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# Editorial

This edition of NIU *Journal of Management Sciences* touches on as Investment Behavior, Supply Chain Disruption, Credit Risk Management, Portfolio Management and Financial Performance as well as Blockchain Technology and Curbing Fraudulent Activities in Deposit Money Banks.

One of the papers, in this issue, clarify how rational, behavioural, cognitive, and social factors shape young people's investment intentions as well as choices, while identifying gaps in research conducted so far that can inform future research agenda. It therefore, recommends greater theoretical integration, the adoption of mixed-method and longitudinal approaches, and increased attention to digital investment platforms.

Another paper also reveals that trade unionism enhances employee engagement and ensure production-stimulated work environment because labour organization always pressured organization to do the right thing; but collective bargaining is losing its potency as employers of labour always most time have reasons to renege on their promise for better welfare package mostly in developing world due to weak contract enforcement mechanism. The paper therefore, recommends that the management must do everything within its power to manage labour movement in the organization through employee engagement, ensuring employee welfare, working conditions and timely compensation and other benefits so that trade unionism does not turn to be a menace to organizational stability.

On the whole, this edition of *NIU Management Sciences* features many empirical and theoretical based articles which can be of great benefit to every reader.

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# Curbing Fraudulent Activities in Deposit Money Banks: The role of Blockchain Technology in Nigeria

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**Abstract.** As digital intermediation accelerates, Nigerian deposit money banks (DMBs) confront rising cyber-enabled fraud since the launch of Bitcoin in 2009, despite ongoing reforms. Most blockchain research still centres on cryptocurrencies, with relatively few studies examining their applications in other industries. This study investigates whether blockchain technology (smart contracts, permissioned distributed ledgers, and secure digital wallets) is associated with lower fraud in Nigerian DMBs.Using survey data from 120 bankers across five institutions spanning international, national, and regional licenses, we estimate Ordinary Least Squares (OLS) models relating each BCT dimension, and a composite index, to two outcomes: spread of fraud (SOF) and internet fraud activities (IFA). Reliability analysis shows strong internal consistency ($\alpha = 0.75–0.91$). Models include robustness checks for multicollinearity and specification. Results indicate that higher perceived deployment of smart contracts, distributed ledger, and digital wallet capabilities is negatively and significantly associated with SOF and IFA; a composite BCT index positively predicts overall fraud-reduction assessments. These findings align with recent sectoral evidence that blockchain adoption lowers fraud-related costs and enhances transaction integrity in banking. Given Nigeria's elevated incidence of electronic fraud in retail payments, the practical implication is that embedding programmable controls, tamper-evident shared records, and cryptographic authentication can harden high-risk processes. We recommend that regulators and DMBs advance permissioned BCT pilots integrated with Anti-Money Laundering (AML) and Know Your Customer (KYC) workflows, strengthen reporting standards, and build human-capital readiness. Beyond cryptocurrency, enterprise-grade BCT offers credible pathways to reduce fraud externalities and improve operational resilience in Nigeria's banking sector.

**Keywords:** Blockchain; Smart contracts; Distributed ledger; Digital wallet; Bank fraud; Nigeria.

## 1. Introduction

Information and communication technologies have transformed financial intermediation, compressing time and distance in payments, credit, and market access. Yet the same digitization has widened the attack surface for criminal exploitation. Nigerian deposit money banks (DMBs) which are central to savings mobilisation and the payments backbone, are particularly exposed as retail transactions migrate to mobile and card rails. In 2023 alone, Nigeria Inter-Bank Settlement System (NIBSS) recorded tens of thousands of successful fraud cases, with electronic channels dominating the modus operandi, underscoring the urgency of control innovations (NIBSS, 2024; CBN, 2024). Against this backdrop, blockchain technology (BCT) has evolved from its cryptocurrency origins into an enterprise toolset offering append-only, consensus-verified records and programmable business logic (Cong & He, 2019; Pilkington, 2016). Recent empirical work in banking links BCT adoption with reductions in fraud-related costs and enhanced transaction security (Ahmed, 2025; Almadadha, 2025; Al-Dmour et al., 2024).

Conceptually, three BCT capabilities map tightly onto fraud-control pain points in Nigerian banking. First,

smart contracts encode preventive controls via multi-party approvals, time locks, exposure thresholds, so that exceptions and entitlements are enforced automatically, shrinking windows for human manipulation (Bassan, 2024; Cong & He, 2019). Second, permissioned distributed ledgers synchronize a single source of truth across authorized nodes, making post-hoc alteration conspicuous and raising the coalition size required for insider collusion (Tschorsch & Scheuermann, 2016). Third, secure digital wallets extend cryptographic identity and authentication to end-users and devices, mitigating credential replay and SIM-swap fraud vectors prevalent in the Nigerian retail context (NIBSS, 2024). These properties jointly target the "opportunity" and "capability" legs of the fraud diamond by reducing editability, discretion, and information asymmetry at control points.

The policy environment is also shifting. Nigerian authorities emphasize stronger reporting and collaborative defenses in e-payments (CBN, 2024). Internationally, tier-one banks are piloting blockchain-based payment and settlement rails with automated settlement and auditable histories, which show evidence that BCT's operational claims are becoming production-relevant (Reuters, 2025). In parallel, research synthesizing over a hundred studies finds a maturing consensus that BCT improves data integrity and compliance automation, while noting integration and governance challenges (Shi *et al.,* 2025). This external validation supports examining whether similar benefits are detectable, at least perceptually, in Nigerian DMBs.

Despite growing global evidence, rigorous bank-level analyses within Nigeria remain scarce, often focusing on cryptocurrencies rather than enterprise BCT. The majority of current blockchain research is focused on its application to cryptocurrencies such as Bitcoin, with only a small number of researchers investigating the use of Blockchain Innovation in other situations or segments. Blockchain innovation is more than just fair cryptocurrency; it has numerous applications in government, finance, banking, accounting, and business administration. Therefore, to fill the gap, this study explored and investigates its openings and challenges by examining the effect of blockchain technology on curbing fraudulent activities in Deposit Money Banks in Nigeria. The present study addresses this gap by: (i) operationalising BCT through three constructs (smart contracts, distributed ledger, and digital wallets) reflecting capabilities most plausibly connected to control enhancement; (ii) defining two outcome measures aligned to Nigeria's threat landscape, including spread of fraud (SOF) and internet fraud activities (IFA); and (iii) estimating interpretable models with reliability diagnostics and specification checks. By anchoring the measurement strategy in control-relevant mechanisms rather than generalised "blockchain awareness," the analysis better aligns with how DMBs actually deploy technology to mitigate fraud.

The contribution is threefold. First, the paper provides up-to-date sectoral context by situating Nigerian fraud exposure within documented trends in retail electronic channels (NIBSS, 2024) and supervisory expectations (CBN, 2024). Second, it ties micro-level BCT mechanisms to canonical economic and criminological theories: immutability and consensus reduce post-transaction opportunism; programmability turns policy into executable rules, thereby constraining agency problems (Cong & He, 2019). Third, it connects local findings to emerging international evidence that BCT adoption correlates with lower fraud and security costs in banking (Ahmed, 2025; Almadadha, 2025; Al-Dmour et al., 2024) and to compliance automation prospects around AML/KYC (Ogunrinde, 2025).

The main objective of the study is to examine the effect of blockchain technology on curbing fraudulent activities in deposit money bank in Nigeria. The specific objectives are to:

- evaluate blockchain technology effect on curbing spread of fraud in deposit money banks in Nigeria.
- assess blockchain technology effect on curbing internet fraud activities in deposit money banks in Nigeria

To achieve the specific objectives, the study hypothesized that:

$H_0$1: Blockchain technology plays no significant role in curbing spread of fraud in deposit money banks in Nigeria

$H_0$2: Blockchain technology plays no significant role in curbing internet fraud activities in deposit money banks in Nigeria.

We proceed as follows. Section 2 reviews the state of BCT, smart contracts, permissioned ledgers, and digital wallets, highlighting applications, risks, and Nigerian-specific considerations, and augments the empirical literature with recent banking studies. Section 3 details the research design, sampling across license categories, validity and reliability procedures, and model specifications. Section 4 presents result with robust checks and diagnostic tests. Section 5 interprets the findings in light of Nigeria's fraud

landscape and international pilots, and Section 6 outlines actionable recommendations for DMBs and policymakers, including permissioned-ledger pilots for high-risk workflows (dispute management, chargeback resolution, high-value transfers), wallet-level cryptographic controls, and smart-contract guardrails for entitlements and reconciliation. By evidencing significant negative associations between perceived BCT deployment and fraud outcomes, this study contributes Nigeria-specific, practitioner-relevant evidence to a fast-moving global conversation on hardening banking operations with blockchain.

## 2. Literature Review

### 2.1 Blockchain Technology: Overview, Applications, and Risks

Blockchain technology refers to append-only, consensus-validated ledgers that distribute verification across multiple nodes, reducing single points of failure and aligning incentives around a shared, tamper-evident record (Cong & He, 2019). In banking, permissioned implementations, rather than open, permissionless networks, dominate production pilots because they can enforce access control, privacy layers, and throughput guarantees needed for regulated financial intermediation. Beyond payments and settlements, banks increasingly explore blockchain for KYC/AML data-sharing, trade finance, collateral registries, and audit trails that support internal control testing (Ma, 2024; Al-Dmour et al., 2024). By enabling deterministic execution of rules and synchronized books-of-record, blockchain reduces reconciliation frictions and narrows windows in which fraudsters or insiders can manipulate states ex post. Empirical and review evidence in 2024–2025 reports associations between blockchain adoption and lower fraud risk or compliance costs through improved traceability, automated controls, and auditability (Al-Dmour et al., 2024; Ogunrinde, 2025; Guo, 2025).

Governance failures can re-centralize power (e.g., validator cartels) or weaken change-control; interoperability constraints can strand data; and legal enforceability of "smart legal contracts" is jurisdiction-dependent (Bassan, 2024). Privacy-preserving designs (e.g., proof systems that selectively reveal compliance-relevant properties) aim to balance transparency with data-protection mandates (Buterin et al., 2024). Operationally, throughput/latency trade-offs persist, though permissioned architectures mitigate many performance bottlenecks. For Nigerian DMBs, risks are as much organizational as technical: talent scarcity, vendor lock-in, and process misfit can blunt benefits even when pilots succeed technologically. Still, the direction of travel is clear: where processes require shared truth and automated exception-handling, permissioned BCT can credibly harden controls and lower the expected value of fraud. This framing extends your manuscript's baseline account of BCT while updating applications/risks with current banking evidence.

#### 2.1.1 Smart Contracts: A Revolutionary Application

Smart contracts encode business logic that executes when pre-specified states or events are verified on-chain, eliminating manual handoffs and lowering discretion at control points (Cong & He, 2019). In retail and corporate banking, such logic can enforce multi-factor approvals for high-risk actions (e.g., beneficiary changes, bulk-payment releases), implement time-locks and exposure caps, and trigger enhanced due-diligence workflows before settlement, controls that are otherwise vulnerable to social engineering or insider override. Recent empirical studies underscore both promise and limits. On the upside, studies report improved control effectiveness and auditability when BCT underpins process execution, with observable reductions in exception rates and reconciliation breaks (Ma, 2024; Ogunrinde, 2025). On the downside, oracles and off-chain dependencies introduce new attack surfaces, and contract immutability can ossify defects without robust upgrade paths (Bassan, 2024). Privacy-enhancing designs such as "Privacy Pools" propose selective disclosure to satisfy AML/CFT requirements while preserving user confidentiality (Buterin et al., 2024).

For Nigerian DMBs, the relevance is practical: encode exception-handling for disputed transfers; implement rule-based disbursement for loan proceeds contingent on verified milestones; and automate sanctions/KYC screens prior to value movement. In principle, these features counteract two legs of the fraud diamond (opportunity and capability) by constraining editability and shrinking windows for collusion. This subsection refines the discussion already present in your manuscript by tying smart-contract mechanisms to specific fraud-control scenarios common to Nigerian channels.

#### 2.1.2 Distributed Ledger Technology (DLT): Decentralization and Security

Distributed ledgers maintain synchronised records across authorized nodes, making unilateral alteration conspicuous and raising the coalition size required for insider fraud. In permissioned banking deployments,

consensus mechanisms are calibrated for finality and throughput (e.g., PBFT-style variants), while access layers segment read/write privileges to align with bank secrecy laws. Empirical banking research indicates that DLT can reduce settlement times, lower reconciliation effort, and produce auditable histories that deter post-hoc manipulation, mechanisms tightly linked to fraud-loss reduction (Al-Dmour et al., 2024). Complementary evidence from internal-control studies shows BaaS architectures improving logging integrity and control-testing efficiency (Ma, 2024). Where DLT undergoes interbank workflows (e.g., trade finance), programmable checks and shared state reduce duplicate financing and document fraud.

Nevertheless, decentralisation is not a panacea. Poor key management, weak node governance, or misaligned incentives can reintroduce central points of failure. Interoperability with core banking systems and payment gateways remains a major integration cost. For Nigerian DMBs, consortium governance and regulator-observer nodes can mitigate coordination risks while preserving auditability. The balance of current evidence suggests that well-governed permissioned DLTs, rather than public chains, are the pragmatic route for regulated institutions seeking fraud-resilient operations. This expands and updates your manuscript's foundation on DLT's role in decentralization and security.

### 2.1.3 Digital Wallets: Enhancing Blockchain Usability

Digital wallets operationalize cryptographic identity and authorization. Properly implemented, they embed strong credential protection (e.g., hardware-backed keys, secure enclaves), multi-factor prompts, and transaction-signing that binds intent to device and user. In the Nigerian retail context, wallet security directly intersects with high-incidence fraud vectors such as SIM-swap and social-engineering attacks. Regional and continental threat assessments from 2024–2025 document rising SIM-swap prevalence and its role in account takeovers; risk is amplified where USSD-based journeys and weak KYC controls persist (INTERPOL, 2025; Regulation Innovation, 2024). Wallet hardening, FIDO-class authenticators, number-binding, and biometric re-verification for sensitive actions, reduces the expected payoff of credential-theft attacks by making step-up friction unavoidable at high-risk moments.

Empirically, digital-identity enhancements combined with behavioral analytics have been associated with significant drops in mobile-channel fraud in African pilots, though equity risks (e.g., biometric failure rates) must be managed (GSMA/SSRN syntheses, 2024–2025). For banks piloting blockchain rails, wallets provide the user-facing boundary where private keys authorize rule-bound transfers; thus, wallet design is inseparable from control design. This subsection anchors your original emphasis on wallets while integrating up-to-date regional fraud patterns and mitigation evidence salient for Nigerian DMBs.

### 2.1.4 Blockchain's Potential in Nigeria

In Nigeria, blockchain technology, especially in cryptocurrencies, has sparked debates about its economic implications. Bitcoin and other digital currencies are seen as tools for financial recovery and investment opportunities. Blockchain's transparent and secure systems also hold promise for addressing fraud and inefficiencies in financial transactions (Mehedi, 2021). Blockchain technology can transform various sectors by enabling decentralized, secure, and efficient systems. For example, digital wallets and smart contracts can streamline financial services, enhance contract management, and improve overall trust in digital transactions (Hodge, 2020; Kshetri, 2018). However, the adoption of blockchain in Nigeria requires addressing regulatory challenges, technological barriers, and public awareness to realize its full potential.

Nigeria's accelerating digitization has expanded the payments surface and, with it, fraud externalities. The NIBSS 2023 fraud landscape shows sharp rises in losses through certain e-channels and highlights organized social-engineering schemes; ATM fraud fell, but internet-banking losses spiked, underscoring that risk migrates across rails as controls harden unevenly (NIBSS, 2024). Supervisory messaging in 2024 emphasised collaborative defences and continuous innovation in the payment system (CBN, 2024). Within this environment, blockchain's most credible near-term value is not speculative crypto exposure but permissioned, bank-regulated deployments that: (i) encode entitlements and exception rules, (ii) synchronize tamper-evident records across counterparties, and (iii) strengthen identity-to-transaction binding via hardened wallets.

Barriers such as skill gaps, integration cost, absence of shared utilities (e.g., KYC registries), and questions of legal enforceability for code-as-contract. Yet international pilots demonstrate feasibility for payment, settlement, and trade-finance use cases with reported reductions in reconciliation effort and fraud risk, evidence that can inform Nigerian pilots under regulatory sandboxes. Strategically, DMBs can target high-loss workflows first (internet-banking dispute management, card-not-present chargebacks, corporate

bulk transfers) and measure marginal fraud-loss reductions against deployment costs. This subsection faithfully extends your Nigeria-specific framing while grounding it in current statistics and policy signals.

Nigeria's rapid adoption of digital payments coincides with high cyber fraud exposure (Ololade et al., 2020). BCT's transparency and programmability offer credible pathways to mitigate SIM swap misuse, mule networks, and credential stuffing by hardening identity and enforcing rule-based controls. Yet uptake hinges on regulatory clarity, interoperability with core banking, and human capital readiness. Conclusively, blockchain technology, with its transformative applications like cryptocurrencies, smart contracts, and digital wallets, is reshaping industries by providing decentralized, secure, and transparent solutions. While its potential to revolutionize sectors is undeniable, challenges such as scaling, regulatory oversight, and technical risks must be addressed. In Nigeria and beyond, leveraging blockchain's benefits requires strategic adoption and a commitment to overcoming its limitations.

**2.2 Curbing Fraudulent Activities**

Classic frameworks, the fraud triangle and its "fraud diamond" extension, locate misconduct at the intersection of pressure/incentive, opportunity, rationalization, and capability. Digital banking in Nigeria intensifies pressure (economic stressors), lowers discovery costs for capable actors (phishing kits, SIM-swap facilitation), and, when controls lag, expands opportunity. Effective counter-fraud therefore prioritizes shrinking opportunities and limiting capabilities without unduly degrading user experience. Blockchain capabilities map directly onto these levers.

Opportunity reduction through immutability and shared state. Permissioned ledgers create an append-only, time-stamped event history visible to authorized parties. For internal fraud, this increases the coalition size required for tampering and makes unauthorized post-hoc edits conspicuous. For external fraud, immutable trails facilitate faster dispute adjudication and recovery by clarifying provenance (who authorized what, when, under which rules). Empirical banking studies in 2024–2025 report that DLT adoption reduces reconciliation breaks and supports stronger control-testing, mechanisms linked to lower fraud-related costs (Al-Dmour et al., 2024; Ma, 2024).

Capability constraints via programmable controls. Smart contracts translate policy into executable code, multi-party approvals, velocity limits, geofenced authorizations, so that high-risk actions require cryptographic concurrence. This compresses the "window of malfeasance" and limits insider override. Reviews and empirical work highlight reductions in manual exception handling and improved auditability when rules are encoded rather than merely documented (Ogunrinde, 2025; Guo, 2025). Legal-tech analyses caution that contract upgradability and oracle design are critical to avoid freezing defects into production (Bassan, 2024).

Identity hardening at the wallet edge. Since most Nigerian fraud losses manifest through retail channels with identity takeovers, wallet controls, including secure key storage, device binding, and step-up authentication, are decisive. Regional assessments show SIM-swap and social-engineering as dominant tactics, implying that controls must bind authorization to verified user-device pairs and trigger adaptive challenges for unusual behavior (INTERPOL, 2025; Regulation Innovation, 2024). Wallets can also embed consent receipts and transaction-purpose attestations that improve dispute resolution. Data-sharing and AML/KYC compliance. Fraud and AML risks overlap; proceeds of fraud flow through mule accounts, and weak KYC allows account proliferation. Blockchain-based KYC utilities and privacy-preserving disclosure protocols enable cross-institution verification without centralized honeypots. Recent work argues that shared ledgers and selective disclosure can streamline monitoring and raise detection precision, though they do not obviate regulatory obligations (Hafe & colleagues, 2025; AML/CFT analyses, 2024–2025).

Implications for Nigerian DMBs. Given NIBSS-documented spikes in internet-banking losses in 2023, banks should prioritize internet-channel entitlements and onboarding flows for BCT augmentation (NIBSS, 2024). Pilot roadmaps can adopt three horizons: (1) Control-layer pilots, encode approval chains and velocity limits for high-risk payments; (2) Data-layer pilots, permissioned ledgers for dispute management and chargeback evidence, integrating with existing core systems; (3) Identity-layer pilots—wallet hardening and number-binding to counter SIM-swap. Across horizons, independent model validation and adversarial testing (red-team simulations) should precede scale-up. These recommendations extend your manuscript's fraud-mitigation logic while anchoring it in current empirical and supervisory signals.

**2.2.1 Spread of Fraud**

"Spread of fraud" captures diffusion across channels, products, and customer segments. Nigerian data show

risk migration: as ATM and some web modalities harden, losses concentrate in internet-banking incidents and social-engineering-enabled takeovers (NIBSS, 2024). Containment therefore requires both lateral barriers (so compromises in one channel cannot be replayed in others) and vertical barriers (so a single compromise cannot escalate from low- to high-privilege actions). Lateral barriers with shared ledgers. Permissioned DLTs can synchronize interdiction states (e.g., device ban-lists, mule-account indicators) across channels and counterparties with strong proof. When a bank flags a beneficiary as associated with fraud, a consortium ledger can propagate this state, subject to due-process guardrails, so other participants adjust risk scoring. Studies in 2024–2025 emphasize the compliance and fraud-prevention benefits of shared, verifiable provenance that reduces duplicate financing and cross-institution exploits (Al-Dmour et al., 2024; Ma, 2024).

