR	5.82E	1.012	1.006
FSIZE	8.74E	8.854	1.006

Source: Researcher's Computation (2026)

The test of multicollinearity was conducted using Breuch-Pagan-Godfrey test. The test revealed that the centered variance inflation factor (VIF) of the respective independent variables is not up to the rule of the thumb of 10. This denotes lack of multicollinearity in the model.

Table 6: Cross-Sectional Dependence Test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	268.284	190	0.000
Pesaran scaled LM	4.015		0.000
Pesaran CD	1.591		0.111

Source: Researcher's Computation (2026)

The cross-sectional dependence was conducted using Breuch-Pagan-Godfrey test. The test showed a Pesaran CD statistic of 1.591 and a p-value of 0.111. This aligns with the null hypothesis residuals. Furthermore, the result showed that there is absence of cross-sectional dependence (correlation) in residuals in the hypotheses.

Table 7: Correlated Random Effects-Hausman Test

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000	3	1.000

Source: Researcher's Computation (2026)

The correlated Hausman test revealed a Chi-Squares statistic of 0.000 with an associated p-value of 1.000. The result revealed that the random effect model is more efficient as the p-value is more than 5% i.e 1.000 > 0.05 residuals in the hypotheses.

Table 8: Panel Least Squares (PLS) Regression Output

Variable	Fixed Effect Model (FEM)		Random Effect Model (REM)	
	Coefficient	Prob.	Coefficient	Prob.
C	0.237	0.672	-0.117	0.300
JIT	-0.014	0.288	-0.014	0.041
ITR	7.59E	0.921	0.20E	0.005
FSIZE	-0.019	0.731	0.016	0.150
R-squared	0.159		0.511	
Adjusted R-squared	0.074		0.490	
S.E. of regression	0.222		0.222	
Sum squared resid	10.715		11.632	
Log likelihood	32.526			
F-statistic	1.870		0.924	
Prob(F-statistic)	0.012		0.002	
Durbin-Watson stat	2.252		1.996	

Source: Researcher's Computation (2026)

Based on the correlated Hausman test Chi-Squares statistic of 0.000 and a p-value of 1.000, the random effect model is more efficient as the p-value is more than 5% i.e 1.000>0.05 residuals in the hypotheses. Based on the random effect panel least squares (PLS) regression output, the R-Squared of the model is 0.511 (51.1%) with an adjusted R-Squared of 0.490 (49.0%). This indicated that the explanatory variables expounded 49% dissimilarity in the explained variable (ROA). The F-statistic value of 0.924 with a related p-value of 0.002 that is significant at 1% shows that there is a substantial linear link between the explained variable (ROA) and the explanatory variables. The Durbin-Watson (DW) statistics of 1.996 showed the nonexistence of autocorrelation in the model. The coefficients and p-values of the two (2) explanatory variables (JIT and ITR) considered, are stated as follows: -0.014 (0.041) and 0.20E (0.005) correspondingly. The outcome showed that JIT has an adverse and significant association with ROA while ITR has a positive and significant association with ROA. Looking at the control variable, the coefficient and p-value of FSIZE is 0.016 (0.150) which implies that FSIZE has a positive but insignificant association with ROA.

5.0 Discussion of Findings

Just-in-time costing (JIT) showed an adverse and significant relationship with financial performance (ROA) which denotes that as JIT increases, there is a substantial reduction in financial performance. This does not align with the *a priori* expectation ($\beta_1>0$). This implies that

JIT system is highly sensitive to disruptions, potentially harming sale revenue and profitability. Also, JIT works in a stable and high-infrastructure environment; Nigeria presents almost the opposite conditions. JIT assumes reliable supply chain stability, predictable transportation, and stable power supply; relying on JIT may face production stoppages, emergency purchases, and higher expediting costs which decreases profitability. This outcome also indicates drawbacks that outweigh its benefits, thus leading to decreased financial performance. This, of course, results in inefficient decision-making and can worsen governance process, ultimately decreasing firm performance. This finding is consistent with the finding of Oyedele et al. (2023) but negates the findings of Jibrin and Ine-Tonbarapa (2023), Olaoye and Olaniyan (2022), and Ukehinakachi et al. (2023).

Inventory turnover ratio (ITR) was revealed to have a positive and significant relationship with financial performance (ROA), which implies that as ITR rises, there is a significant increase in financial performance. This supports the *a priori* expectation ($\beta_2>0$). Flowing from the finding, it can be argued that companies with higher inventory turnover ratios tend to have high operational efficiency in terms of quick conversion of inventory into sales; lower holding, storage, and obsolescence costs; and reduced risk of damage, spoilage, or theft. A high ITR also indicates that products match consumer demand, companies response quickly to market changes, and inventory levels are well aligned with sales forecasts, thus suggesting efficient inventory management. The finding also indicates that higher inventory ratios can decrease inventory holding costs, thus contributing to improved financial performance. Also, companies with greater inventory turnover ratios, effective supply chain management, better inventory forecasts, and improved operational efficiencies might experience increased sales, therefore leading to improved financial performance. The result supports the findings of Abubakar et al. (2024), Etale and Sawyerr (2024), Jonah et al. (2023), and Otuya and Eginiwin (2024) but contradicts the findings of Ekpenyong et al. (2023), Kagongo and Irungu (2024).

5.1 Conclusion and Recommendations

The study concluded that just-in-time costing and inventory turnover ratio are good predictors of financial performance while firm size is not a good predictor of financial performance of listed manufacturing companies in Nigeria. Therefore, it recommended that:

i. Management should be more analytical and take another look at the specific aspects of just-in-time costing that might be contributing to such adverse impacts. Management should explore alternative cost management strategies that might be more effective in improving financial performance, and conduct industry-specific analysis to ascertain if the negative influences hold across different industries.

ii. Management should focus on inventory management practices to improve inventory turnover ratios, sustain best inventory policies to minimize holding costs and maximize sales, and adjust inventory management strategies as needed to maintain optimal performance.

5.2 Recommendations for Further Studies

The study recommended that

i. Other researchers should investigate other regions outside Africa like Europe, Asia and America. This will enable us to properly evaluate and appreciate the degree of relationship between lean accounting practices and financial performance in different countries and regions across the globe.

ii. Studies should be conducted in this direction by considering other sectors like agricultural sector, service sector, and financial sector.

5.3 Contribution to knowledge

This study contributed to empirical studies on lean accounting practices and financial performance of listed manufacturing companies in Nigeria due to dearth in empirical studies that have control for firm size. This study contributed to knowledge by validating the production theory in Nigeria, as the study revealed that kaizen costing has a positive and significant relationship with financial performance of listed companies in Nigeria.

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