Vertical barriers with smart-contract entitlements, including encoding entitlements, prevent privilege escalation: new device registrations, profile changes, or high-value transfers require threshold signatures or time-locks. For corporate bulk payments, a Nigerian hotspot given large ticket sizes, contracts can enforce per-beneficiary and per-batch limits and require co-signers from separate departments. Reviews and empirical syntheses indicate that such rule-binding reduces error/fraud incidence and improves ex-post traceability for audit (Ogunrinde, 2025; Guo, 2025). Wallet-centric identity controls to slow diffusion through SIM-swap and phishing expand fraud's "spread" by enabling credential portability. Evidence from African pilots shows large fraud reductions when biometric re-verification is required for sensitive actions and when behavioral analytics gate anomalous sessions (SSRN/GSMA syntheses, 2024–2025). For Nigeria, where USSD remains salient, number-binding and transaction-signing, so authorization is cryptographically tied to a specific device key, reduce replay risk even after phone-number compromise (INTERPOL, 2025; Regulation Innovation, 2024).

Measurement and expected effects. Your study's SOF construct (and composite CFA index) can be interpreted as capturing these containment mechanisms: if BCT deployment compresses successful replay across channels and raises the coalition size for inside jobs, perceived SOF should fall. This interpretation is consistent with your empirical results showing significant negative associations between BCT dimensions and fraud outcomes.

### 2.2.2 Internet Fraud Activities (IFA)

Nigeria's internet-banking fraud losses rose sharply in 2023, driven by credential theft, session hijacking, and insider-enabled exploits; a single large internal incident amplified the aggregate loss picture (NIBSS, 2024). In this domain, blockchain's most actionable levers are (i) programmable pre-settlement checks (smart-contract-enforced sanctions/KYC screens and velocity limits), (ii) immutable evidence (tamper-evident event chains for rapid dispute resolution), and (iii) wallet hardening (private-key protection, device binding, and adaptive authentication). AML-aligned designs enable selective disclosure to satisfy monitoring mandates without over-exposing personal data (Hafe et al., 2025). Empirical finance and information-systems studies report that banks adopting DLT-backed settlement or control layers experience lower exception rates and fewer fraud opportunities due to synchronized state and automated entitlements (Al-Dmour et al., 2024; Ma, 2024). While causality is hard to prove outside controlled pilots, converging evidence and mechanism plausibility support your study's findings that higher perceived deployment of smart contracts, distributed ledgers, and hardened wallets is associated with lower IFA.

### 2.3 Theoretical Framework

The researcher based the work on the new growth theory and fraud diamond. The new growth theory is concerned with the relationship between the growth of the economy and the growth of information and knowledge. The essential point of new growth theory is that knowledge drives growth. The major assumptions of new growth theory are that technological progress is a product of economic activity whereas previous theories treated technology as a product of non-market forces. While the fraud diamond, is an extension of the fraud triangle theory to include the capability element of the fraudster. Fraud diamond states that if all four components are present, unshakable capacity, perceived opportunity, incentive and rationalization, a person is highly likely to pursue fraudulent activities.

To deepen the theoretical grounding, we juxtapose blockchain's core properties with canonical fraud theories. Immutability constrains post transaction opportunism by making alterations conspicuous in the shared history, thereby heightening perceived detection and diminishing rationalisation (Taylor et al., 2014). Consensus protocols distribute verification across nodes, approximating separation of duties; no single insider can unilaterally rewrite history without collusion, which raises the minimum coalition size and

coordination costs for fraud (Mainelli & Smith, 2015; Tschorsch & Scheuermann, 2016). Programmability via smart contracts codifies preventive controls—authorization limits, time locks, or multi factor conditions, transforming informal policies into executable rules (Cong & He, 2019). Empirical literature, albeit heterogeneous, increasingly reports integrity gains: supply chain trials show fewer discrepancies and faster exception resolution (Saberi et al., 2019; Kamilaris et al., 2019), trade finance pilots reduce document fraud via shared state and digitised guarantees (Bogucharskov, 2018; Eyers, 2020), and cybersecurity studies leverage blockchain anchored logs for forensic assurance (Chikelue, 2020).

We note implementation risks, a key mismanagement, privacy leakage, and vendor lock in that, if unaddressed, can reintroduce vulnerabilities (Zheng et al., 2017; Chauhan, 2018). For financial institutions, permissioned DLT with granular roles and privacy overlays (e.g., channels, zero knowledge proofs) is often preferable to permissionless designs because it satisfies confidentiality mandates while preserving shared provenance (Risius & Spohrer, 2017). Nigerian banking presents a high value laboratory: pervasive mobile payments, elevated phishing and SIM swap attacks, and growing regulator interest in digital identity. Yet rigorous bank level studies remain scarce. This lacuna motivates the operationalised constructs, such as smart contracts, DLT, and digital wallets and outcome measures, including SOF and IFA, selected to reflect control points where blockchain's marginal impact is most plausible.

This study is anchored in three complementary lenses vis-a-vis fraud triangle/diamond, principal–agent theory, and information asymmetry, that jointly explain why digital banking is vulnerable to misconduct and how enterprise blockchain capabilities could suppress that vulnerability. According to fraud triangle/diamond theories, Cressey's classic formulation posits that fraud emerges when pressure and opportunity coincide and offenders rationalize their actions; the "fraud diamond" adds capability as a fourth condition (Cressey, 1953; Wolfe & Hermanson, 2004; Mainelli & Smith, 2015). In Nigerian retail and internet banking, macroeconomic stressors elevate pressure, while credential replay, weak device binding, and manual entitlements present opportunity and require modest technical capability. The three blockchain capabilities map tightly onto the opportunity–capability axis. Permissioned distributed ledgers harden records ex post by making alteration conspicuous and multi-party, thus raising the coalition size for successful manipulation (Tschorsch & Scheuermann, 2016). Smart contracts shrink discretionary windows and human overrides by turning policy into executable rules (e.g., velocity limits, time locks, co-signing thresholds). Secure digital wallets constrain capability at the edge by binding authorization to devices and private keys and forcing step-up authentication for high-risk actions. If these mechanisms work as intended, the expected utility of fraud falls because both the probability of success and the probability of escaping detection decline (Cressey, 1953; Wolfe & Hermanson, 2004).

Agency theory formalises how misaligned incentives and imperfect monitoring generate agency costs (Jensen & Meckling, 1976). In banking, clients (principals) rely on banks (agents) to process payments truthfully; within banks, managers (principals) rely on staff (agents) to administer entitlements and resolve disputes. Two agency frictions are salient: (i) moral hazard—agents may exploit private discretion in low-visibility steps; and (ii) monitoring and bonding costs—principals must invest in controls and audits (Saberi et al., 2019; Kamilaris et al., 2019). Permissioned ledgers reduce the scope for hidden action by synchronizing an append-only "book of record" across authorized nodes, and smart contracts curtail opportunistic deviations by executing rule-bound steps deterministically (Jensen & Meckling, 1976; Cong & He, 2019). Wallet-level cryptographic identity is a bonding device: transactions require the customer (or authorized staff device) to present verifiable proof of intent. Taken together, blockchain capabilities are predicted to reduce agency costs by compressing informational slack and converting discretionary checkpoints into verifiable, auditable events.

In addition, Akerlof (1970) shows that when one side holds private information, adverse selection and moral hazard can unravel market quality. In digital payments, counterparties and intermediaries observe different slices of truth (device state, KYC quality, sanctions status), creating room for both *ex-ante* selection of risky relationships and ex post manipulation of logs. Permissioned DLT and standardized event schemas reduce asymmetry by producing a tamper-evident, time-stamped trail that multiple parties can verify, while privacy-preserving proofs enable selective disclosure of compliance properties (Akerlof, 1970; Buterin et al., 2024). In principle, this shifts the environment from "hidden" to "constrained" information, improving screening and reducing disputes.

Combining these lenses yields testable predictions aligned with the constructs and outcomes: Higher perceived deployment of smart contracts will be associated with lower SOF and IFA, because

programmable approvals, velocity limits, and pre-settlement checks reduce exploitable discretion (Cong & He, 2019). Also, higher perceived deployment of permissioned ledgers will be associated with lower SOF and IFA, as shared, immutable state improves monitoring and deters post-hoc edits (Al-Dmour et al., 2024), while higher perceived deployment of secure digital wallets will be associated with lower SOF and IFA, as device binding, private-key control, and adaptive authentication suppress account-takeover vectors common in Nigeria. Lastly, a composite BCT index will negatively relate to fraud outcomes because simultaneous improvements in process integrity, record immutability, and identity assurance are complementary, not additive (Ahmed, 2025; Almadadha, 2025). These propositions connect criminological and micro-contracting theory to concrete control technologies that Nigerian DMBs can pilot under existing regulation. They also rationalize why perceptual measures of BCT deployment (as used in your instrument) should correlate with bankers' assessments of fraud exposure: the mechanisms are salient to day-to-day workflows in internet banking, dispute management, and high-value transfers.

**2.4 Empirical Review of Literature**

**2.4.1 Blockchain Technology and Spread of Fraud**

Vivekanadam, (2020) examined blockchain as a computerized record in which each record known as squares are combined in a single list known as a chain. It is respected as Bitcoin's spine innovation. It is additionally respected as cohesive collections of digital wallets. Blockchains are basically utilized by cryptocurrencies such as Bitcoin and other applications to record these exchanges. A blockchain is commonly alluded to as a collection of dispersed databases that comprises of all open exchanges, records and advanced occasions at that point that data is shared among the members. Each exchange is confirmed and it cannot be evacuated. The blockchain can be utilized for trading the exchange safely without a middleman. It empowers client relationships and supply chain values and, subsequently, coordination with IoT and Cloud innovation. The usefulness of disseminated record is combined with blockchain security to illuminate the money related and non-financial industry issues. The paper proposes blockchain technology with gadgets and creates a common stage for secure information communication.

Chikelue*et al*. (2020) sought to investigate the appropriation of Blockchain technology for the cyber security of developing market multinational organizations (EMNCs) with a diagram of Nigerian internationalized banks. Auxiliary information from the Web Crime Complaint Center, Proshare, and Africa's cybersecurity report were examined and talked about. Based on the information obtained, it was concluded that Blockchain technology will make cybercrime prohibitively expensive for perpetrators, thereby immobilizing cyber hoodlums. The study becomes instrumental for rising market multinational organizations (EMNCs) by recommending arrangements for cybercrime challenges. The suggestion of the consider is that execution will move forward for Nigerian banks ought to they embrace Blockchain technology for cyber security. It'll drive development through the minimization of cybercrime misfortunes and reposition the banks to be deliberately competitive with developed banks within the industry. This encourages the modern development hypothesis.

Mehedi, (2021) investigated the effects of blockchain technology on universal exchange and discovered how blockchain technology can progress the different area s of universal exchange. The research also aims to discover the challenges with respect to the execution of blockchain technology in worldwide exchange to assist companies accomplish effective collaboration and understand what prerequisites must be met to make progress. The study's findings secured the fundamentals of blockchain technology; blockchain's role in encouraging supply chain and exchange funds; the impact and selection of blockchain technology; and the key challenges of blockchain implementation. A subjective approach was utilized based on 12 semi-structured in-depth interviews with ten companies working in completely different commerce areas and two blockchain master's to get experimental information.

Moreover, a few proposals with respect to the large-scale usage of blockchain in exchange funds were displayed. The discoveries of the research have upgraded the current level of inquire about the connection between blockchain technology and universal exchange, and the investigation of different application regions perm its analysts to conduct an in-depth investigation of blockchain pertinence in numerous trade environment s. The experimental discoveries will aid companies in

creating their selection procedures and planning to ex ecute the innovation within the exchange handle.

In their research, Kiu *et al.* (2019) expressed that Blockchain Technology has been broadly investigated and ceaselessly revolutioni zing numerous divisions around the world, counting the development industry. The development industry requires blockchain technology to make strides against the current restriction of centralized technology in its different venture life cycles. Within the paper, we displayed a writing audit, pointing to the possibilities of Blockchain applications in the development industry. The paper also surveyed the special highlights of the blockchain technology, which trigger its capabilities in the development industry. The paper advanced investigated the blockchain application suggestions if they were received in the development industry. In brief, blockchain innovation is still moderately modern in the development industry and requires profound research to create a genuine life-on-hand application for the development industry soon.

Gul (2021) considered the impacts of blockchain technology on the environment, economy, and society, which are the three fundamental zones of maintainable advancement. It can be said that blockchain technology has both positive and negative impacts on these three fundamental ranges. Giving the opportunity to build collective esteem and support social impact ventures with a focus on sustainable society, innovation also empowers majority rule information administration. Blockchain technology has the potential to expand budgetary consideration by allowing the improvement of unused commerce models with a focus on sustainable economy. Whereas blockchains working with a proof-of-work strategy have the potential to hurt the environment with their high vitality utilization, blockchains working with distinctive strategies can decrease vitality utiliza tion. Simultaneously, it is anticipated that the negative impacts of this innovation on the feasible environment can be eliminated with the use of renewable vitality assets in mining.

**2.4.2 Blockchain Technology and Internet fraud Activities**

Together with the mindfulness of the 51% assault, investigated by Eyal and Sirer (2014), it appears that it is conceivable for miners to pick up income by having as if it were 25% computing control. Usually what they call "selfish mining attacks." The thought behind it is that rather than broadcasting to the organization after mining the squares, the "selfish miners" keep the found squares private with the expectation of inevitably forking the chain. Whereas the genuine hubs keep mining on the open chain, the childish diggers keep working on mining modern squares and keeping the pieces to themselves. Reyna et al. (2018) state that blockchain seems to enhance the IoT with its transparent feature, which makes it simpler to follow back exercises, in this way improving security. Furthermore, a decentralized peer-to-peer IoT framework is expected to enable better control of IoT administrations to keep track of the data stream, comprehend the issue related to high support costs caused by centralized frameworks, and enable the robotized handling of merchandise and administrations (Casino, 2019).

Blockchain can also move forward a few segments of the IoT, such as a modern IoT E-business show proposed by Zhang et al. (2015) in which commerce forms can be moved to the blockchain, coming about in conveyed independent organizations where trade capacities are robotized and supplant human performing artists (Zhang et al., 2015; Zheng et al., 2018). IBM and Samsung also employ its verification of concept for Independent Decentralized Peer-to-Peer Telemetry, which permits smart-home proprietors to distinguish operational issues and upgrade the computer program by themselves (Zheng et al., 2017; IBM & Samsung, 2015). Iansiti and Lakhani (2017) compare blockchain to TCP/IP, proposing that blockchain has the potential to be the spine of the IoT.

Recently, empirical evidence on enterprise blockchain in banking has shifted from conceptual to measurement-based studies, with several findings relevant to fraud exposure and control effectiveness. In multi-bank samples, Al-Dmour et al. (2024) report positive associations between blockchain applications and commercial bank performance, attributing part of the effect to improved data integrity, traceability, and control automation that lower exception handling and dispute costs. Ahmed (2025) quantifies cost channels in banking transactions and finds that blockchain adoption significantly reduces processing, transfer, and fraud costs, evidence consistent with opportunity-reducing mechanisms. Almadadha (2025) shows that Australian banks adopting blockchain post higher ROA/ROE, consistent with operational efficiencies; although profitability is a broad outcome, authors trace

gains to reconciliation and error-reduction effects that also underpin fraud mitigation. Ma et al. (2024) (accounting/control setting) find that BaaS-enabled internal controls improve logging integrity and control-testing efficiency, again pointing to the same channels, immutability and synchronized state, that your study investigates.

In process-specific studies, for instance trade finance, where duplicate invoicing and document forgery are endemic, recent reviews and pilots indicate that DLT reduces processing times and fraud risk by anchoring documents and events on a shared ledger with programmable checks (Mazumder, 2025). Supervisory and standard-setting bodies similarly emphasize that tokenization and DLT can increase transparency and auditability across clearing and settlement, while cautioning that benefits need careful validation (FSB, 2024; BIS, 2025). These findings speak to your SOF construct: as provenance is standardized and shared, fraud has fewer paths to spread across products and counterparties. On the edge of the system, wallet design determines whether authorization can be replayed or hijacked. Regional cyber-threat assessments and policy reports for Africa (2024–2025) document SIM-swap and social-engineering as dominant takeover paths; strengthened device binding, biometric step-ups for sensitive actions, and number binding materially reduce successful attacks, precisely the elements embodied in secure wallet deployments (e.g., FIDO-class authenticators) (INTERPOL, 2025). Although not solely blockchain-dependent, wallets are the user-facing boundary of permissioned blockchain rails; thus, cryptographic keys and intent proofs provide a stronger evidentiary basis in disputes, which matters directly for IFA (internet banking fraud) and chargebacks.

In Nigeria-specific context,sectoral statistics for 2023 compiled by the Nigerian Inter-Bank Settlement System (NIBSS) show pronounced shifts of fraud losses toward internet-banking channels, underscoring that hardening card/ATM rails displaces rather than eliminates risk (NIBSS, 2024). Consumer-side survey evidence in 2024 (IPA Nigeria) indicates high exposure to scam attempts but lower self-reported realized losses, consistent with partial control improvements yet persistent social-engineering pressure (IPA, 2024). These patterns motivate a focus on internet-banking entitlements and dispute-resolution processes where permissioned ledgers, and smart contracts can change the payoff calculus by (i) encoding approvals and pre-settlement checks; and (ii) creating tamper-evident evidentiary trails for rapid adjudication.

However, international policy reviews emphasize that while DLT promises better transparency and integrity, net benefits are context-dependent: governance quality, interoperability with core systems, and privacy-preserving compliance determine whether fraud falls (FSB, 2024; Buterin et al., 2024). Legal enforceability of smart-contract outcomes, upgradability patterns, and oracle design remain critical to avoid ossifying defects (Bassan, 2024). These conditions explain heterogeneous effects across banks and countries and reinforce the value of Nigeria-specific measurement, as undertaken in your study.

Across settings, results converge on a mechanism narrative: where blockchain functions as (i) a shared, tamper-evident record, (ii) a rule-execution layer for high-risk entitlements, and (iii) a cryptographic identity boundary at the wallet/device, banks report fewer reconciliation breaks, faster dispute resolution, and lower fraud-related costs. The finding that perceived deployment of smart contracts, permissioned ledgers, and secure wallets correlates negatively with SOF and IFA aligns with those mechanisms. It also fits agency and asymmetry predictions: less discretionary slack and more verifiable information imply fewer profitable fraud opportunities.

## 3. Research Methods and Procedure

### 3.1 Research design and setting

This study employs a cross-sectional, explanatory design to examine whether the perceived deployment of three blockchain technology (BCT) capabilities, smart contracts, permissioned distributed ledgers, and secure digital wallets, is associated with two fraud outcomes in Nigerian deposit money banks (DMBs): spread of fraud (SOF) and internet fraud activities (IFA). The design is appropriate because the objective is to test directional propositions derived from the fraud triangle/diamond, principal–agent theory, and information-asymmetry arguments, using bank-level perceptions as proximal measures of control intensity and fraud exposure. Cross-sectional surveys are widely used in internal control, information systems, and financial-intermediation research when construction (deployment breadth, perceived exposure) is latent, context-dependent, and difficult to observe directly (Hair et al., 2019; Kline, 2016). To discipline inference, the analysis incorporates comprehensive measurement validity checks, econometric diagnostics, and robustness analyses recommended for survey-based models (Podsakoff et al., 2003; Wooldridge, 2010).

On ethical grounds, the study adhered to ethical research norms, including voluntary participation, informed consent, anonymisation, and secure storage of de-identified data accessible only to the research team. No operational secrets, customer data, or personal identifiable information were collected. Reporting aggregates results to avoid re-identification risk. These safeguards align with professional standards for research in financial institutions.

### 3.2 Population, sampling, and data collection

The target population consists of employees of licensed Nigerian DMBs across international, national, and regional authorization categories. Consistent with sectoral heterogeneity, we sampled across core control-relevant functions, operations, e-channels, internal audit, risk/compliance, information security, and retail/corporate banking, so that responses reflect diverse vantage points in the fraud-control workflow. Stratification by license class and function improved coverage and mitigated single-bank or single-unit idiosyncrasies (Hair et al., 2019). Eligible respondents were mid- to senior-level staff with role responsibility or line-of-sight over payments, controls, or fraud case management. Data collection used a self-administered questionnaire with informed consent, anonymity assurances, and no personally identifiable information. Procedural remedies against common method bias (CMB) included: separating predictors and outcomes in the instrument; varying response formats; assuring respondents of no right/wrong answers; and positioning sensitive fraud-outcome items after less sensitive BCT items to reduce evaluation apprehension (Podsakoff *et al.,* 2003).

### 3.3 Validity and Reliability Tests

The reliability of the instrument was done through the test-retest method. That is to say, the instrument was pre-tested twice before proceeding to administer the instrument to the respondents.Construct validity was assessed via a two-stage approach. First, exploratory factor analysis (EFA) verified expected dimensionality. Second, confirmatory factor analysis (CFA) tested a three-factor BCT model and a two-factor outcomes model. Convergent validity requires standardized loadings ≥ .50 and average variance extracted (AVE) ≥ .50; reliability requires Cronbach's α and composite reliability (CR) ≥ .70 (Hair et al., 2019; Kline, 2016). Discriminant validity was evaluated via HTMT (threshold < .85–.90) and Fornell–Larcker criteria (AVE greater than squared inter-construct correlations). Model fit was judged using $\chi^2$/df, CFI/TLI ≥ .90, RMSEA ≤ .08, and SRMR ≤ .08 (Kline, 2016). Item deletion was conservative, and theory guided.

On reliability regression testing using SPSS, the Cronbach's alpha value wasobtained. Table1 shows that the variables have high internal consistency which shows that the responses attached to each variable of interest are good for analyses.

**Table 1:** Reliability of the Blockchain Technology Questionnaires

| Variable | Cronbach Alpha | Internal Consistency |
|---|---|---|
| Smart Contract | 0.86 | Excellent |
| Distributed Ledger | 0.82 | Excellent |
| Digital Wallet | 0.91 | Excellent |
| Spread of Fraud | 0.73 | Excellent |
| Internet Fraud | 0.80 | Excellent |

***Source:*** *Authors' Compilation*

## Researcher's Conceptual Model

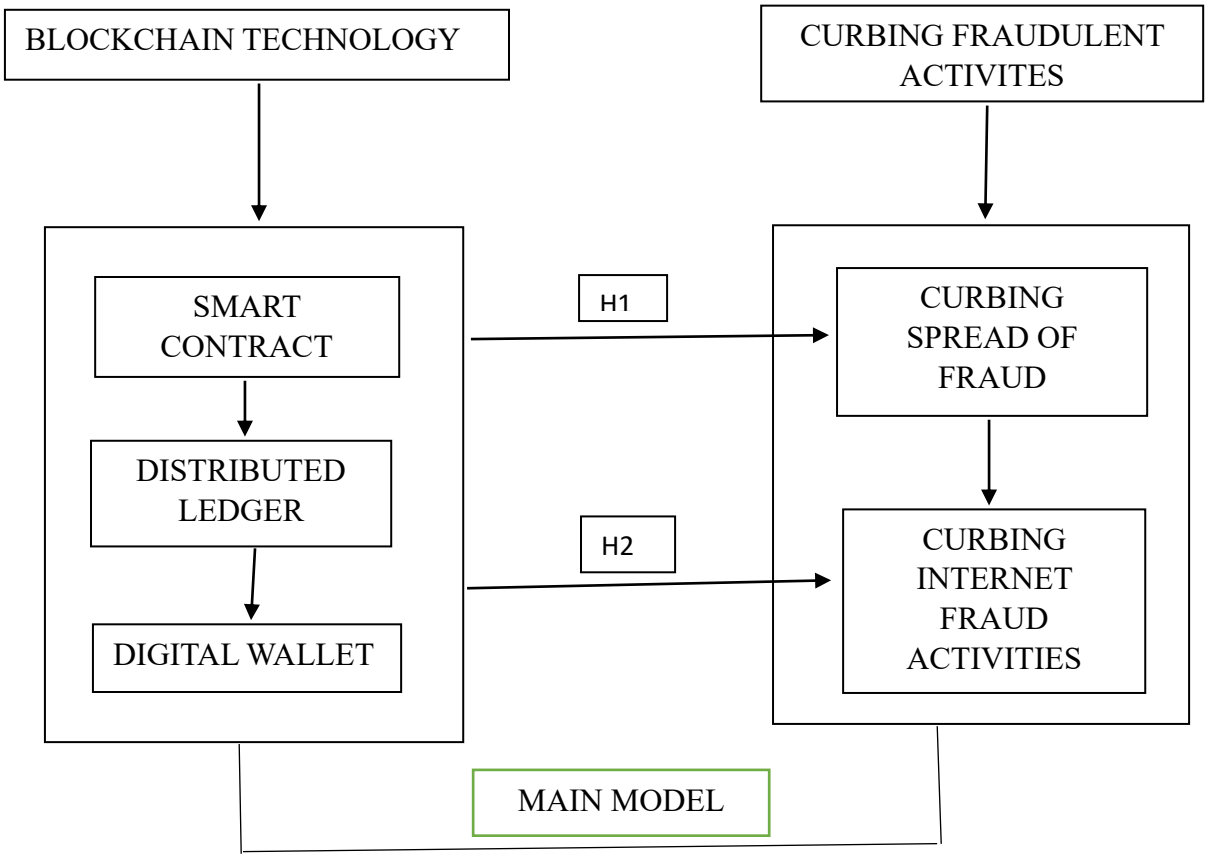


**Figure 1:** Conceptual Model, 2023

### 3.3 Model Specifications and Data Issues

Following the fraud triangle hypothesis, the baseline models to achieve the stated objectives are specified below:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \varepsilon_i \quad 1$$

Where Y, the Dependent Variable (Curbing Fraudulent Activities) is a 3*1 vector of dependent variable such as Curbing Fraudulent Activities (CFA), which is also proxied with Spread of Fraud (SOF) and Activities of Internet Fraud (IFA). The models are written explicitly in Equation 2-4:

$$SOF_i = \beta_0 + \beta_1 SMC_i + \beta_2 DIL_i + \beta_3 DIW_i + \varepsilon_i \quad 2$$

$$IFA_i = \beta_0 + \beta_1 SMC_i + \beta_2 DIL_i + \beta_3 DIW_i + \varepsilon_i \quad 3$$

$$CFA_i = \beta_0 + \beta_1 SMC_i + \beta_2 DIL_i + \beta_3 DIW_i + \varepsilon_i \quad 4$$

Where X is the Independent Variable (Blockchain Technology); $\beta_0$= Value of the Intercept; $\beta_1, \beta_2, \beta_3$= Coefficient of explanatory variables; and $\varepsilon$ = Error Term. $i$is the Number of Sampled DMBs. The independent variable is Blockchain Technology (BTC) represented with Smart Contract (SMC), Distributed Ledger (DIL) and Digital Wallet (DIW). We expect the coefficients to be positive in Equation 1 to 4 ($\beta_{1\text{-}3} > 0$) as the *a priori* expectations.The study estimated Equation 2-4 via OLS because outcomes are measured on quasi-continuous Likert scales (averaged across multiple items), for which OLS yields unbiased and efficient estimates under standard conditions; coefficient interpretation is transparent and comparable across specifications (Wooldridge, 2010). To guard against assumption violations, we compute heteroskedasticity-robust (Huber–White) standard errors (White, 1980). Because multicollinearity can inflate variance when technology dimensions co-move, we examine variance inflation factors (VIF) and tolerances, and center predictors.

### 4. Results and Discussion

For estimation, we standardised predictors to facilitate coefficient comparability. OLS models were chosen

for interpretability given the continuous Likert type indices aggregated at scale level; as a sensitivity check we replicated results using robust standard errors and median regressions, yielding consistent signs and significance. Multicollinearity diagnostics (VIF < 5) indicated acceptable independence. We addressed common method variance via procedural remedies (assured anonymity, separated predictor/outcome sections) and the Harman single factor test, which did not indicate dominance by a single factor. Although causal identification is beyond scope, we discuss threats, omitted variable bias (e.g., broader digital maturity), reverse causality (banks with less fraud invest more/less in BCT), and measurement error, and interpret estimates accordingly. Ethical approval was obtained from the relevant institutional review committee; participation was voluntary and non-remunerated.

The descriptive statistics of the study variables are presented in Table 2. It showed that the minimum of 1, maximum value of 5, Mean of 4.08 and Standard Deviation of 1.13 for Smart Contract. Minimum of 1, mean of 5, maximum of 4.16 and Standard Deviation of 1.04 for Distributed Ledger. While Digital Wallet ranges from minimum of 1 to maximum of 5, mean of 4.28 and standard deviation of 0.98. Spread of fraud range from minimum of 1, mean of 4.13, maximum of 5 and standard deviation of 0.99. Internet fraud activities range from minimum of 1 to maximum of 5, mean of 4.30 and standards deviation of 0.98. All the results revealed that all the variables follow a normal distribution.

**Table 2:** Descriptive Statistics of Variable of Interest.

| Variables | Num | Minimum | Maximum | Mean | Standard Deviation |
|---|---|---|---|---|---|
| Smart Contract | 120 | 1 | 5 | 4.08 | 1.13 |
| Distributed Ledger | 120 | 1 | 5 | 4.16 | 1.04 |
| Digital Wallet | 120 | 1 | 5 | 4.28 | 0.98 |
| Spread of fraud | 120 | 1 | 5 | 4.13 | 0.99 |
| Internet fraud Activities | 120 | 1 | 5 | 4.30 | 0.98 |

***Source:*** *Author Compilation*

**Test of Hypotheses**

**$H_{01}$:** Blockchain technology does not play significant role in curbing spread of fraud in deposit money banks in Nigeria. (300 words)

Table 3 shows that the coefficient of determination of the model is 0.43. This implies that 43 percent changes in spread of fraud are explained by Blockchain technology. Also, Table 3 indicates that there is a negative relationship between Smart contract and spread of fraud in deposit money bank. 1 unit increase in smart contract leads to 1.923 unit decrease in spread of fraud in deposit money bank, and it is statistically significant at 5 percent with T-stat of 5.270 and p-value of 0.008 which is less than 0.05. Also,1 unit increase in Distributed ledger leads to 1.259 unit decrease in spread of fraud in deposit money bank, and it is statistically significant at 5 percent with T-stat of 4.287 and p-value of 0.047 which is less than 0.05.One unit increase in Digital wallet leads to 1.781 unit decrease in spread of fraud in deposit money bank and it is statistically significant at 5 percent with T-stat of 3.247 and p-value of 0.032 which is less than 0.05.Hence, we reject the null hypothesis and conclude that Blockchain technology has significant effect on spread of fraud in deposit money banks.

**Table 3:** Regression Analysis for the effect of Blockchain technology on curbing spread of fraud in deposit money banks in Nigeria. Dependent Variable: Spread of fraud

| Variable | Coefficient | Standard Error | t-stat | Prob. |
|---|---|---|---|---|
| (Constant) | 15.238 | 1.302 | 11.707 | 0.000 |
| Smart Contract | -1.923 | 0.075 | 5.270 | 0.008 |
| Distributed Ledger | -1.259 | 0.072 | 4.287 | 0.047 |
| Digital Wallet | -1.781 | 0.057 | 3.247 | 0.032 |
| R-Square | 0.47 | | | |
| Adjusted R-Square | 0.43 | | | |
| F-Statistic | F(1, 80) = 5.709** | | | |
| Prob. (F-Stat) | Prob >F = 0.0495 | | | |

'**' and '*' indicate significant at 5% and 10% respectively. Source: Researcher's Computation (2024)

**Hypothesis 2**

$H_{02}$: Blockchain technology does not have significant effect on curbing internet fraud activities in deposit money banks in Nigeria.

Table 4indicates that the coefficient of determination of the model is 0. 241.This indicates that roughly 24.1% of variation in IFA is explained by the three BCT levers plus the constant, an economically meaningful share for organizational controls in a complex fraud environment. Table 4 estimates the association between the three BCT capabilities and activities of internet fraudsters (IFA outcome). The fitted model reports $R^2 = 0.271$ (Adjusted $R^2 = 0.241$) and an omnibus F-statistic reported as $F(1, 80) = 5.9338$, with Prob > F = 0.000; coefficients for each capability are negative and statistically significant at 5%. Specifically: Smart contracts $\beta = -1.133$ (SE = 0.043; t = 5.124; p = 0.017); Distributed ledger $\beta = -1.939$ (SE = 0.082; t = 4.347; p = 0.034); and Digital wallet $\beta = -1.781$ (SE = 0.047; t = 3.173; p = 0.014). The constant is 15.248 (SE = 1.475; t = 11.707; p = 0.000). The relatively larger magnitude on distributed ledger (−1.939) suggests that tamper-evident, shared records and synchronized books of record may be particularly salient for deterring or containing internet-channel attack paths such as dispute manipulation, and ex-post edits.One unit increase in smart contracts leads to 1.133 unit decrease in activities of fraudsters in deposit money bank, and it is statistically significant at 5 percent with T-stat of 5.124 and p-value of 0.017 which is less than 5 per cent. Also, one unit increase in Distributed ledger leads to 1.939 unit decrease in activities of fraudsters in deposit money bank, and it is statistically significant at 5 percent with T-stat of 4.347and p-value of 0.034 which is less than 0.05. One unit increase in Digital wallet leads to 1.237 unit decrease in activities of fraudsters in money bank deposit, and it is statistically significant at 5 percent with T-stat of 3.173 and p-value of 0.014 which is less than 0.05. Hence, we reject the null hypothesis and conclude that Blockchain technology has significant effect on activities of fraudsters in deposit money banks in Nigeria.

**Table 4:** Regression Analysis for the effect of Blockchain technology on curbing internet fraud activities in deposit money banks in Nigeria. Dependent Variable: Activities of Internet fraudsters

| Variable | Coefficient | Standard Error | t-stat | Prob. |
|---|---|---|---|---|
| (Constant) | 15.248 | 1.475 | 11.707 | 0.000 |
| Smart Contract | -1.133 | 0.043 | 5.124 | 0.017 |
| Distributed Ledger | -1.939 | 0.082 | 4.347 | 0.034 |
| Digital Wallet | -1.781 | 0.047 | 3.173 | 0.014 |
| R-Square | 0.271 | | | |
| Adjusted R-Square | 0.241 | | | |
| F-Statistic | F(1, 80) = 5.9338** | | | |
| Prob. (F-Stat) | Prob >F = 0.000 | | | |

'**' and '*' indicate significant at 5% and 10% respectively. Source: Researcher's Computation (2024)

**Main Model Hypothesis**

$H_0$: Blockchain technology does not have significant effect in curbing Fraud Activities in Deposit money bank

The study reports a main-model specification using a composite blockchain index (BCT) to explain fraud reduction (an overall outcome complementary to SOF/IFA). Table 5 shows $R^2 = 0.242$ (Adjusted $R^2 = 0.230$) with $F(1, 80) = 3.508$ and Prob > F = 0.005. The BCT index carries a positive, statistically significant coefficient: $\beta = 2.080$ (SE = 0.043; t = 1.873; p = 0.005). The constant is 44.688 (SE = 1.858; t = 24.054; p = .000). There is a positive significant effect of blockchain technology in curbing fraud activities in deposit money banks. The index-based result complements the granular IFA model: when banks report broader deployment across smart contracts, permissioned ledgers, and secure wallets, they also report higher levels of overall fraud reduction. Table 5indicates that the coefficient of determination of the model is 0.24. This implies that 24 percent changes in fraud reduction are explained by blockchain technology. Table 5 shows that there is a positive significant effect of block chain technology in curbing fraud activities in deposit money bank. 1 unit increase in block chain technology leads to 2.080 unit increase in fraud reduction in deposit money bank, and it is statistically significant at 5 percent with T-stat of 1.873 and p-value of 0.005; F-Stat of 3.508 and p-value of 0.005 which is less than 0.05. Hence, we conclude that block chain technology has significant effect on curbing fraud activities in deposit money banks in Nigeria

**Table 5:** Regression Analysis for the effect of Blockchain technology in curbing Fraud Activities in deposit money banks in Nigeria. Dependent Variable: Fraud reduction

| Variable | Coefficient | Standard Error | t-stat | Prob. |
|---|---|---|---|---|
| (Constant) | 44.688 | 1.858 | 24.054 | .000 |
| Blockchain | 2.080 | 0.043 | 1.873 | .005 |
| R-Square | 0.242 | | | |
| Adjusted R-Square | 0.230 | | | |
| F-Statistic | F(1, 80) = 3.508** | | | |
| Prob. (F-Stat) | Prob >F =0.005 | | | |

## 5. Discussion of Findings

The study shows that higher perceived deployment of smart contracts, permissioned distributed ledgers, and secure digital wallets is associated with lower internet fraud activities (IFA), and that a composite BCT index positively predicts overall fraud reduction. Interpreted through the fraud diamond, these results imply that blockchain capabilities compress the opportunity and capability dimensions of fraud. Smart contracts translate policy into executable rules (velocity limits, co-signing thresholds, pre-settlement KYC/sanctions check), thereby shrinking the discretionary windows where social engineering and insider override usually operate. Permissioned ledgers raise the coalition size required for tampering and render ex-post edits conspicuous via append-only, time-stamped trails. Wallet hardening constrains capability at the edge by binding authorization to cryptographic keys, devices, and step-up authentication (Cressey, 1953; Wolfe & Hermanson, 2004; Cong & He, 2019).

From agency theory perspective, the negative coefficients on all three BCT dimensions point to lower agency costs. Programmable controls reduce moral hazard in high-risk steps (e.g., beneficiary changes, bulk-payment releases), while shared state improves monitoring and reduces reconciliation disputes that otherwise depend on unverifiable logs. While wallets act as bonding mechanisms, authorisation requires device-tied keys and user intent proofs, dampening opportunistic behaviour in retail channels (Jensen & Meckling, 1976; Cong & He, 2019). The composite BCT effect suggests complementarities when rule-execution (smart contracts), shared truth (DLT), and strong identity (wallets) move together, monitoring and bonding reinforcing each other rather than simply add up.

The findings also align with information asymmetric arguments. Internet banking fraud thrives when counterparties and internal units observe different "slices of truth." By standardizing event provenance and making records tamper-evident, permissioned DLT reduces hidden action and supports quicker, evidence-based dispute resolution. Privacy-preserving proofs can expose compliance-relevant properties (e.g., sanction-screened/PEP-screened) without revealing full personal data, striking a workable balance between control and confidentiality (Akerlof, 1970; Buterin, Gafni, & Roughgarden, 2024).The relative magnitudes, particularly the strong association for distributed ledgers, are intuitively consistent with Nigeria's 2023–2024 fraud profile, where internet-channel losses and dispute complexity have grown: when the "book of record" becomes shared, tamper-evident, and quarriable, both opportunism and ex-post narrative manipulation become harder. Meanwhile, smart contracts and wallets attack the two flanks of typical incidents: entry (credential takeover, SIM-swap) and execution (authorization of high-risk transfers). The pattern of results, negative signs across all BCT levers and a positive composite effect, mirrors recent multi-bank evidence linking blockchain adoption to better control outcomes and lower exception/fraud-related costs (Al-Dmour, Alshurideh, Al-Kurdi, &Masa'deh, 2024; Ahmed, 2025; Almadadha, 2025; Ma, Sun, & Chen, 2024).

## 6. Conclusion and Recommendations

This study provides Nigeria-specific, bank-level evidence that stronger perceived deployment of enterprise-grade blockchain capabilities (smart contracts, permissioned ledgers, and secure digital wallets) coincides with lower fraud exposure in internet channels and higher overall fraud-reduction assessments. The pattern is theory-consistent (fraud diamond, principal–agent, information asymmetry) and practice-consistent with emerging international evidence in banking. While causality awaits pilot-based designs, the results justify targeted, near-term adoption in high-loss workflows.

Based on the objectives of the study which sought to examine the effect of blockchain technology in curbing fraudulent activities in DMBs in Nigeria, the study concluded that blockchain technology plays a significant role in curbing spread of fraud and internet fraud activities in Deposit Money Banks in Nigeria.

The empirical results indicate that higher deployment of smart contracts, permissioned distributed ledgers, and secure digital wallets coincides with lower fraud exposure, especially on internet channels. The appropriate managerial response is not to "adopt blockchain" generically but to embed specific BCT capabilities into high-loss processes where they change incentives and evidence. Practically, that means (i) converting policy into enforceable code at critical entitlements; (ii) anchoring dispute-relevant events on a shared, tamper-evident ledger; and (iii) binding authorization to cryptographic identity at the wallet/device boundary. Policy action should, in turn, enable and standardize these moves. In line with these findings, the study recommended that government, Central Bank and Deposit Money Banks should conduct a comprehensive review on block chain technology and explore the usage and benefits of Smart contracts, Distributed ledgers and Digital wallet. They should go beyond crypto currencies and exhaust the capabilities of blockchain technology to curb spread of fraud and elimination or minimization of Internet fraud activities. The study also recommend that the Nigerian government should avoid banning such good technology but study and utilize the use of blockchain technology in public and private sectors of the economy. The researcher believes that this technology has great potentials, not just in relation to cryptocurrency or curbing fraudulent activities because the technology is so robust and if utilized well can make a huge difference in Nigerian economy.

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# Exploring Investment Behavior among Young Consumers: A Review and Research Agenda

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**Abstract.** This paper provides a comprehensive theoretical and methodological review of conceptual and empirical research on investment behaviour among young consumers, particularly undergraduates, who have increasingly become active in the financial market. The main objective of the paper is to clarify how rational, behavioural, cognitive, and social factors shape young people's investment intentions as well as choices, while identifying gaps in research conducted so far that can inform future research agenda. The study achieved its aim by systematically reviewing dominant theoretical frameworks that have been used in studying investment behaviour among young consumers, including the Theory of Planned Behaviour, Behavioural Finance Theory, Prospect Theory, Dual Process Theory, and Rational Choice Theory. It also synthesized empirical studies that have employed quantitative methods such as regression analysis, ANOVA, and structural equation modelling in exploring the phenomenon of investment among young consumers. Result from the review, suggest that existing studies rely heavily on cross-sectional survey data and quantitative techniques, with limited use of qualitative, longitudinal, or experimental designs. Findings from the reviewed studies consistently show that investment behaviour among young consumers is multidimensional, shaped by financial literacy, perceived behavioural control, emotional biases (such as overconfidence and loss aversion), parental influence, peer dynamics, and digital financial environments. Furthermore, the review showed that while rational evaluation plays a role in investment decisions, behavioural and contextual factors frequently drive decision-making. The paper therefore recommends greater theoretical integration, the adoption of mixed-method and longitudinal approaches, and increased attention to digital investment platforms. It further encourages the development of hybrid models that combine rational and behavioural perspectives in explaining investment behaviour among young investors.

**Keywords:** Behavioral finance, financial literacy, Investment behavior, Responsible marketing, Undergraduate students, young consumers.

## 1. Introduction

Investment refers to the allocation of funds or other resources to a specific asset or project with the expectation of generating future financial returns (Gitman & Zutter, 2008). In essence, it entails deploying present capital in ways intended to yield profits over time (Ansari & Moid, 2013). Examining investment behaviour among undergraduate students is therefore a significant line of inquiry, given its implications for their long-term financial stability as well as its broader contribution to economic development. As observed by Evbayiro-Osagie, Isibor, and Ihemefor (2017), university students frequently represent first-time account holders, positioning them at an early and formative stage in terms of financial engagement. For financial institutions seeking to cultivate enduring client relationships, insight into this group's investment behaviour becomes especially valuable. Moreover, careful attention to the factors shaping investment decisions, particularly among young adults, is essential for the design of effective financial education programmes and policies (Kolade, Adewale, & Owonibi, 2022). Such efforts are critical because financial education not only strengthens individual confidence but also mitigates vulnerability to cognitive biases that encourages poor financial behaviour (Lusardi & Mitchell,
2014).

Recent research has increasingly emphasized the central role of financial education in shaping the investment behaviour of undergraduates. Owusu, Ansong, Koomson, and Addo-Yobo (2020), for example, reported that higher levels of financial literacy among Ghanaian university students were

positively associated with more prudent savings and investment decisions. In a similar vein, Kolade et al. (2022) found that financial literacy exerted a significant influence on Nigerian undergraduates' attitudes toward financial investments, thereby reinforcing the argument for targeted financial education initiatives. Beyond financial education, parental financial behaviour has also been shown to play a pivotal role in shaping students' investment habits, suggesting that the family functions as a primary agent of financial socialization. At the macroeconomic level, factors such as interest rates and inflation further condition the investment behaviour of young people. David (2023), in an empirical assessment of interest rate variations and investment behaviour in Nigeria, found that macroeconomic variables significantly influence the investment decisions of young people.

Despite these contributions, the existing studies remain limited in scope, as the drivers, antecedents, and challenges associated with investment among young consumers, particularly undergraduates, have not been examined in a comprehensive manner. A more thorough exploration of these dimensions is therefore warranted, especially given that undergraduates constitute a substantial proportion of the youth population expected to shape the future trajectory of Nigeria's economy. This paper therefore presents a comprehensive theoretical and methodological review of existing research on investment behaviour among undergraduates. In doing so, it critically examines the principal theories that have informed prior investigations, alongside the research methods employed, while drawing attention to the key factors identified as influencing the behaviour of these young investors. The paper further identifies existing knowledge gap and outlines areas that remain open for further scholarly inquiry.

## 2. Investment Behaviour: Theoretical Review

Understanding how young consumers make investment decisions requires a coherent theoretical foundation that integrates both rational and behavioural perspectives. Hence, this study engages Rational Choice Theory, the Theory of Planned Behaviour (TPB), Behavioural Finance, Dual-Process models, and Prospect Theory, as together they provide a comprehensive framework for explaining investment behaviour. Rational Choice Theory provides the foundational assumptions for information processing and utility maximisation in financial decision-making (Becker, 1976). Complementing this view, TPB accounts for the attitudinal, normative, and perceived behavioural control factors that shape intentions, particularly among undergraduates whose decisions are influenced by peer dynamics and self-efficacy considerations (Ajzen, 1991).

The behavioural finance and prospect theory extends explanation for financial behaviour beyond the rational model. It explains systematic deviations from rationality by incorporating factors such as loss aversion, framing effects, and heuristic bias: that are frequently observed among novice investors (Kahneman & Tversky, 2013; Barber & Odean, 2001). Dual process models, distinguishing between System 1 and System 2 processing, further clarify the conditions under which intuitive judgments supersede reflective reasoning, thereby informing interventions aimed at strengthening cognitive reflection (Kahneman, 2011; Frederick, 2005; Stanovich & West, 2002). Taken together, these widely cited theoretical perspectives provide an interdisciplinary, empirically grounded, and conceptually coherent basis for understanding young investors' financial behaviour. They also offer a policy-relevant foundation for the development of marketing strategies that align with the cognitive and behavioural realities characterizing young consumers (Lusardi & Mitchell, 2014).

### 2.1 Theory of Planned Behavior

The theory of planned behaviour (TPB) remains one of the most extensively utilized frameworks for explaining human decision-making (Ajzen, 1991). Central to the theory is the proposition that behavioural intention serves as the most immediate antecedent of action, shaped by three interrelated determinants: attitude, subjective norms, and perceived behavioral control. Within investment settings, these components operate jointly to explain how young consumers develop both the intention and the confidence to engage in investing. Attitude captures an individual's evaluative judgment of investing, whether it is perceived as advantageous or fraught with risk. When investment is construed as a pathway to financial independence or social mobility, intention is strengthened and, conversely, may weaken when such positive evaluations are absent (Ajzen, 2020). Subjective norms denote perceived social pressures, including peer influence, family expectations, and participation in online financial communities, that frequently guide the behaviour of young adults (Kobylińska, 2022). Perceived behavioral control, by contrast, reflects an individual's sense of capability and access to the requisite financial resources, a perception often shaped by levels of financial literacy and digital familiarity (Xiao & Porto,

2017). Empirical findings provide considerable support to the relevance of TPB in explaining youth investment behaviour. Baihui, Bahador and Saat (2024) reported that all three TPB components significantly predicted students' intentions to invest in Internet Money Market Funds, whereas Paramita, Rahayu and Widjaja (2018) identified attitude and perceived behavioral control as the most influential predictors. Additional studies have also demonstrated that TPB constructs consistently account for financial intentions, although their relative influence appears to vary across cultural settings, gender, and contextual factors (Rosavina et al., 2019; Aren & Zengin, 2017). Despite its explanatory strength, TPB does not fully encompass the emotional, impulsive, and social media–driven financial choices that frequently characterise young investors (Hoffmann & Post, 2017). Investment behaviour, for instance, may be shaped by prevailing trends or the fear of missing out, which often unfolds with minimal deliberation. Furthermore, perceived behavioural control may insufficiently account for structural and technological constraints that condition actual efficacy (Xiao & O'Neill, 2018). Regardless of this, TPB continues to offer a robust framework for modelling investment intentions and informing behavioural interventions. In this regard, the theory suggests that favourable attitudes toward investment behaviour can be strengthened through literacy programmes, the reinforcement of supportive peer norms, and the enhancement of perceived control via digital education. Future research may therefore refine TPB by incorporating emotional, cultural, and digital dimensions, thereby aligning the framework more closely with the contemporary realities of investment decision-making among young adults.

**2.2 Behavioral Finance Theory**

Behavioural Finance emerged in the late twentieth century in response to the limitations of classical financial theories, which assume that investors behave rationally and that markets are efficient. Drawing on Kahneman and Tversky's (2013) Prospect Theory and Thaler's (1985) concepts of bounded rationality and mental accounting, it incorporates psychological, cognitive, and emotional dimensions into financial decision-making. In doing so, it challenges the rational agent model by demonstrating that investor choices are systematically shaped by biases, heuristics, and affective states (Barberis & Thaler, 2003). For young and inexperienced investors in particular, behavioral finance offers a useful explanatory lens, as their financial behaviour often reflects emotional responses, social influence, and limited experience rather than purely objective analysis. Within this framework, four behavioural dimensions (loss aversion, overconfidence, herding, and risk perception) are especially pertinent to explaining their departures from rationality.

Loss aversion refers to the tendency to assign greater weight to potential losses than to equivalent gains. Such emotional asymmetry fosters excessive risk aversion, even when expected returns are favourable (Kahneman & Tversky, 2013). Empirical evidence continues to confirm its persistence, indicating that loss-averse investors frequently avoid equities or long-term investments despite positive expected outcomes (Tetteh, Adu-Darko, & Agyirey-Kwakye, 2024). Among young consumers, this bias may appear as heightened financial caution or withdrawal during periods of market volatility. Nevertheless, financial education and digital investment tools can temper these tendencies by reframing risk as opportunity (Agyemang-Mintah, Awuah, & Asamoah, 2021). Overconfidence bias arises when investors overestimate their knowledge, analytical competence, or informational advantage. It is associated with excessive trading, inadequate portfolio diversification, and weak long-term returns (Chaudhary, 2025; Barber & Odean, 2001). For young investors, digital trading platforms and social media environments often amplify this bias, as gamified interfaces and rapid feedback cultivate an inflated sense of expertise. While overconfidence may initially stimulate financial participation, it frequently erodes stability and sustained investment discipline. Evidence suggests that targeted financial education and reflective decision-training can curb overconfidence by increasing awareness of cognitive limitations (Aren, & Aydemir, 2014).

Herding denotes the tendency of investors to follow others' actions rather than exercise independent judgment. Although it can function as a rational heuristic under conditions of uncertainty, herding may also contribute to speculative bubbles and collective misjudgments (Spyrou, 2013). Among undergraduates and novice investors, such behaviour is often shaped by online trends, influencers, and investment communities, where popularity is frequently equated with credibility (Hong, Kubik & Stein, 2004; Bikhchandani, Hirshleifer & Welch, 1992). At the same time, herding is not invariably irrational; it may reflect social conformity or a desire for belonging, both of which are integral to youth identity and culture. This duality underscores the importance of examining herding not solely as a cognitive bias but also as a socio-psychological phenomenon. Risk perception concerns the subjective assessment of uncertainty and potential loss, which often diverges from objective

measures of risk. It is shaped by emotional states, prior experiences, and external cues (Ricciardi & Simon, 2000). For young investors, limited experience and exposure to negative financial narratives tend to heighten perceived risk. Recent findings suggest that perceived risk, rather than actual financial literacy, frequently determines willingness to invest (Agyemang-Mintah et al., 2021). Accordingly, understanding the dynamics of risk perception is critical for designing interventions that build confidence without promoting recklessness.

Taken together, these behavioural dimensions indicate that young investors' financial behaviour emerges from the interplay of emotion, cognition, and social context, rather than from purely rational analysis. Yet much of the empirical literature examines these biases in isolation, overlooking their interaction. Overconfidence, for instance, may dampen loss aversion, while herding can lower perceived risk by providing social reassurance (Hong, Kubik & Stein, 2004; Barber & Odean, 2001; Gervais & Odean, 2001;). Future research would benefit from integrative behavioural models that account for such interdependencies, particularly within digital investment environments characterised by information overload and social validation. Practically, recognising these biases enables the development of interventions that accommodate behavioural tendencies instead of presuming perfect rationality. Educational programmes, for example, can frame risk-taking as strategic learning, while marketing communications may nudge investors toward diversification and long-term orientation. In this way, behavioural finance deepens theoretical insight into youth investment behaviour while offering actionable guidance for promoting informed and sustainable financial participation.

### 2.3 Dual Process Theory

The Dual Process Theory (DPT) offers a cognitive-psychological explanation of decision-making by proposing that individuals draw on two interacting systems of thought: System 1, characterised as fast, intuitive, and emotion-driven, and System 2, which is slower, reflective, and analytical (Kahneman, 2011). Within financial settings, the interplay between these systems shapes how investors interpret information, evaluate risk, and navigate uncertainty. System 1 facilitates rapid heuristic judgments that may prove adaptive under time constraints, whereas System 2 underpins more deliberate reasoning, however at a greater cognitive cost (Evans & Stanovich, 2013).

Among young investors, the predominance of System 1 is reflected in impulsive or emotionally driven investment behaviour shaped by digital stimuli, peer trends, and gamified trading environments. Immediate feedback and social validation on investment platforms tend to activate intuitive, rather than reflective, decision-making processes (Othman, 2024). By contrast, engagement of System 2 becomes more apparent when individuals assess long-term outcomes, diversify portfolios, or consult professional advice. While DPT accounts for numerous departures from rational behaviour, its rigid distinction between Systems 1 and 2 has been criticised as overly simplistic. Empirical research indicates that emotion and cognition often operate in tandem, functioning along a continuum rather than as discrete mechanisms (Evans & Stanovich, 2013; Harmon-Jones, Harmon-Jones, & Summerell, 2017). For young investors, this interaction suggests that affective impulses and reflective reasoning frequently co-determine financial judgements.

Recognizing this cognitive duality carries important implications for education, research, and responsible marketing. Evidence indicates that reflective decision-training, structured financial literacy programmes, and "choice architecture" mechanisms (such as delayed confirmation prompts or visualised risk feedback) can stimulate System 2 processing and moderate impulsive responses (Kahneman, 2011; Frederick, 2005; Othman, 2024). By encouraging greater deliberation, these interventions support more considered and sustainable financial behaviour among young consumers.

### 2.4 Prospect Theory

Prospect Theory (PT), advanced by Kahneman and Tversky (2013), stands as one of the most influential frameworks in behavioural economics for understanding decision-making under conditions of risk. It advances two central principles: loss aversion, whereby losses are weighted more heavily than equivalent gains, and diminishing sensitivity, which posits that the psychological impact of gains or losses declines as their magnitude increases. Within investment contexts, prospect theory clarifies why investors (particularly young or inexperienced ones) often behave inconsistently. Many retain losing stocks for extended periods (the disposition effect) or dispose of winning assets prematurely out of concern over potential future losses (Barberis & Xiong, 2012). Among young investors, such tendencies are amplified by emotional reactivity and social comparison, especially on digital platforms that deliver immediate feedback. Continuous real-time visibility can intensify sensitivity to losses (Kaur and Badola, 2026). Cross-cultural research, however, show that the degree of

loss aversion varies according to financial literacy levels and cultural attitudes toward risk (Wang, Rieger, & Hens, 2017).

Although prospect theory has substantially advanced behavioural finance, critics argue that it remains primarily descriptive and pays limited attention to social and contextual influences, including peer dynamics within online investment communities. Integrating it with dual process theory helps address this gap, as intuitive, emotion-driven System 1 processes may heighten loss aversion, whereas reflective System 2 reasoning can temper it. Recent evidence (Chaudhary, 2025; Marcu, Rad & Rad, 2024) indicates that loss aversion diminishes with greater experience and education, suggesting that behavioural interventions can mitigate emotional bias. Overall, prospect theory continues to provide a foundational lens for understanding youth investment behaviour. Future research might examine how digital technologies and peer interactions reshape reference points and perceptions of loss. Extending PT to online investment environments would further strengthen both theoretical insight and practical approaches to fostering balanced and informed financial behaviour among young consumers.

### 2.5 Rational Choice Theory

Rational Choice Theory (RCT) occupies a central position in classical economics, proposing that individuals make decisions through logical evaluation of alternatives in order to maximise expected utility (Simon, 1986; Becker, 1976). The theory assumes that investors behave rationally, maintain stable preferences, and possess complete information, enabling selection of options with the most favourable risk-return trade-off. Applied to young or student investors, RCT suggests that investment decisions stem from deliberate assessments of opportunity cost, financial literacy, and expected returns. Empirical findings, however, frequently challenge these assumptions. Evidence indicates that young investors often rely on emotions, peer dynamics, and online trends rather than systematic analysis (Baihui, Bahador & Saat, 2024; Agyemang-Mintah et al., 2021). Such patterns underscore the limits of strict rationality, particularly when decisions are made under uncertainty or cognitive strain. Simon (1986) introduced bounded rationality to refine RCT, arguing that individuals "satisfice" instead of optimise due to constraints of time, information, and cognitive capacity. Among novice investors, bounded rationality is especially apparent, as limited financial experience, exposure to digital trading stimuli, and social media hype restrict the capacity to process complex financial information (Wardana & Tandiawan, 2025).

Nevertheless, rational elements remain observable; many students continue to compare alternatives, consult expert advice, or estimate expected returns. RCT therefore retains partial explanatory relevance when positioned alongside behavioural frameworks such as behavioural finance and dual process theory, which account for the cognitive and affective biases shaping youth investment behaviour (Kahneman, 2011; Barberis & Thaler, 2003). For researchers, RCT serves as a normative benchmark against which deviations from logical standards can be evaluated. For educators and marketers, recognition of bounded rationality highlights the need to simplify complex financial products, encourage reflective decision-making, and promote responsible investment participation among young consumers.

## 3. Theoretical Synthesis and Evaluation

The synthesis in Table 1 indicates that although each theory contributes valuable insight, none independently captures the full complexity of undergraduate or young consumer investment behaviour. The theory of planned behaviour (Ajzen, 1991) provides a structured account of how attitudes, subjective norms, and perceived behavioural control shape investment intentions; however, its rational orientation tends to understate the affective forces influencing actual decisions. Behavioural finance theory and prospect theory (Kahneman & Tversky, 2013; Barberis & Thaler, 2003) broaden this perspective by demonstrating how emotional biases (including loss aversion, overconfidence, and herding) distort rational judgement, particularly within digitally mediated and peer-driven investment settings. Dual process theory (Evans & Stanovich, 2013; Kahneman, 2011) further enriches the analysis by clarifying the interaction between intuitive (System 1) and analytical (System 2) processes, showing how impulsive and reflective mechanisms jointly inform financial judgement. By comparison, Rational Choice Theory (Simon, 1986; Becker, 1976) operates as a normative benchmark, specifying the standards of rational decision-making against which behavioural departures may be assessed.

Taken together, these perspectives underscore the multidimensional nature of young investors' financial behaviour, which emerges from the interplay of rational evaluation, emotional bias, cognitive duality, and social influence. Rational frameworks offer structural precision and predictive logic, whereas behavioural and cognitive models introduce the

psychological and contextual dimensions. Their integration therefore yields a more comprehensive and policy-relevant account of youth investment behaviour in contemporary financial environments. Empirical evidence supports this integrative view. Research shows that higher financial literacy is associated with more deliberate, goal-oriented investment behaviour and improved financial outcomes (Lusardi & Mitchell, 2014). At the same time, behavioural distortions (such as overconfidence, loss aversion, and risk misperception) continue to shape investment choices (Edeh, 2020; Kahneman & Tversky, 2013). Studies applying the theory of planned behaviour consistently report that attitudes, subjective norms, and perceived behavioural control predict young investors' intentions (Akhtar & Das, 2019), while demographic factors including gender, parental background, and field of study moderate these relationships, illustrating the complex social and cognitive ecology underlying youth investment decisions (Manocha, Bhullar, & Sachdeva, 2023).

As shown in Table 1, these theoretical perspectives collectively acknowledge that no single framework sufficiently explains the diverse psychological, social, and cognitive influences shaping young investors' behaviour. Accordingly, future research would benefit from integrative or hybrid approaches that combine complementary constructs across theories to better represent the multifaceted character of youth financial decision-making. Building on these theoretical insights, the next section presents the empirical review. It synthesises existing evidence on young consumers' investment behaviour, highlighting principal determinants, measurement strategies, and unresolved research gaps. This progression from theory to empirical evidence ensures that the subsequent analysis remains both conceptually anchored and empirically substantiated, thereby offering a coherent basis for subsequent hypotheses formulation and model specification.

**Table 1:** Summary of theories explored in review

| Theory | Key Proponents | Major Dimensions of Theory | Dimensions Proposed by Recent Authors | Dimensions Found to Significantly Influence Youth Investment Behaviour |
|---|---|---|---|---|
| Theory of Planned Behaviour (TPB) | Ajzen (1991) | Attitude, subjective norm, perceived behavioural control | Perceived value, financial literacy, and digital influence (Baihui et al., 2024; Paramita et al., 2018) | Attitude, subjective norm, perceived behavioural control, and perceived value significantly predict investment intention among young adults. |
| Behavioural Finance Theory | Kahneman and Tversky (2013); Barberis and Thaler (2003) | Loss aversion, overconfidence, herding, mental accounting, risk perception | Emotional bias, financial literacy, and cognitive reflection (Agyemang-Mintah et al., 2021; Aren & Aydemir, 2014) | Loss aversion, overconfidence, and herding strongly shape risk-taking and impulsive investment tendencies in youths. |
| Dual Process Theory | Kahneman (2011); Evans and Stanovich (2013) | Intuitive (System 1) and analytical (System 2) thinking | Cognitive reflection and education level as moderators (Frederick, 2005; Othman, 2024) | Intuitive (System 1) thinking dominates youth investment behaviour, though education and experience encourage analytical (System 2) reasoning. |
| Prospect Theory | Kahneman and Tversky (2013) | Loss aversion, reference dependence, diminishing sensitivity | Emotional regulation and gain–loss framing (Wang et al., 2017) | Loss aversion and reference dependence explain risk-averse tendencies and short-term trading patterns among young investors. |
| Rational Choice Theory (RCT) | Smith (2002); Becker (1976) | Rational evaluation, cost–benefit analysis, and self-interest | development of a "third-generation" rational choice theory by introducing a Multiple Player Approach (Brandt, Poulsen, & Svendsen, 2024) | Rational decision processes are present but often constrained by bounded rationality and emotional biases among youths. |

**Source:** Authors' Compilation (2026)

## 4. Investment Behavior: Methodological Review

This section examines the research designs and statistical techniques used in studies of investment behaviour among young adults, including youths, adolescents, and undergraduates. Table 2 summarises selected contributions in this area. Across the reviewed literature (see Table 2), there is evident methodological convergence around quantitative, theory-driven designs, reflecting the influence of structured frameworks such as the Theory of Planned Behaviour (Ajzen, 1991), Behavioural Finance Theory (Kahneman & Tversky, 2013), Dual Process Theory (Kahneman, 2011), and Prospect Theory (Barberis & Thaler, 2003). Most empirical studies apply regression-based methods, Analysis of Variance (ANOVA), or Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine predictive relationships among attitudinal, cognitive, and behavioural variables (Baihui, Bahador & Saat, 2024; Aboluwodi et al., 2022; Kolade, Orekoya & Adeniyi, 2022; Sapkota, 2022). This quantitative emphasis facilitates systematic hypothesis testing and yields statistically robust evidence on the determinants of youth investment behaviour.

Findings across studies consistently identify behavioural and cognitive factors (particularly financial literacy, perceived behavioural control, attitude, loss aversion, and overconfidence) as significant predictors of investment intention and behaviour (Kolade et al., 2022; Sapkota, 2022; Lusardi & Mitchell, 2014). Research grounded in the Theory of Planned Behaviour underscores the importance of attitude and perceived control in shaping intention (Baihui et al., 2024; Paramita et al., 2018), whereas applications of Behavioural Finance and Prospect Theory highlight the persistent influence of biases such as herding, loss aversion, and overconfidence in distorting rational decision-making (Edeh, 2020; Kahneman & Tversky, 2013;).

Notwithstanding these contributions, notable methodological and contextual gaps remain. Longitudinal and experimental designs capable of capturing the temporal and situational dynamics of youth financial decision-making are relatively scarce. Cultural and contextual moderators (including digital finance exposure, social influence, and economic background) are also seldom incorporated into analytical models, despite evidence that they significantly shape financial attitudes and risk perceptions (Aboluwodi et al., 2022; Owusu et al., 2020). Moreover, limited effort has been made to integrate multiple theoretical perspectives, such as combining Rational Choice and Behavioural Finance approaches, to generate a more comprehensive account of investment behaviour.

Although many reviewed studies appropriately employ advanced quantitative tools (including regression analysis, ANOVA, and structural equation modelling) consistent with theories that conceptualise investment behaviour as multidimensional (Baihui, Bahador & Saat, 2024; Aboluwodi et al., 2022), the predominance of cross-sectional quantitative designs signals a key limitation: the relative absence of qualitative and mixed-method approaches. Consequently, important psychosocial and contextual factors (such as family narratives, peer culture, and emotional triggers) remain insufficiently examined (Gainau, 2020; Muhoza, 2019). Qualitative interviews, focus groups, and sequential mixed-method designs could provide deeper insight into how undergraduates interpret financial risk, engage with digital investment tools, and internalise parental financial norms, thereby strengthening existing models. Furthermore, while some recent studies have adopted more sophisticated techniques, including PLS-SEM, Probit regression, and mediation analysis, few extend these approaches through longitudinal or experimental methods capable of establishing causality (Kolade, Orekoya & Adeniyi, 2022; Guo & Schonleber, 2020). Emerging methodologies, such as machine learning–based predictive analytics and hybrid modelling, therefore offer promising directions for advancing both theoretical and empirical understanding of youth investment behaviour.

Overall, the empirical literature reviewed affirms that youth investment behaviour is inherently multidimensional, arising from the interaction of rational, behavioural, and contextual influences. At the same time, further advancement in this field depends on greater methodological diversity, stronger theoretical integration, and heightened cultural sensitivity. These observations lay the groundwork for the ensuing methodological review, which examines how research design decisions have shaped empirical outcomes and highlights emerging pathways for more refined and contextually attuned investigation.

| Author (Year) | Country | Sample (size/frame) | Independent variables | Dependent variable(s) | Method | Statistical tool(s) | Theory / theoretical lens | Key findings |
|---|---|---|---|---|---|---|---|---|
| Aboluwodi et al. (2022) | South Africa | 344 Business students at a South African University | Gender, field of study, socio-demographics | Intuitive vs analytical investment behaviour | Quantitative (survey) | ANOVA; logistic regression | Dual-Process Theory | Gender and field of study influenced intuitive vs analytical behaviour; socio-demographics not significant |
| Sapkota (2022) | Nepal | n = 284 (Masters students; usable response rate ≈60%) | Loss aversion, overconfidence, risk perception, herding | Stock investment decision / intention | Quantitative (survey) | Descriptive statistics; multiple regression | Behavioural Finance | Herding, loss aversion, overconfidence and risk propensity has significant positive influence on stock investment decisions among investors |
| Muhoza (2019) | Kenya (Nairobi SE) | n = 378 (students surveyed) | Knowledge of financial products; financial skills; access to information | Investment behaviour / participation | Quantitative (survey) | Descriptive stats, regression | Financial literacy lens | Financial literacy positively associated with investment behaviour |
| Kolade, Orekoya and Adeniyi (2022) | Nigeria | n ≈ 300 (university undergraduates; number of observations reported: 259 in logistic model) | Gender, faculty, level, work experience | Financial behaviour / choice of instrument | Quantitative (survey) | Logistic regression; ANOVA | Financial literacy theory | Male, finance faculty, higher level, work experience are positive determinants of financial literacy, and higher financial literacy resulted in better financial behaviour |
| Paramita et al. (2018) | Indonesia | n not reported (Students of the faculty of Economics, who had invested in the Indonesian Stock Exchange) | Attitude; subjective norms; perceived behavioural control | Investment intention; behaviour | Quantitative (survey) | PLS-SEM | Theory of Planned Behaviour | Attitude, PBC and subjective norms affect intention; intention determined actual behaviour |
| Baihui, Bahador and Saat (2024) | China | n not reported (University students in China) | Attitude; subjective norms; PBC; perceived value (functional, emotional, | Investment intention (IMMFs) | Quantitative (Survey) | Descriptive stats; regression | TPB | Attitude, PBC, norms and perceived value significantly predicted IMMF investment |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | efficiency, social) | | | | | intention |
| Guo and Schönleber (2020) | US/Global mutual funds dataset | 49,000 fund-month observations (paper analyses secondary data) | Prospect-theory value; fund characteristics | Mutual fund flows | Quantitative (secondary market data) | Fama-MacBeth regressions; panel tests | Prospect Theory | Prospect-theory value predicts future fund flows above traditional performance measures (loss-aversion signal) |
| Hoffmann and Post (2017) | Netherlands | N varied for each month covered: Individual investors from the Netherlands for the period April 2008 through March 2009 | Past returns; realised risk; return experiences | Beliefs (return expectations), risk perception, risk tolerance | Combined administrative and survey | Panel regressions; fixed effects | Behavioural finance / experience effects (Prospect-related) | Past returns positively impact return expectations and risk tolerance, and negatively impact risk perceptions. Realized risk, however, has no effect. |
| Menkhoff and Kaiser (2018/2022 RCT studies) | Myanmar / other developing contexts | n ≈ 1,200, (multi-site RCTs; cluster randomised; see Menkhoff et al.) | Financial education / training interventions | Savings / investment behaviour; knowledge | Field RCT | OLS, clustered SEs; IV where applicable | RCT / intervention evaluation (bounded rationality focus) | Interactive training and incentives increase knowledge and some measures of saving/investment behaviour (effects vary by design) |

**Table 2:** Summary of empirical studies employed in methodological review
**Source:** Authors' Compilation (2026)

## 5. Practical Implications

The findings of this review hold important implications for marketers, policymakers, and educators committed to fostering responsible financial behaviour among young consumers. Financial institutions and fintech firms can draw on identified behavioural drivers (such as attitudes, perceived control, and emotional value) to craft youth-oriented marketing strategies that prioritise empowerment, trust, and long-term financial growth over short-term speculation.

Educational institutions, in turn, can embed behavioural finance principles within financial literacy curricula, equipping students to identify and manage biases including overconfidence and herding. For policymakers, the evidence underscores the value of early financial education and equitable access to secure digital investment platforms. Marketers designing products for the youth segment should therefore anchor brand communication in transparency and social responsibility, framing investment not solely as profit maximisation but as a means of economic participation and empowerment. Ultimately, recognising young investors as responsible consumers allows stakeholders to cultivate a financially informed generation capable of contributing to sustainable economic and social development.

## 6. Conclusion and Recommendations for Further Studies

This study has examined the principal theories applied in explaining student investment behavior, including the theory of planned behavior (TPB), prospect theory, dual-process theory, behavioral finance theories, and rational choice theory (RCT). It has also reviewed methodological approaches used in prior research, notably cross-sectional surveys and analytical tools such as structural equation modeling. The analysis reveals an overreliance on quantitative techniques, which has limited the depth of insight within this domain. Accordingly, broader sampling strategies, longitudinal designs, experimental methods, and

mixed-method approaches are needed to generate a more comprehensive understanding of how students' investment decisions evolve over time. Based on this review, several research gaps emerge as avenues for further inquiry:

**Employing qualitative approach:** Greater use of qualitative methods would support the development of new theoretical perspectives on investment behaviour among young adults.

**Adoption of mixed method approaches:** Integrating quantitative and qualitative techniques would provide deeper insight into why young people invest as they do. Given that prior studies have relied heavily on self-reported surveys and regression analysis, causal relationships between investment behaviour and its determinants may not be fully captured. Longitudinal research, experimental designs, and behavioural simulations should therefore be incorporated to observe changes in students' investment behaviour over time.

**Investigate behavior on digital financial platforms:** Future studies should examine how online investment tools influence young people investment behaviour.

**Inclusion of more diverse samples:** Expanding representation across age groups, academic disciplines, income levels, and cultural backgrounds would enhance generalisability and contextual relevance.

**Development of hybrid theoretical frameworks:** Future models should integrate the intentional dimension of TPB, the emotional realism of behavioural finance, and the cognitive mechanisms of dual process theory. Such synthesis can advance behavioural finance scholarship while informing responsible marketing and financial education practices. Additionally, exploration of less-utilised perspectives, such as regret theory, social learning theory, self-determination theory, cognitive dissonance theory, and institutional theory, may open promising research streams and uncover latent variables that enable marketers to better understand and strategically engage the young consumer investment market.

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# Portfolio Management and Financial Performance of Listed Deposit Money Banks in Nigeria

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**Abstract.** Portfolio Management and Financial performance are key indicators used to measure the growth and activities of listed deposit money banks in Nigeria. Portfolio management involves investment and administration of a portfolio of securities, in accordance with the investors' preference while reducing risk and increasing the returns. This study investigated the effect of portfolio management and financial performance of listed deposit money banks in Nigeria. To achieve this, secondary data obtained from the annual financial statement of the Nigerian Exchange Group (NEX) as at 31st December, 2024 were used as the primary source of data for the study. The research population was all the 24 listed deposit money banks in Nigeria, out of which a sample size of ten (10) listed deposit money banks were chosen using purposive sampling. Validated data were obtained from the annual published reports of the sampled banks for a period of 10 years (2015-2024). The data were descriptive in nature. The study adopted the ex post facto research design and regression analysis to analyze the relationship between portfolio management activities and the financial performance of the sampled deposit money banks. The results of the study shows that Portfolio management has positive significant effect on return on asset of listed deposit money banks in Nigeria, positive significant effect on return on equity of listed deposit money banks in Nigeria. The results of the study concluded that portfolio management activities have positive and significant effects on the financial performance of the listed deposit money banks in Nigeria. The study recommended that deposit money banks should invest more in portfolio management activities in order to drive better financial performance. In addition, the study recommended better monitoring of portfolio management activities by deposit money banks in order to ensure proper utilization of funds and resources.

**Keywords:** Portfolio Management, Financial Performance, Return on Assets, Return on Equity and Net Profit Margin.

## 1. Introduction

The critical role of banks as financial intermediaries in the normal running of an economy cannot be emphasized. The financial system in Nigeria is characterized by a broad market base, a broad market base that includes a broad instrument base, participants and institutions that all work together to provide financial services in the country. Portfolio management is important to the success and stability of Deposit Money Banks (DMBs). Asset selection choices, diversification, and continuous portfolio management play an important role in determining financial performance of a bank. The assets that may form part of portfolios are equities, bonds, derivatives like options and futures, gold certificates, real estate, production facilities or other assets that are expected to hold their value. Ideally, one ought to make both short term and long-term financial plans that will guide them to make financial decisions (Fajinmi, Onuka, and Ayeni, 2023).

A portfolio may be defined as a collection of different investments. The general properties of a portfolio cannot be the same as those of the constituent securities. A portfolio is essentially the collection of investments held by an individual, financial institution, hedge fund or an investment company in order to attain participation in risky assets. Portfolio investment is useful in alleviating the effects of

variation in returns of various investment choices (Obiora and Ujam, 2021). Portfolio management is particularly important to the bank and is a very important aspect in the lending process. Portfolio management enables banks to maximize returns and manage the risk through a well-managed credit exposure, as a result reducing any potential negative impacts of credit risk (Njoku and Ezeudu, 2017). Deposit money banks are a key component of the financial sector of any economy and their operations, whether they are thriving or not can have significant impacts on the stability of an economy, which are either positive or negative (Obiora and Ujam, 2021).
The portfolio management is concerned with the review of individual portfolio on a periodical basis to determine the quality of assets in the portfolio and guard against depreciation of assets in the portfolio by taking necessary corrective measures accordingly and in time. To manage the credit portfolio, the banks can separate its total credit assets in various portfolios or sub portfolios (Hamidovich, 2016). Globally, credit risk constitutes more than 50 percent of the total risk factors in Banks and Financial Institutions (BFIs). As a result, credit risk management has been a burning issue of top priority to BFIs. Credit risk management is a number of processes that include: identifying, measuring, mitigating, monitoring and controlling of exposure to risks related to credit (Lalon, 2015).

Within a portfolio management setting, investors must always look into their portfolios besides carrying out asset allocation. This makes sure that returns of the portfolio are in line with the expectations of the investor, and allows one to know whether any changes in the strategic asset allocation are needed. Frequent tracking also gives specific information on the investments made by the investor and results of such monitoring may lead to the adjustment of assets to ensure that they remain on course according to the long-term investment needs. It is important to note that portfolio management, as an investment process, is not a static, but a dynamic one, where you should regularly adapt your decisions to changes in the market and in your own circumstances. (Bhunia, Mukhuti & Roy 2011).

Portfolio management enhances the liquidity of banks, as professional fund managers can accumulate portfolios that can be readily converted into cash within a relatively short timeframe. This increase in available funds benefits lenders, who play a pivotal role in allocating resources in the economy. Moreover, the borrowed funds can be directed towards investments, further boosting overall expenditure and gross domestic product. In Nigeria, the Central Bank of Nigeria (CBN) and the Securities and Exchange Commission (SEC) have issued guidelines that regulate portfolio management activities, including the careful selection and supervision of liquid assets. As an example, in 2019, the CBN introduced guidelines that required Deposit Money Banks (DMBs) to address credit concentration in their portfolios and adopt information technology infrastructure to effectively monitor credit concentration (CBN, 2019).

Organizational performance is the outcomes of the actions undertaken by the individuals and different units of an organization. The evaluation tool used to measure performance depends on the reason of the evaluation. One of the key principles in modern financial management is that managers have to make a decision that will maximize the value of equity of shareholders. In general, performance refers to how well an organization is performing its goals whereas financial performance is a performance that refers to financial well-being of an organization. In easier terms, financial performance could be described as the degree to which an organization is effective in using its available resources in business activities to make income; it simply shows the financial health of a company within a given time (Bhunia, Mukhuti and Roy, 2011). It is usually required to analyze financial performance of a company to gain an overall insight in terms of financial performance of a company. This analysis is usually based on financial statements of a firm and it gives an insight on the operations of the firm and financial aspects as well. The main aim of the financial performance analysis is to assess the performance and efficiency of management as reported in the financial records of the organization (Bhunia, Mukhuti and Roy, 2011).

Despite the significance of portfolio management and financial performance, many Deposit Money Banks in Nigeria continue to face challenges in these areas. This problem is exacerbated by the country's volatile economic environment, which is characterized by inflation, fluctuating exchange rates, and high interest rates. It should also be noted that there is a significant lack of research on portfolio management, both at a global and local level (Campbell, 2022). Given the considerable importance of portfolio management in shaping policies and development strategies, scholars, policymakers, and donors are now giving more attention to its impact on the performance of financial institutions.

Consequently, this study examined the effect of portfolio management on financial performance of listed deposit money bank in Nigeria. This study

answered and tested the following research questions and hypotheses.

**Research Questions:**

- How does portfolio management affect Return on Asset of listed deposit money bank in Nigeria?.
- To what extent do Portfolio Management affect Return on Equity of Listed Deposit Money Banks in Nigeria?

**Research Hypothesis:**

- Portfolio Management does not significant effect on Return on Asset of Listed Deposit Banks in Nigeria.
- There is no significant effect of Portfolio Management on Return on Equity of Listed Deposit Banks in Nigeria.

The rest of the study was structured as follows:

- Section 2 provides a brief literature review on the portfolio management and its determinants as well as the financial performance, its measures and the theoretical frame work.
- In section 3, the study considered methodology looking at the sources of data employed and analyses.
- Section 4 provide the empirical results and discussions.
- The study ends in section 5 with a conclusion and recommendation.

## 2. Literature Review

### 2.1 Concept of Financial Performance

Financial performance is the manner in which a company efficiently utilizes its funds during a specific time such as the activity of raising and distributing money. It is measured through a few metrics including capital adequacy, liquidity, solvency, operational efficiency, leverage and profitability. The success of the management of these resources is an indication of the financial competence of the organization. In order to make strategic decisions, corporate managers often rely on data in cash flow statements, balance sheets, income statements, and changes in capital. Fatihudin, Jusni, and Mochklas (2018) define financial performance as a subjective measure of the effectiveness with which an organization uses its primary business resources in generation of revenue. It is also a general measure of the financial soundness of a firm within a given timeframe and it can be used to compare performance with those of other companies operating in the same industry or even different sectors (Charles, 2013).

Return on Asset

The dependent variable in this study is the organizational performance that will be measured by the proxy of Return on Assets (ROA). Performance is a concept that describes the level at which a firm uses the major business resources to generate revenue and this success is a measure of the success by the management to use the available resources to gain profit. Business performance can be measured with the help of various indicators, and ROA is one of the most commonly applied indicators.

Abaanewe, Ogbulu, and Ndugbu (2013) state that ROA is a financial ratio that measures the profitability of a company in terms of its total assets, which gives an indication of the efficiency of assets to earn profits. This ratio is of great use especially in the case of deposit banks in Nigeria because it shows the capability of a bank to generate profits out of its assets base. Investors and analysts also find ROA useful as it provides an accurate measure of the financial well-being and profitability of a company as well as provides opportunities to compare and contrast the results of companies in the same industry and monitor the investment progress over time (Ajayi and Omankhanlen, 2020). The formula for calculating ROA is:

ROA = Net Income (Profit before tax) / Average Total Assets

### 2.2 Return on Equity

Return on Equity (ROE) is a key financial ratio used to evaluate a firm's profitability by expressing net income as a percentage of shareholders' equity. It indicates how efficiently a company utilises owners' funds to generate earnings. Within the Nigerian deposit money banking sector, ROE serves as an important indicator of financial performance and overall stability. According to Adegbaju and Isibor (2017), ROE reflects the profit attributable to shareholders after accounting for all equity contributions, thereby showing the return generated on invested capital.

$$\text{Return on Equity} = \frac{\text{Net profit after tax}}{\text{Shareholders' Equity}}$$

Return on Equity (ROE) is another financial metric applied to evaluate the profitability of the company relative to the invested money of the shareholders. It

is calculated by dividing net after tax profit by the total shareholders equity. ROE is a valuable indicator of financial performance and efficiency to the deposit money banks in Nigeria. The ratio indicates the ability of a bank to make profits out of the capital that is invested in the bank by its shareholders. High ROE is an indication that the bank is well utilizing its equity base to generate profits. Also, the ROE allows making significant comparisons between the banks that work in the same industry and aids in assessing the performance pattern over the course of time. In the Nigerian banking industry, the regulatory bodies set a minimum ROE of 10 percent that deposit banks have to maintain. The Central Bank of Nigeria has set this benchmark and is aimed at making sure that banks gain sufficient profitability to continue their operations and encourage the stability of the entire financial system (Oladipupo & Adeoti, 2018)

**2.3 Concept of Portfolio Management**

The Association of Project Management (2018) defines a portfolio as a collection of projects or programs organized and managed at an organizational or functional level to optimize strategic benefits or operational efficiency. It can be managed either at the organizational level or the functional level. On the other hand, portfolio, as described by Ajose (2022), refers to an individual's or firm's complete collection of financial assets, which may include treasury bills, debenture bonds, stocks, mutual funds, real estate, cryptocurrencies, and other valuable items. The portfolio is simply a collection of investments which can be dispersed over various accounts.

Portfolio management refers to managing a portfolio of investments with a view of attaining a certain financial objective, say, maximizing returns or reducing risks. This involves the creation and execution of a plan of choosing and distributing investments in different classes of assets e.g. stocks, bonds, and property to attain the targeted goals. Portfolio management has gained significance in the corporate field, and its performance is also useful in minimizing fraud, dealing with possible threats, and using assets more productively (Axelos Global Best Practice, 2014).

Portfolio management is a management of the portfolio of securities, held by an investor, which is managed and invested as per their choice, and the goal of the portfolio is to reduce the risks and maximize returns. The investor usually leaves the decision-making of investment to a managing entity whereby the managing entity makes decisions as per the preference of the investor. By applying the needs of the investors, Rubinstein (2006) came up with the conclusion that peripheral aspects of portfolio management rely on the needs of the investors such as capital appreciation, constant or regular returns, investment safety, marketability and liquidity and minimizing tax liabilities. Portfolio management needs to be a systematic consideration, action and good judgment in order to successfully implement the investment plans of the assets and securities within the portfolio.

**2.4 Liquidity Risk**

Liquidity means the ability of a person or a company to meet his or her short term and immediate financial commitments. This is done through the presence of enough cash or holding an asset that is easily converted to cash. In accounting, the liquidity is measured in terms of current assets being able to meet the current liabilities. Liquidity in the context of investment is associated with the simplicity and rapidity through which an investment portfolio can be translated into cash without incurring large losses in value. Some banks may not be able to handle their own funds because they do not understand liquidity risk although they make a profit. The liquidity position of the commercial banks determines their viability, as they can finance the growth of their assets and fulfill their obligations without suffering too much loss (Ngari, 2016).

Wuava, Yua, and Yua (2020) define liquidity as the capacity of a bank to fund the growth in assets and satisfy the requirements as they occur without experiencing intolerable losses. An efficient liquidity risk management is very essential to guarantee the commitment of a bank to respond to the uncertain cash flow requirements that arise as a result of the occurrence of external events and actions of other agents. The liquidity risk is the most critical to be managed as the liquidity deficit in one organization can have an extensive impact on the whole financial system. Banking being a financial intermediary, which carries out maturity transformation of short-term deposits into long-term lending, is vulnerable to both idiosyncratic (institution-specific) level and systemic liquidity risk (Obiora & Ujam, 2021).

**2.5 Credit Risk**

Credit is the association between a borrower and a lender in which the former acquires funds by the latter in a promise of repaying the loaned funds with interest at a later time. Credit risk or default risk or counterparty risk is the risk that the borrower or counterparty will default on his or her financial

responsibilities in accordance with the accord and cause losses to the lender or investor. Adequate regulation of credit risk is very important in ensuring lenders and investors do not incur financial losses. Credit risk management aims at maximizing the risk-adjusted rate of return, through keeping the credit risk exposure within a reasonable range. Another essential element of a holistic approach to risk management is credit risk management that is the key to long-term success of any banking institution (Ahmad, 2017).

There are two major types of credit risk; the individual credit risk, and the systemic credit risk. Individual credit risk refers to the risk of default of a particular borrower or counterparty with regard to their loan or financial obligation. Systemic credit risk on the other hand entails the risk of default or financial distress on a financial system or market wide. Credit risk may be as a result of a number of factors, such as the creditworthiness of the borrower or counterparty, actual economic conditions, and the nature of the financial instrument used. As an example, a poor credit history or a borrower with little collateral presents a greater risk in credit than a borrower with a good credit rating and lots of assets.

**2.6 Financial Risk**

Financial risk is any form of riskiness that is linked to financing and investment activities. In the case of banks, it may be especially disastrous, both insofar as it entails monetary losses, and it also brings about a tarnished reputation. It is usually assumed to include downside risk only. Financial risk concept is mainly associated with risks that the Deposit Money Banks (DMBs) face in their daily operations, turning it into one of the oldest and most difficult types of risks that the latter face (Mostafa, Mahmoud, Jalal and Elahe, 2016). Financial risk events can arise from various causes, such as defaulting on loan repayments resulting in nonperforming loans (NPL) or credit risk (CR), liquidity risk (LIQR), insolvency risk (INSRK), and market risk (MKTR). Additionally, financial risk may also encompass interest rate risk, currency risk, and business risk that can emerge during financial transactions.

According to Muriithi and Muigai (2017), financial risk poses a threat to the financial stability and performance of the financial sector. It is defined as all risks that could introduce volatility in a bank's reserves, expenses, and the overall value of their business. If not systematically addressed, financial risk can lead to inconsistent performance and earnings for stakeholders, impacting banks' revenues and net worth, and in some cases, resulting in disastrous systemic consequences, as demonstrated by Benlian & Hess (2011)

**2.7 Tenor**

Tenor denotes the remaining time until a financial contract reaches its maturity, and it is often used interchangeably with the term "maturity." In the context of banking, tenor refers to the duration within which the borrower is expected to repay the loan along with the interest. For instance, a home loan may have a tenor ranging from 5 to 20 years, with some banks allowing up to 25 years. In specific cases, such as project financing, the loan tenor may extend from 5 to 25 years, or in exceptional circumstances, up to 30 years, depending on the project type and its ability to service debt (Perez, 2015).

Tenor basis risk emerges when a basis swap is involved. Despite re-pricing on the same date, being in the same currency, and being linked to the same benchmark, issues can arise if they re-price for different periods or tenors. Understanding the tenor of financial instruments, whether short- or long-term derivatives, is essential for maintaining a steady cash flow and assessing the risk associated with a contract (Bismak & Chengyi, 2015).

Deposit Mix

Bank deposits encompass different types of accounts, namely Savings Bank Accounts, Current Accounts, and Term Deposits. The combination of Savings Account and Current Account is commonly referred to as "CASA" (Current Account, Savings Account), which holds significant importance. Currently, Current Accounts come at no cost, while Savings Accounts have a relatively low cost, typically around 3%. Maintaining a high percentage of CASA, preferably above 40%, in a bank's deposit portfolio is considered favorable. The remaining 60% of deposits consist of various types of term deposits, which offer interest rates ranging from 6% to 15% per annum.

The principle of buy low, sell high is applicable in the banking industry in regard to profit margin. In the case of banks, margins are influenced by the difference between the yield on the advances (interest earned on loans) and the cost of money (interest paid on deposits) that is the net interest income. Banks who are able to source out funds at a low cost can make huge returns. The yield on advances is comparably constant among banks owing to stiff competition on the interests charged on loans. Therefore, the cost of raising funds becomes a key element of forecasting the profitability of a bank. Banks with reduced interests on deposits have high chances of drawing more borrowers thus

more profits. Thus, the low cost of funds and a desirable proportion of deposits is extremely important to the overall profitability of a bank (Ngari, 2016). Deposit mix is a term that is used to describe the composition of the deposit of a financial institution in the form of their source and type. It also gives the insight about the funding structure of the institution and may have implications on its liquidity, interest rate risk and its profitability. Deposit mix is measured through a study of how deposits are distributed in terms of different attributes. The important metrics that could be used to gauge the deposit mix are:

## 3. Theoretical Frame Work

### 3.1 Markowitz Portfolio Theory

The Markowitz Portfolio Theory was invented by Harry Markowitz in 1952 and has transformed the modern portfolio management and has been a fundamental concept in finance. The theory of diversification was included in the theory by Markowitz, which stated that both risk and return should be considered when making an investment portfolio. The theory offered a quantitative analysis of how best an investor can make decisions about investments depending on the level of the risk taken and the amount of desired returns. According to the Markowitz Portfolio Theory, an investor cannot simply concentrate on the expected performance of individual investments but should also be concerned with the risk of an investment and its correlation with other investments within a portfolio. Markowitz states that the well-diversified portfolio must not only maximize the expected value but also reduce the risk or volatility, in general.

According to the theory, a perfect balance between the return and the risk can be obtained by mixing the assets with various risk and returning properties in a portfolio. The point is that it is important to choose assets which are negatively correlated with each other or have low correlation. Markowitz developed the efficient frontier concept that is portfolios that maximize expected return given a certain amount of risk and minimizes risk given a certain amount of expected return.

The Markowitz Portfolio Theory has found a lot of support and acknowledgment among the finance fraternity. It is the foundation of the current methods of portfolio management and has found wide application in educational programs and practice by investment practitioners around the globe. The mathematical way of the theory offers a methodological way of portfolio making where investors are able to make rational decisions regarding the goals of risk and returns.

The Markowitz Portfolio Theory has been criticized and limited despite its popularity. The major criticisms are:
Assumptions: The theory has a number of simplifying assumptions, including the normality of the distribution of the returns on the assets, the fact that the correlation is constant and no transaction costs exist, which are not necessarily true in the real world.

### 3.2 Stakeholder Theory

The Stakeholder Theory is a theory in the business ethics and management field that was initially introduced, in 1984, by R. Edward Freeman, in his book, Strategic Management: A Stakeholder Approach. According to the theory, a business organization must pay and take into consideration the interests of all its stakeholders and not just maximizing profits to shareholders alone. The Stakeholder Theory states that companies are not only obliged to the shareholders but also to more people or groups (stakeholders). The stakeholders can be the employees, the customers, the suppliers, the communities, government agencies and even the environment. The theory suggests that all stakeholders should be considered when making decisions and running of business; instead of focusing on the interests of shareholders. According to the theory, businesses can improve their sustainability and success in the long term by taking into account the interests of the stakeholders and managing the stakeholders. It also underlines the need to create a good rapport with stakeholders, their needs, and how business is carried out should mirror what stakeholders expect. In this way, organizations can not only be able to create value to shareholders but also the society.

**R. Edward Freeman:** Freeman as the founder of the theory still promotes its implementation in the contemporary business practices. According to him, competitive advantages can be attained when businesses are commendably involved in and are satisfying to their stakeholders. The Stakeholder Theory is also supported by many scholars in the business ethics, management, and corporate social responsibility disciplines. They claim that the theory gives a more holistic approach to making decisions, which covers the ethical issues and sustainability of business in the long run.

**Milton Friedman:** Milton Friedman is one of the most vocal critics of the Stakeholder Theory. He claims that it is the only duty of a corporation to make

profit maximally to shareholders. Friedman believes that the process of serving the interests of stakeholders may be regarded as a distortion of the main objective and lead to the decrease in the market efficiency.

## 4. Empirical Review

Fajinmi, Onuka, and Ayeni (2023) have investigated the correlation between portfolio management and the performance of deposit money banks in Nigeria. The purpose of the study was to establish the possibility of using portfolio management as a predictor of the profitability of these banks beyond the sample period. Based on the Markowitz portfolio theory, the study utilized time series of data between 1990 and 2020 and included the liquidity, financial assets, foreign portfolio holdings, deposit composition and concentration of deposit money by the private sector of the deposit banks. The findings showed that portfolio management and its various methods have a considerable impact on the most notable performance indicators, such as profit after tax (PAT), return on investment (ROI), asset quality (ASQ) and capital adequacy (CA) of the Nigerian banks.

On the same note, Obiora and Ujam (2021) examined how portfolio management has affected the performance of listed deposit money banks in Nigeria. The Modern Portfolio and Shiftability Theories led them in their study and the ex post facto research design was used. The annual reports of the banks that had international authorization within the years 2016 to 2020 were used to source data and analyzed with the help of the linear regression model. The results indicated that credit risk management and liquidity risk management had positive and significant relationship with the performance of the banks in terms of NAPS. The study therefore established an effect of portfolio management in improving the financial performance of the deposit money banks. It advised banks to be very careful with the liquidity and ensure that the liquidity is maintained at optimal levels to enhance the financial performance.

Olagbenga and Oluwafemi (2020) in another study investigated the impacts of portfolio management practice on bank performance in Nigeria, especially with regard to loan risk analysis, loan risk diversification, and loan risk monitoring. Primary data used in the study comprised a portfolio management scale, which was used to gather the primary data, and secondary data, which were financial statements of the annual statements. The SPSS 20.0 was used to analyze the data by providing multiple and logit regression methods. The findings showed that the analysis of loan risk, diversification, and the monitoring of the loan risk had immense positive impacts on the bank performance, in terms of return on assets. The research established that proper management of the loan portfolios has a positive contribution towards the overall performance of the deposit money banks in Nigeria.

## 5. Research Methodology

In this chapter, the author aims at analyzing the correlation between managing the portfolio and the financial performance of the deposit money banks in Nigeria. Regression analysis was utilized to measure the interactions among the variables and measure the strength of each independent variable on the dependent variables. The researchers applied the macroeconomic data obtained in the published annual financial reports of 10 deposit money banks in Nigeria within a period of 10 years, that is, between 2015 and 2024. In estimating the multiple regression model, the panel least squares (PLS) method was used because of the cross-sectional data. The independent variables were Liquidity Risk (LR), Credit Risk (CR), Financial Risk (FR), Tenor (TN), and Deposit Mix (DM), whereas the dependent variables were Return on Assets (ROA) and Return on Equity (ROE). In order to guarantee the validity of the results and prevent the spurious regression outcomes, the preliminary tests were carried out. In particular, the Augmented Dickey-Fuller (ADF) test was used to test the presence of unit roots as well as, the stationarity of the variables. All the variables were also computed using descriptive statistics. The E-Views statistical software version 9.0 was used to carry out the analysis. The statistical significance level was considered 0.05 p-value, the value used to assess the relationships and effects to be tested in the study.

### 5.1 Model Specification

In order to test for the relationship between Portfolio Management on Financial Performance, the regression model was adopted. The independent variable of the study is Portfolio Management, and the following proxies were used to measure it; liquidity risk, credit risk, financial risk, tenor, and deposit mix. The dependent variable is financial performance and the proxies used were Return on Asset (ROA), and Return on Equity (ROE) . The multiple linear regression analysis model which would be used is given as follows:

$Y= f(X)$

Where;
Y= Dependent Variable
X= Independent Variable
FP = f (PM
PM = Portfolio Management
FP = Financial Performance
Y = Financial Performance
Y = $y_1$ , $y_2$ , $y_3$
$y_1$ = Return on Asset (ROA)
$y_2$ = Return on Equity (ROE)

While,
X = Portfolio Management
X =$X_1$ , $X_2$ , $X_3$ , $X_4$ , $X_5$
$X_1$ = Liquidity Risk (LR)
$X_2$ = Credit Risk (CR)
$X_3$ = Financial Risk (FR)
$X_4$ = Tenor (T)
$X_5$ = Deposit Mix (DM)
$y_1$ = f(x)
$y_2$ = f(x)
$y_3$ = f(x)
Therefore, FP= f ($X_1$ , $X_2$ , $X_3$ , $X_4$ , $X_5$ )
ROA= f (LR, CR, FA, T, DM)……f1……Equation 1
ROE= f (LR, CR, FA, T, DM)……f2……Equation 2
F1, F2 and F3 are the working functional relationships that would be used to determine the impact of Portfolio Management and Financial Performance of Selected Money Banks in Nigeria.
Given the above mathematical equation, the econometric model expresses Financial Performance as a function of Portfolio Management. The model for the regression analysis is presented below as:
$ROA_{it} = \beta_0 + \beta_1(LR)_{it} + \beta_2(CR)_{it} + \beta_3(FR)_{it} + \beta_4(T)_{it} + \beta_5(DM)_{it} + e_{it}$ ……...Model 1
$ROE_{it} = \beta_0 + \beta_1(LR)_{it} + \beta_2(CR)_{it} + \beta_3(FR)_{it} + \beta_4(T)_{it} + \beta_5(DM)_{it} + e_{it}$ ……...Model 2

Where;
ROA= Return on Asset
ROE = Return on Equity
LR = Liquidity Risk
CR = Credit Risk
FR = Financial Risk
T =Tenor
DM = Deposit Mix
$\beta_0$ represent regression intercept (constant parameter/intercept);

## 6. Data Analysis, Results and Discussions

**Table 6.1:** Unit Root Test Using Augmented Dickey Fuller (ADF) 2015-2024.

| Variables | ADF-Statistic | Critical Values | Order of Integration |
|---|---|---|---|
| LR | -8.515384 (0.0000) | 1% = -4.226815<br>5% = -3.536601<br>10% = -3.200320 | Stationary at level |
| CR | -4.509501<br>(0.0049) | 1% = -4.509501<br>5% = -4.226815<br>10% = -3.536601 | Stationary first difference |
| FR | -7.452877 (0.0000) | 1% = -4.226815<br>5% = -3.536601<br>10% = -3.200320 | Stationary at level |
| TN | -6.567140 (0.0000) | 1% = -4.234972<br>5% = -3.540328<br>10% = -3.202445 | Stationary at second difference |

| | | | |
|---|---|---|---|
| DM | -9.667270 (0.0000) | 1% = -6.055378<br>5% = -4.321562<br>10% = -3.972089 | Stationary at level |
| ROA | -6.702505<br>(0.0000) | 1% = -4.509501<br>5% = -4.226815<br>10% = -3.536601 | Stationary first difference |
| ROE | -6.667344 (0.0000) | 1% = -4.234972<br>5% = -3.540328<br>10% = -3.202445 | Stationary at second difference |
| NPM | -8.515384 (0.0000) | 1% = -4.226815<br>5% = -3.536601<br>10% = -3.200320 | Stationary at first difference |

**Source:** *Researchers Compilation 2025.*

The results of the Stationarity (unit root) test indicate that ROA, NPM, and CR were stationary at first difference; ROE and TN stationary at second difference while LR, FR and DM was stationary at level. Therefore, it indicated that most of the variables were stationary at the different levels. Hence, further analysis could be carryon to test the long run relationship among the variables.

**Table 4.2:** Descriptive Statistics of the Variables (Sample: 2015- 2024)

| Statistics | CR | DM | NPM | ROA | ROE | FR | LR | T |
|---|---|---|---|---|---|---|---|---|
| Mean | 54263963 | 2598.029 | 43755917 | 0.038561 | 0.160202 | 66131670 | 1.50E+09 | 5.800000 |
| Median | 309512.0 | 2191.440 | 159241.5 | 0.025636 | 0.161331 | 218421.5 | 5272476. | 5.500000 |
| Maximum | 4.03E+08 | 6362.462 | 2.15E+08 | 0.318244 | 0.339435 | 2.54E+08 | 1.06E+10 | 12.00000 |
| Minimum | 5885.000 | 7.120000 | 2180.000 | 0.007708 | 0.007868 | 614.0000 | 5751.000 | 1.000000 |
| Std. Dev. | 90403064 | 2327.428 | 63776688 | 0.053801 | 0.077145 | 88279197 | 2.44E+09 | 3.023716 |
| Skewness | 1.949449 | 0.176756 | 1.225862 | 4.083505 | 0.149212 | 0.801032 | 1.963887 | 0.434896 |
| Kurtosis | 6.617998 | 1.371419 | 3.251195 | 19.85656 | 2.926171 | 2.007693 | 6.656145 | 2.276228 |
| Jarque-Bera | 58.94024 | 5.785930 | 12.65427 | 730.9244 | 0.196890 | 7.398509 | 59.98917 | 2.667468 |
| Probability | 0.000000 | 0.055412 | 0.001787 | 0.000000 | 0.906245 | 0.024742 | 0.000000 | 0.263492 |
| Sum | 2.71E+09 | 129901.4 | 2.19E+09 | 1.928056 | 8.010109 | 3.31E+09 | 7.52E+10 | 290.0000 |
| Sum Sq. Dev. | 4.00E+17 | 2.65E+08 | 1.99E+17 | 0.141833 | 0.291614 | 3.82E+17 | 2.92E+20 | 448.0000 |
| Observations | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

**Source:** *Researchers Compilation 2025.*

The descriptive statistics presented in Table 2 indicate notable variations across the study variables. Credit Risk (CR) recorded an average value of ₦54,263,963 million, with a maximum of ₦403,000,000 million and a minimum of ₦5,885 thousand. The distribution is positively skewed (1.949449), and the probability value of 0.000000 is below the 0.05 threshold, indicating statistical significance at the 5% level. Deposit Mix (DM) shows a mean value of ₦2,598,029 million, a maximum of ₦6,362,462 million, and a minimum of ₦7,120 thousand. The skewness value of 0.176756 suggests a slight positive distribution. However, the probability value of 0.055412 exceeds 0.05, indicating that the variable is not statistically significant at the 5% level.

Net Profit Margin (NPM) has an average value of ₦43,755,917 million, with a maximum of ₦215,000,000 million and a minimum of ₦2,180 million. The data remain positively skewed (1.225862), and the probability value of 0.001789 confirms significance at the 5% level. Return on Assets (ROA) records a mean of 0.038561 (3.8%), a maximum of 0.318244 (31.8%), and a minimum of 0.007708 (0.7%). The distribution is highly positively skewed at 4.083505, with a probability value of 0.000000, indicating strong statistical significance. Similarly, Return on Equity (ROE) shows an average of 0.160202 (16.0%), with a maximum of 0.318244 (31.8%) and a minimum of 0.007868 (0.7%). The skewness value of 0.149212 reflects a mild positive distribution. However, its probability value of

0.906245 exceeds 0.05, suggesting that it is not statistically significant at the 5% level. Financial Risk (FR) reports a mean value of ₦66,131,670 million, with a maximum of ₦254,000,000 million and a minimum of ₦6,140,000 million. The variable is positively skewed (0.801032), and the probability value of 0.024742 indicates statistical significance at 5%. Liquidity Risk (LR) has an average value of ₦1,500,000,000 billion, reaching a maximum of ₦10,600,000,000 billion and a minimum of ₦5,751,000 million. The skewness statistic of 1.963887 shows a positive distribution, while the probability value of 0.000000 confirms statistical significance. Lastly, Tenor (TN) records an average duration of 5 years and 8 months, with a maximum of 12 years and a minimum of 1 year. The skewness value of 0.434896 indicates a moderate positive distribution. However, the probability value of 0.263492 is above 0.05, implying that it is not statistically significant at the 5% level. Overall, the findings suggest that most of the variables exhibit positive skewness. While several variables are statistically significant at the 5% level, others do not meet the required threshold, indicating varying levels of statistical relevance within the model.

**Figure 4.1:** Stationary Graph at Level for the Combined Variables

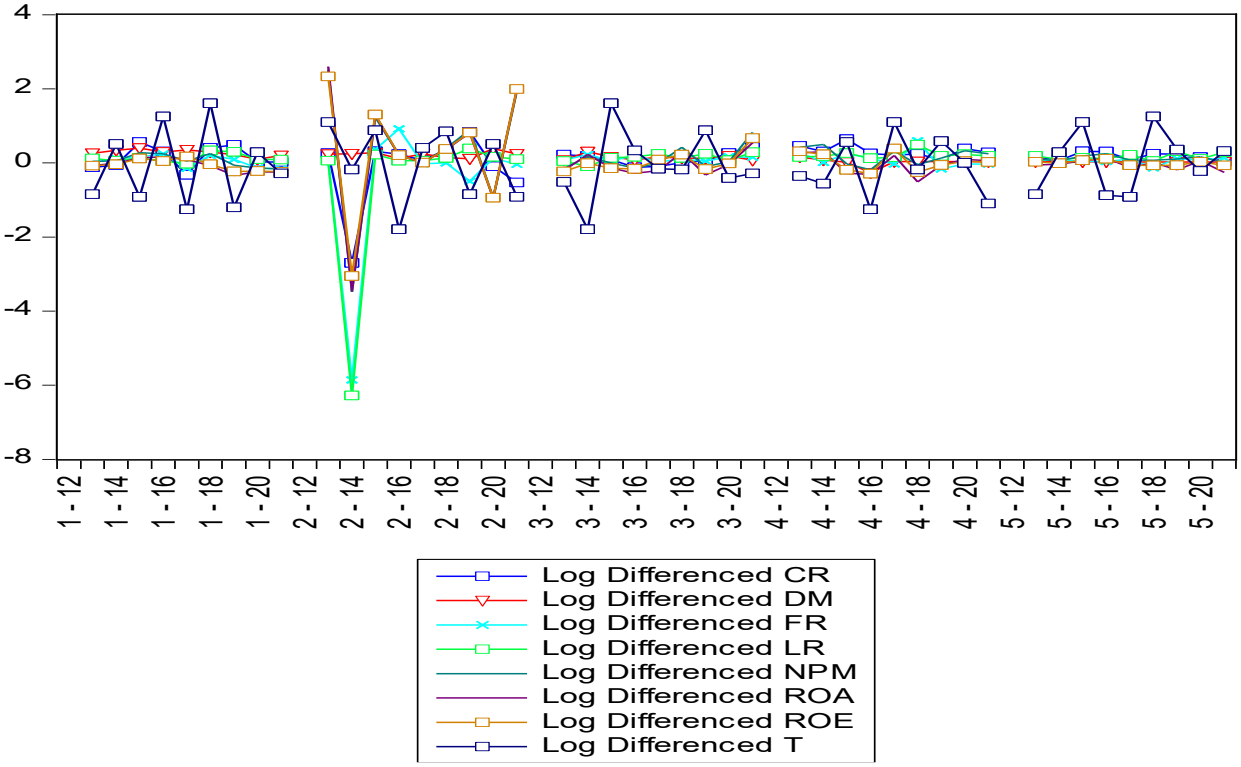
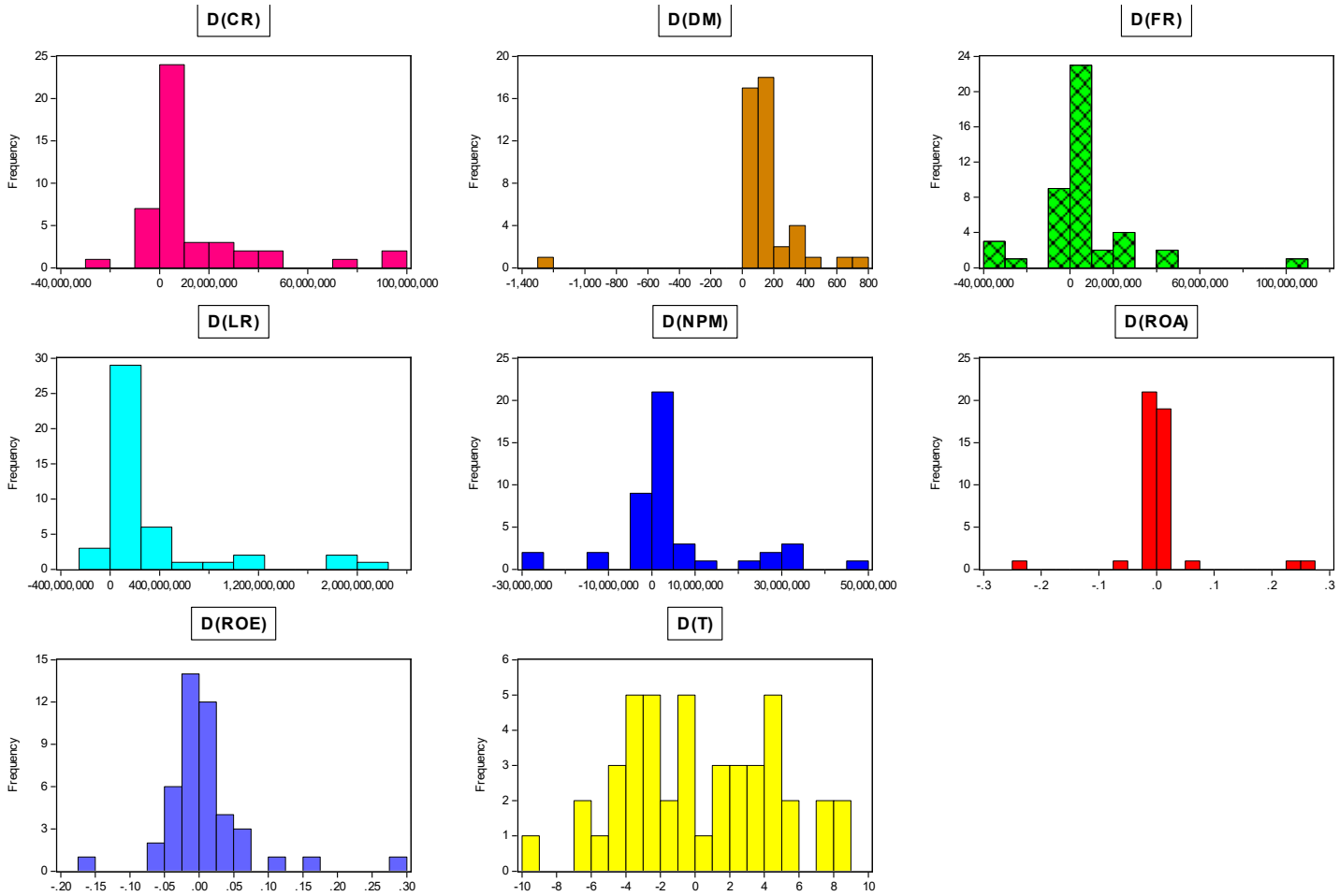



Figure 4.2 Stationary Graphs at the Level for Individual Variables




### 6.3 Research Hypotheses

#### 6.3.1 Hypothesis One

$H_0$: Portfolio Management has no significant effect on Return on Asset of Selected Deposit Money Banks in Nigeria.

Model Representatives (1)
Estimation Equation:
==========
ROA = C(1) + C(2)*LR + C(3)*CR + C(4)*FR + C(5)*T + C(6)*DM

Substituted Coefficients:
==========
ROA = 0.0786714546659 + 3.05302613704e-12*LR - 1.04091991735e-10*CR - 8.52868673764e-11*FR - 0.00249522283549*T - 7.29145260171e-06*DM
Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/26/25 Time: 06:55
Sample: 2014 2025
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

**Table 6.3**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.078671 | 0.019210 | 4.095418 | 0.0002 |
| LR | 3.054562 | 1.992011 | 3.153156 | 0.0090 |
| CR | 1.042710 | 5.371510 | 1.193783 | 0.0472 |
| FR | 8.539511 | 1.682510 | 2.508742 | 0.0135 |
| TN | 0.872495 | 0.204645 | 0.943378 | 0.0506 |
| DM | 7.291706 | 3.831906 | 1.905200 | 0.0333 |

| | | | |
|---|---|---|---|
| R-squared | 0.548601 | Mean dependent var | 0.038561 |
| Adjusted R-squared | 0.051851 | S.D. dependent var | 0.053801 |
| S.E. of regression | 0.052388 | Akaike info criterion | 1.948124 |
| Sum squared resid | 0.120757 | Schwarz criterion | 2.718681 |
| Log likelihood | 79.70310 | Hannan-Quinn criter. | -2.860751 |
| F-statistic | 31.53593 | Durbin-Watson stat | 0.504616 |
| Prob(F-statistic) | 0.000001 | | |

**Source:** *Researchers Compilation 2025*

### 6.4 Hypothesis Two

**$H_0$**: Portfolio Management has no significant effect on Return on Equity of Selected Deposit Money Banks in Nigeria.

**Model Representatives (2)**

Estimation Equation:

==========

ROE = C(1) + C(2)*LR + C(3)*CR + C(4)*FR + C(5)*T + C(6)*DM

Substituted Coefficients:

==========

ROE = 0.115203480782 + 4.87790249236e-11*LR + 5.45143010215e-10*CR + 1.05424528481e-09*FR - 0.00208604643709*T + 1.20076527979e-05*DM

Dependent Variable: ROE
Method: Panel Least Squares
Date: 05/26/25 Time: 06:57
Sample: 2014 2025
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

**Table 6.4**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.115203 | 0.022731 | 5.068027 | 0.0000 |
| LR | 4.884311 | 2.36E-11 | 2.067898 | 0.0446 |
| CR | 5.454710 | 6.36E-10 | 0.857633 | 0.3957 |
| FR | 1.058909 | 1.98E-10 | 5.314335 | 0.0000 |
| T | 0.012086 | 0.003130 | -0.666489 | 0.5086 |
| DM | 1.207705 | 4.53E-06 | 2.651410 | 0.0111 |

| | | | |
|---|---|---|---|
| R-squared | 0.420146 | Mean dependent var | 0.160202 |
| Adjusted R-squared | 0.354254 | S.D. dependent var | 0.077145 |
| S.E. of regression | 0.061992 | Akaike info criterion | -2.611450 |
| Sum squared resid | 0.169093 | Schwarz criterion | -2.382007 |
| Log likelihood | 71.28625 | Hannan-Quinn criter. | -2.524077 |
| F-statistic | 16.37642 | Durbin-Watson stat | 0.301098 |
| Prob(F-statistic) | 0.000156 | | |

**Source:** *Researchers Compilation 2025.*

### 6.5 Interpretation of the coefficients of determination

The regression findings show that multiple regression analysis was done to test the relation between the independent variables and the dependent variable. The results indicate that Liquidity Risk (LR), Credit Risk (CR), Financial Risk (FR), Tenor (TN), and Deposit Mix (DM) have statistically significant positive effect on Return on Assets (ROA) with a 5% level of significance. The coefficient of determination (R2) of the model is 0.548601 and this indicates that the overall explanation of the variations in the ROA with the help of the explanatory variables incorporated in the model is approximated to be 54.86. This means that the regression model has a moderate explanatory power. Further analysis of the unstandardized beta coefficients depicts that LR ( = 3.054562), CR ( = 1.042710), FR ( = 8.539511), TN ( = 0.872495), and DM ( = 7.291706) have positive coefficients. This means that a one percent change in Liquidity Risk and Credit Risk and Financial Risk, Tenor, and Deposit Mix will be observed to be accompanied by a change of about 30.5, 10.4, 85.3, 8.7, and 72.9 in ROA, respectively. Since they all have a p-value that is less than 0.05 (0.0000-0.05), the relationships are not statistically insignificant. On the whole, the findings indicate that the model is a good fit because the independent variables make a significant contribution to the variation in the dependent variable.

### 6.6 Decision Rule

Durbin-Watson statistic is employed to identify whether there exists autocorrelation in the returns of a regression equation. It is a value that lies between 0-4 with a closer value of 2 showing no autocorrelation. Values that are closer to 0 indicate positive autocorrelation whereas those that are closer to 4 indicate negative autocorrelation. The estimated value of 0.504616 (Durbin-Watson) implies that the model has a positive serial (first-order) autocorrelation. Also, F-statistic of 31.53593 with a probability value of 0.000001 supports the fact that the overall regression model is significant. This implies that the explanatory variables together do have a significant influence on the dependent variable. According to the general findings, Liquidity Risk, Credit Risk, Financial Risk, Tenor, and Deposit Mix have a significant impact on Return on Assets. Thus, the null hypothesis (H 0 ) that there is no significant impact of portfolio management on the Return on Assets of the listed Deposit Money Banks in Nigeria is rejected and the alternative one is accepted.

## 7. Discussion of Findings

Study has empirically investigated the links between Portfolio Management and Financial Performance in Selected Deposit Money Banks under three specific objectives. The first objective is explained below:

The hypothesis one summary indicates that the coefficient of determination is R-squared is 0.548601, this therefore reveals that all the explanatory variables jointly account for 54.8% changes in Return On Asset determined by all the predictors. It indicates that the first objective found that Liquidity Risk (LR), Credit Risk (CR), Financial Risk (FR), Tenor (T), and Deposit Mix (DM) have significant positive effect on the Return on Asset (ROA) at the 5% alpha level of significance. The results of the findings of this study is in line with the findings and study of Olokoyo, (2012); Akinlo & Akinlo, (2016), who had similar results that portfolio management has a positive relationship with financial performance of listed deposit money banks in Nigeria otherwise, the study of Babajide & Olufemi, 2018 and Ajayi & Omankhanlen (2020); Mwatuwano (2012); Joan, (2021) shows a negative significant relationship.

## 8. Implication of Findings

The finding of the study show that Portfolio Management has a significant positive effect on Return on Assets (ROA) indicates that effective portfolio management strategies can lead to improved asset utilization and higher profitability for the company. Some key implications of this finding are; efficient asset allocation, Risk diversification, optimal resource utilization, Focus on value creation, Enhanced decision-making, Investor confidence and valuation, and Competitive advantage. It is therefore important to highlight that the implications mentioned above assume that portfolio management is carried out skilfully and aligns with the company's objectives and risk tolerance. Poorly executed portfolio management strategies may lead to adverse effects on ROA and overall financial performance. Therefore, companies should ensure that they have competent professionals overseeing their portfolio management activities and regularly review and adjust their strategies as needed.

## 9. Conclusion and Recommendation

The study analyzed the effect portfolio management on financial performance of listed deposit money banks in Nigeria. Based on the findings, the study concluded that portfolio management has positive significant effect on the financial performance of listed

deposit money banks in Nigeria. Based on the findings, the following were recommended:

Financial institutions, particularly deposit money banks, should prioritize and enhance their portfolio management practices. This incorporates the adoption of strong measures of diversifying and managing their investment portfolios. In such a manner, banks will have a chance to increase their ROA and general financial performance. Moreover, banks should also be encouraged to frequently review and evaluate the performance of their portfolios, and pinpoint any risks in their portfolios and implement the required amendments to maximize returns.

Portfolio management should be considered an issue of importance by financial institutions to maximize on their Return on Equity (ROE). As a way of exploiting this beneficial influence, banks ought to concentrate on creating sound portfolio management procedures that conform to its business purposes and risk propensity. This is why it is also desirable that banks maintain a clearly defined risk management structure to ensure that the portfolio is duly diversified and the risk is adequately addressed.

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# Imperativeness of Trade Unionism to Employee Engagement: Evidence from Manufacturing Companies in Nigeria

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**Abstract.** The trade union movement all over the world has always served as platform to support decent work and check managerial rascality there by making labour partners in progress and not just dispensable tools. In spite of the presence of labour organization employees are still faced with threat, opposition, unjustifiable dismissal, denial of statutory rights, alienation and executive excesses. Hence, the need to examine the imperativeness of trade unionism to employee engagement. The study seeks to establish a connection between trade unionism and employee engagement in a unionized organization by determining the veracity of employee contract at ensuring production-stimulated work environment. The study used six hundred and four (604) participants drawn from the total population of two thousand six hundred and eighty (2,680) employees through stratified random sampling techniques. Primary data was collected from the respondents using Likert format questionnaire and data analyzed using Linear regression analysis. The reliability of the measuring instruments was determined by means of Cronbach Alpha Coefficients, and the validity was confirmed using Confirmatory Factor Analysis through Structural Equation Modelling. The Kaiser Mayer Oklin was used as a prerequisite for conducting Confirmatory Factor Analysis. The results showed that there were positive ($r>0.5$) correlations between trade union participation, employee welfare, employee contract and employee engagement. Furthermore, the results showed that there were strong ($r>0.5$) positive correlations between employee engagement, communication and work environment. Findings from the study revealed that trade unionism enhances employee engagement and ensure production-stimulated work environment because labour organization always pressured organization to do the right thing; but collective bargaining is losing its potency as employers of labour always most time have reasons to renege on their promise for better welfare package mostly in developing world due to weak contract enforcement mechanism. The study concluded that trade union leaders need to do more and be more assertive in ensuring that agreements bargained is executed. Based on the conclusion, the study recommended that the management must do everything within its power to manage labour movement in the organization through employee engagement, ensuring employee welfare, working conditions and timely compensation and other benefits so that trade unionism does not turn to be a menace to organizational stability.

**Keywords:** Trade union, employee engagement, collective bargaining, employment contract, welfare package.

## 1. Introduction

Industrial relations practice has become one of the most delicate and complex problems of modern industrial society. Industrial progress is impossible without cooperation of labour and other related bodies. One can equally argue that industrial relations is a major factor that affects directly or indirectly workplace employment and productivity through such variables as managerial competence, workers motivation, and institutional backup (Osarenmwinda & Prince, 2023). In this era of globalization, coupled with complex organizational structures and changing workplace environment, no nation's industrial sector can function effectively without the cooperation of employers, employees, government, and labour unions culminating in a tripartite relationship, integrated for nation's development. Since labour force serves as a critical factor for organizational and nation's development, the relationship between employees, employers, trade union and government has become an important issue to address for smooth functioning of labour union organizations, government, employers of labour and employees. According to Thompson (2011) many organizations today value their labour force and see them as major contributors to the achievement of corporate goals, and they recognize that employing effective employment relationships and engagement can enhance their organizations' strength. Labour unions and employment engagement have been the most critical element to address in both the public and private sectors since the conception of modern economic organizations (Akume & Abdullahi, 2013). All over the world, trade unions have become important agents of socio-economic transformation and class struggle always representing the working-class interests against capitalist exploitations. In contemporary times, trade

unionism has become an indispensable tool in ensuring industrial harmony between employer and employee, especially in developing countries. It is well known that trade unions have emerged throughout the world to improve workers living and working conditions (Okechukwu, 2016).

The relationship between employees and employers and trade union has been seen as tripartite relationship of which its effective management leads to favourable workplace employment relations and contributes maximally to nation's economic development, growth, stability, success of labour unions as well as friendly work environment (Budd, 2018). Employment relations focuses on managing the relationship between employees and employers to enhance their engagement (Sholokwu, 2020).

### 1.1 Statement of the Problem

Trade union has always been posited as a pressure group by all standards and purposes and by this stands to defend the rights of their members and the populace in general. Trade unionism ensures that workers are given the right attention and social contracts as agreed by both the employers and the employees are executed. Gradually we see trade unions in Nigeria sliding and not having the right bite they use to have some years back. This has greatly affected employee engagement and workers right denied. It is not out of place to see workers at the mercy of their employers. Lack of vibrant trade union has caused denial of employees' rights, unjustified dismissal, retrenchment without statutory payments, lopsided and inequitable salary, unjustified deductions and surcharges that are unexplainable, and precarious work environment. Employee engagement, which is the level of enthusiasm, commitment, and emotional investment an employee has in their role and the company's success, goes beyond job satisfaction and extends to how connected employees feel to their colleagues, leaders, and the organization's mission. The connection cannot be ascertained where workers' rights and privileges cannot be ascertained and institutionalized. At times employers does not do enough to align the employees with the objectives of the organization; tools are not provided and compensation and other things that motivates are not within the reach of the employees, hence the essence of trade union that can engage the employees productively. However, trade unions in Nigeria face several obstacles and that should boost our curiosity of the imperativeness and relevance of trade union in modern and contemporary employment structure. Internal divisions, political meddling, and limited bargaining strength frequently reduce the effectiveness of unions in achieving their goals.

These challenges call for a deeper analysis of trade unions' role in promoting employee engagement, especially in Nigerian public and private institutions where bureaucratic hurdles, financial limitations and compromise of union officials through inducements are widespread, expanding the continuous debate on the relevance of trade unionism in Nigeria. This study aims to fill this gap by examining the imperativeness of trade unionism in ensuring employee engagement in the Nigerian manufacturing companies. Specifically, the study seeks to achieve the following:

- Examine the effect of collective bargaining on employee welfare
- Determine whether lobbying ensures working conditions
- Investigate the influence of strikes on compensation and other benefits.

### 1.2 Research Hypotheses

The following research hypotheses will be tested to validate the research objectives

Ho – Collective Bargaining does not have any significant effect on employee welfare

Ho - Lobbying does not have any significant effect on working conditions

Ho – Strikes does not have any significant effect on compensation and other benefits

## 2. Literature Review

### 2.1 General Concept of Trade Unionism

A labour union otherwise known as a trade union refers to the organization of workforces in the workplace who share the same agenda of attaining joint objectives in crucial matters such as terms and conditions of work. According to Emmanuel, Ismaila & Mustapha (2020), trade union is a constant group of wage recipients who have the resolution to maintain in addition to improving the situations of more than six persons with the principal aim of constituting and regulating the relationship between employees and employers which may take account of negotiating on employees' remuneration and compensation, rules of work, procedures for complaints in the workplace, rules and regulations having to do with hiring, firing and elevation of employees together with safety at work. According to the Nigerian labour law, specifically Section 1(1) of the Trade Unions Act, a trade union is any combination of workers or employers, whether temporary or permanent, formed to regulate the terms and conditions of employment. Its primary purpose is to protect and advance the collective interests of its members in the workplace, which can include improving working conditions, advocating for fair wages, and providing support against unfair treatment, stipulating that at least minimum of fifty people can sign to form a trade union in an organization.

Ogundare (2023) posited that trade union or labor union, often simply referred to as a union, is an organization of workers whose objective is to maintain or improve the conditions of their employment contract, such as attaining better wages and benefits, improving working

conditions, improving safety standards and ensuring the overall well-being and better condition of their members by engaging employers of labour to do what is right and justifiable for those who are in their employment, who create economic values for the sustenance of the organization. According to the International Labour Organization (ILO), a trade union is defined as a workers' organization formed for the purpose of furthering and defending the interests of workers. This encompasses protecting workers' rights, improving conditions of employment like wages and safety, and increasing workers' bargaining power, often through collective bargaining with employers. Akume & Abdullahi (2013) aver that the main justification for labour action is the failure of collective bargaining. When workers and employers engage in collective bargaining, there is no guarantee that it will be successful. Even when successful, there is no guarantee that it will be honoured. Consequently, unsuccessful bargaining and failure to adhere to agreed terms naturally lead to labour conflicts and dislocation of labour harmony (Ibrahim & Bamidele, 2019).

**2.2 Activities of trade union in Nigeria**

According to Bala & Sadeeq (2024) the key reason for trade unions' establishment is to re - establish the power balance between employers and employees, and to make these employees in the organization to have a common voice through which their grievances could be heard. This is also to give them greater influence on how they should undertake their work and to boost their input in organizational decision-making in such a manner that this will be beneficial not only to themselves, but also to their employers. However, to achieve these purposes, the unions' main activities within the associations must be effectively undertaken and carefully carried out as these comprise, but not limited to:

**Purposeful Representation of the Employees' Interests to the Employers:** Generally, good unions with purposeful and selfless leadership at work are always preoccupied with activities that will promote the general welfare of the members. The unions' executives ensure that they represent their members to their employers in a meaningful or purposeful manner. According to Armstrong (2006), this may be through collective bargaining or mutual agreement with the management of the organization in which the unions are formed.

**Engagement in Diverse Exercises to Press for Workers' Demands when Negotiations Fail:** As said by Griswold (2010), trade unions sometimes do not hesitate to engage in some exercises deem necessary to promptly draw attention of the organizations' management teams to their requests. These, most times, are in form of organization of demonstrations, picketing, embarking on strikes, etc., all is with a view to attract the management's attention. These actions are opted for when all other efforts made by the unions have proved abortive. Griswold (2010) added that in the past, labour unions have influenced a lot not only organizations, but also governments of many countries as the key reason for their formation and development in the first place is to fight for the workers' welfare and rights in public and private establishments as these unions have always mounted pressures on the employers in the favour of the members.

**Having Work Arrangements with the Employer:** Jepkorir (2014) maintains that trade unions sometimes do arrange works for performance the employer in the organization. This is in as much as employers and the unions' leaders come to agreement on the set targets, and whereby the unions also guarantee mobilization of their members for the realization of the set targets and on the grounds that the employers are in readiness to offer compensation to the employees for the extra work done.

**Industrial action:** When negotiations fail, unions may organize or support industrial action, such as strikes, to pressure employers into meeting workers' demands.

**Membership support & services:** Unions provide various services to their members, including training, professional advice, and sometimes financial or recreational benefits.

Advocacy & policy influence: Unions may engage in broader social and political advocacy, lobbying for legislation and policies that support workers' rights and interests.

**Grievance handling:** Unions represent their members in handling individual complaints and disputes with management, acting as a bridge between employees and employers.

**2.3 Assessment of Trade Union activities in Nigeria**

The advent of the colonial government heralded wage employment relationship in Nigeria and this brought about employer - employee relationship whereby employer is the master and employee as the servant. In order to strike a balance in this relationship, the colonial master allowed formation of trade union for the first time in Nigeria in 1912 and since that time, the development of trade union has undergone series of transformation although the objectives remained the same as many of the unions were born out of necessity (Oginni, Faseyiku & Ajani, 2019). . Considering the time of the formation of the first trade union which was during colonial era, all the union formed in Nigeria before independence added political emancipation i.e. political struggle for independence to the union's objectives and this endeared the struggle of the union to many people and their leaders were popular and synonymous with deliverer of the masses from the oppression of the colonial government (Odey, & Owan, 2014). We can assert that trade union plays significant role in the realization of independence for Nigeria and remains as one of the oldest institution in Nigeria even though it has undergone series of reformations since Trade Union Ordinances of 1938 to Trade Union Act of 2005 Amendment (Ojomo, 2017).

Oginni et al (2019) opined that over the years, the labour union in Nigeria favours the use of militant approach over fraternal approach and that the fraternal approach has been relegated on account of the behaviour of employers towards union activities. The rationale behind this was evidence in the work of (Ojomo, 2017) when it was opined that behaviour of employers in the last two decades towards the requests of the unions towards fulfilling their obligations to members has been lackadaisical, suppressive and unfriendly. Despite this suppressive behaviour of the employer, the unions had survived and enjoyed active participation from members towards engaging employers for the purpose of actualizing their demands during colonial and post-colonial eras. However, at the return of Nigeria to civil rule in 1999, the trends in successes recorded by unions in the wake of advancing the interests of Nigerian workers towards a remarkable quality of life could not be compared with what had been the in place before 1999. The success was largely due to members' participation because it was considered to be the surest way to survive and meet their collective needs even though not all members were favourably disposed to this collective struggle but majority of the members displayed favourable attitude towards unions' activities and those who stayed away often supported the course of the union by attending meetings whenever it called with maximum cooperation with the directives of the unions' leadership. Since the return of Nigeria to civil rule in 1999, the success recorded in terms of advancing members' interests was very low in comparison with what was obtainable between 1955 - 1999. In the study advance by Edet & Emmanuel (2024) in challenges confronting Nigerian trade union in the 21st Century, members' participation in union activities has gone low because of low level of interest and leadership lack of direction were among reasons adduced forward to explain the decline in members' participation in union activities. The results afterward made Nigerian workers to develop apathy towards unionism with drastic implication on involvement and participation in unions' activities.

Considering the significance of members' participation in union activities as a united force towards improving the economic interest of their members as it was in the early days of trade union development in Nigeria as evident in the works of many researchers in the precolonial era and the first decade after independence, the current state of union members' participation in the activities of the union has become a point of concern for researchers in this area in the last two decades because members' participation is the vital ingredient needed for unions' survival and success in fulfilling their obligations towards members.

There is serious poor perception of union leaders as to their seriousness and unbiased stands on issues of welfare that concern workers in Nigeria. Members' perception of union was because of accumulated experiences, and these accumulated experiences are interpreted accordingly to give corresponding behaviour. In the two decades, the experience has not been palatable as members have lost trust in the leadership of the union, and they could no longer be taken seriously in union activities. Olaseni (2019) conducted a research investigating the reaction of union members on the proposed strike by the joint federal unions (Nigerian Labour Congress and Trade Union Congress) on the Federal government position on national minimum wage that was aborted two hours to the commencement of strike. The outcome of the investigation revealed union members were disappointed and decided to distant from any future participation and vented their anger on the union's properties by vandalizing many of these properties and labelled union leadership as corrupt meaning that the Federal government of Nigeria has bribed the union executive and that was why the strike was aborted despite the fact that their demands were not met. As we investigate the world of work in the future, we can only hope that union leaders will get their hearts together and fight the battles they are elected to fight. Mixing politics with union matters or soliciting favours from government of the day amounts to distortion of interest and encroachment of the fundamentals of unionism. An average Nigerian worker is suffering under the exploitative tendencies of their employers and biting economic policies of government with no palliatives to reduce the effect of the economic reform.

**2.4 Concept of employee engagement**

Employee engagement refers to the positive, affective psychological work-related state of mind that leads employees to actively express and invest themselves emotionally, cognitively, and physically in their role performance. Employee engagement is therefore a psychological facet that encompasses energy, enthusiasm, and engrossed effort (Asuquo, 2023). According to Usoro (2021) employee engagement refers to the emotional and cognitive state of employees characterized by their commitment, dedication, and involvement in their work and the organization. They concluded that characteristically employee engagement is a multidimensional construct that captures the extent to which employees feel connected to their work, experience a sense of purpose, and are motivated to go above and beyond their job requirements.

The impact of employee engagement extends to various organizational performance metrics, including productivity, profitability and customer satisfaction. Organizations with high engagement levels often report significant improvements in productivity, as employees demonstrate a greater willingness to take initiative and solve problems (Udofia, 2020). The engagement of employees who interact with customers can contribute to enhanced customer satisfaction, as their positive attitudes and commitment are often reflected in their interactions with clients and stakeholders (Olayemi, 2023). Ogundare (2023) posited

that employee engagement acts as a catalyst for achieving positive outcomes on multiple organizational levels. Engaged employees are more invested in their work, leading to higher efficiency and better quality. Research indicates significant increases in productivity and profitability in companies with high engagement.

## 3. Theoretical Review

### 3.1 Industrial Democracy Theory

Sidney Webb and Beatrice Webb, the British reformers of the socialist wing developed industrial democracy theory close to the end of the 19th century. Trade unions or labour union is an extension of democracy into the workplace directly from the politics. Union in the organization is therefore considered to be the vehicle used by the workers to bring to bear their will or wills when it comes to getting enhanced remuneration, desired working conditions and improved labor contracts for the benefit of the members. It is therefore argued that individual – based whim is not sufficient to form a decision that is capable of being binding on all in the democratic societies, instead, worthy or acceptable decisions are gotten once every stakeholder in a system has agreed on policies and schemes that are beneficial to all individuals that make up such system. The Webbs therefore conclude that trade unions provide in the workplace opportunities through which employees under an umbrella can easily engage in discussions or dialogues, and negotiations with their proprietors to obtain favourable deals that can facilitate their free operation without victimization of the unions' leaders.

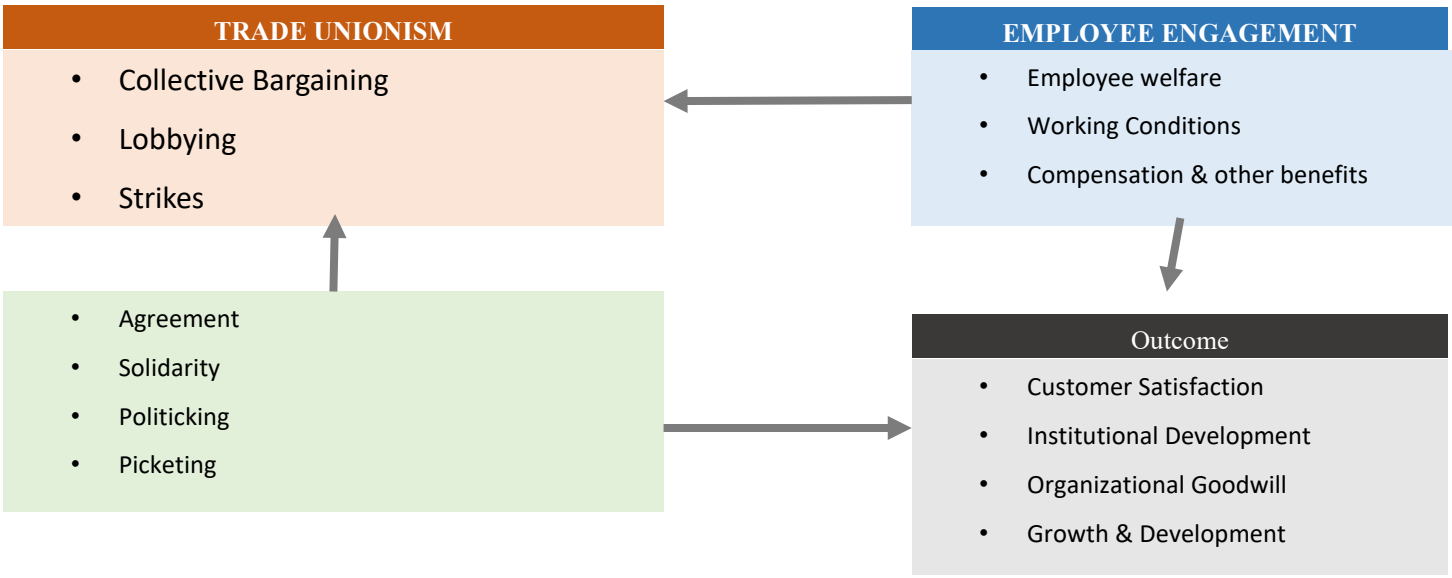
## 4. Empirical Review

Bala & Sadeeq (2024) examined the effect of trade unionism on the workers' welfare of the Federal Polytechnic Bauchi. The study utilized simple random sampling techniques by administering questionnaires on the respondents to draw the required information. The descriptive statistics used included simple percentages and tables, while inferential statistics utilized was linear regression. The findings of the study established that trade union's actions do have significant effect on employees' wages and salaries; and, that trade union's membership has significant effect on employees' working conditions. The findings of the study indicated further that trade union's negotiation ability plays significant role in improving employees' job security among the Federal Polytechnic staff. The study therefore recommends more encouragement for trade unionism in the Federal Polytechnic Bauchi.

Edet, Etukudoh & Eno (2024) investigated the impact of trade unionism on staff welfare in Nigerian public institutions, with a particular focus on Akwa Ibom State University (AKSU). The study addressed three main objectives: examining the effect of trade union activities on working conditions and benefits at AKSU, assessing the relationship between lobbying efforts and staff welfare, and evaluating the impact of strikes on staff welfare at the university. The findings revealed that trade union activities significantly impacted the working conditions and benefits of employees at AKSU. Unionized staff reported better access to resources, improved remuneration, and more favorable working environments compared to their non-unionized counterparts. The study also found a positive relationship between lobbying and staff welfare in AKSU, as effective lobbying efforts by trade unions contributed to the implementation of policies and programs that enhanced staff welfare, such as salary reviews and career development opportunities. The study concluded that trade unionism played a vital role in shaping staff welfare in Nigerian public institutions, as exemplified by the case of Akwa Ibom State University (AKSU). The findings highlighted the importance of constructive engagement between university management and trade unions to address staff welfare concerns and foster a conducive work environment. The study recommended that the university management and the state government establish regular dialogue and collaborative platforms with trade unions to address staff welfare issues proactively. AKSU should also develop comprehensive staff welfare programs that address the diverse needs of its academic and non-academic staff and strengthen its internal dispute resolution mechanisms to minimize the frequency and impact of strikes.

Emmanuel, Ismaila & Mustapha (2020) investigated the effect of trade unionism on the workers' welfare of the Nigerian Medical Association (NMA) in Kwara State. The study utilized simple random sampling techniques by administering questionnaires on the respondents so as to draw the required information. The descriptive statistics used included simple percentages and tables, while inferential statistics utilized was linear regression. The findings of the study established that trade union's actions do have significant effect on employees' wages and salaries; and, that trade union's membership has significant effect on employees' working conditions. The findings of the study indicated further that trade union's negotiation ability plays significant role in improving employees' job security among the medical staff of the Association. The study therefore recommends more encouragement for trade unionism in the Kwara State chapter of NMA.

## 5. Conceptual Framework




From the diagram above we saw the connectivity between trade unionism and employee engagement in a typical organization. The variable adopted by the study to represent trade unionism are collective bargaining, lobbying and strikes. Trade union activities alongside these variables are agreements, solidarity, politicking and picketing. Employee engagement includes employee welfare, working conditions, compensation and other benefits. Where there is good relationship between the employer and the employee, it is noticeable in employee engagement, while the study concluded that employee engagement will result into customer satisfaction, institutional development, organizational goodwill, and growth and development.

## 6. Research Methodology

The study adopted a survey research design which helps in the collection of respondents' opinions on the activities of trade unions in organizations and employee engagement. Primary data were collected through questionnaire administration. The population of this study consists of six hundred and five (605) employees of C-Way Foods Limited, Fidson Glow healthcare Limited, Tuyil drugs manufacturing company Nigeria Limited. The target population includes top management staff including executive directors, middle management staff (departmental heads/supervisors) and lower management staff (operatives). A census sampling approach was adopted for the study, and the entire population constituted the sample size. Validity and reliability of the instrument was carried out using Factor Analysis and Cronbach's Alpha respectively.

**Statistics of participants by organizations**

| Name of Organization | Number of Participants |
|---|---|
| C-Way Foods Limited, Nigeria | 306 |
| Fidson Glow Healthcare Limited, Nigeria | 184 |
| Tuyil Drugs Manufacturing Company, Nigeria | 115 |

## 7. Data Presentation and Analysis

### Demographic information of the respondents

**Table 4.1:** Demographic Information of the Respondent's Firm

| Variables | Frequency | Percentage |
|---|---|---|
| **Gender:** | | |
| Male | 510 | 84.3% |
| Female | 95 | 15.7% |
| Total | 605 | 100% |
| **Academic Qualification:** | | |
| OND/HND holder | 11 | 1.8% |
| B.Sc holder | 315 | 52.1% |
| MSc/MBA holder | 191 | 31.6% |
| PhD holder | 50 | 8.3% |
| Others | 38 | 6.3% |
| Total | 605 | 100% |

| | | |
|---|---|---|
| **Age Category:** | | |
| 20-29yrs | 259 | 42.8% |
| 30-39yrs | 242 | 40.0% |
| 40-49yrs | 68 | 11.2% |
| 50yrs and above | 36 | 6.0% |
| Total | 605 | 100% |
| **Employees' Status:** | | |
| Junior Staff | 226 | 37.4% |
| Senior Staff | 131 | 21.7% |
| Assistance Directors | 92 | 15.2% |
| Managing Directors | 26 | 4.3% |
| Supervisors | 130 | 21.5% |
| Total | 605 | 100% |
| **Years of Experience in Construction** | | |
| 1-5yrs | 262 | 43.3% |
| 6-10yrs | 176 | 29.1% |
| 11-15yrs | 76 | 12.6% |
| 16-20yrs | 59 | 9.8% |
| 20yrs & above | 32 | 5.3% |
| Total | 605 | 100% |

***Source:*** *Field Survey (2025)*

### Testing of Research Hypotheses

Hypothesis One

$H_{01}$: Collective Bargaining does not have any significant effect on Employee Welfare.

Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .134[a] | .118 | .116 | 13.77029 | 1.811 |

a. Predictors: (Constant), Collective Bargaining

b. Dependent Variable: Employee Welfare

ANOVA[a]

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 2087.141 | 1 | 2087.141 | 11.007 | .001[b] |
| | Residual | 114341.381 | 603 | 189.621 | | |
| | Total | 116428.522 | 604 | | | |

a. Dependent Variable: Employee Welfare

b. Predictors: (Constant), Collective Bargaining

Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 56.849 | 3.475 | | 16.358 | .000 |
| | Collective Bargaining | .147 | .044 | .134 | 3.318 | .001 |

Dependent Variable: Employee Welfare
Source: Author's computation (2025)

### Interpretation of the coefficients

The above result was analyzed using linear regression analysis of the coefficients. The dependent variable of the model is Employee Welfare (EW) while the independent variable is Collective Bargaining (CB). The estimation results show that the variable- Collective Bargaining has significant impact on employee welfare at the 5% alpha level of significance. Therefore, the estimation shows that the co-efficient of determination R-squared is 0.118, implying that explanatory variable accounted for 11.8% changes in Employee Welfare (EW). Un-standardized coefficient of determination value ($\beta$= 0.147) indicated that 1% increase in Collective Bargaining led to 14.7% increase in Employee Welfare with (P-value of 0.000 < 0.05%). It tells us the model is of good fit, and that the independent variable to a large degree explains changes in the dependent variable.

**Interpretation of Durbin Watson and F- Statistics**

The Durbin Watson statistic is a number that tests for autocorrelation in the residuals from a statistical regression analysis. The Durbin-Watson statistic is always between 0 and 4. A value approaching 2 means that there is no autocorrelation in the sample. Values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation. From the estimation, Durbin Watson statistics is (1.811), this implies that there is no serial or positive autocorrelation. Therefore, is no evidence of first order serial correlation in residuals regression analysis. Also, the F-statistics value is (11.007) with a probability or significant level of P-value 0.001 < 0.05 shows the overall analysis of variance of the model; while the result indicates that explanatory variables are fundamental, explaining the overall variation in the dependent variable. In conclusion, since at the overall level, collective bargaining can bring positive effect to the employee welfare, therefore, $H_0$ that says, "*Collective Bargaining does not have any significant effect on Employee Welfare*", is rejected while the alternative $H_1$ hypothesis accepted. This finding lends credence to the observation of Olayemi (2023) in his study that unionization of the workforces in the organization has been so helpful in making individuals in the company to put in their best towards the organizational productivity knowing fully well that they would not be denied their rights and that their interests would always be protected by the union.

**Hypothesis Two**

$H_{02}$: Lobbying does not have any significant effect on working conditions.

Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .687[a] | .472 | .471 | 6.55107 | 1.464 |

a. Predictors: (Constant), Lobbying

b. Dependent Variable: Working Condition

ANOVA[a]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 23160.584 | 1 | 23160.584 | 539.667 | .000[b] |
| | Residual | 25878.629 | 603 | 42.916 | | |
| | Total | 49039.213 | 604 | | | |

a. Dependent Variable: Working Condition

b. Predictors: (Constant), Lobbying

Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 15.473 | 1.203 | | 12.857 | .000 |
| | Lobbying | -.346 | .015 | .687 | 23.231 | .000 |

Dependent Variable: Working Condition
Source: Author's computation (2025)

**Interpretation of the coefficients**

The above analysis was done using linear regression analysis of the coefficients. The dependent variable of the model is Working Conditions (WC) while the independent variable is Lobbying (Lobby). The estimation results show that the variable- Lobbying has significant impact on the Working Conditions at 5% alpha level of significant. Therefore, the estimation shows that the co-efficient of determination R-squared is 0.472, implying that explanatory variable accounted for 47.2% changes in Working Conditions (WC). Un-standardized coefficient of determination value (β= -0.346), indicating that 1% increase in lobbying led to 34.6% decrease in effective administration standard with (P-value of 0.000 < 0.05%).

**Interpretation of Durbin Watson and F- Statistics**

From the estimation, Durbin Watson statistics is (1.464), implying that there is no serial or positive autocorrelation. While F-statistics value is (539.667) with a probability or significant level of P-value 0.000 < 0.05 showing the overall analysis

of variance of the model; while the result indicates that explanatory variable are fundamental explaining the overall variation in the dependent variable. In conclusion, since at the overall level, lobbying bring negative effect to the working conditions, therefore, $H_0$ that says, "*Lobbying does not have any significant effect on working conditions*", is rejected while the alternative $H_1$ hypothesis accepted. The finding corroborates the result of the research undertaken by Emmanuel, Ismaila and Mustapha (2020) which ascertained that the level of negotiation that union's members adopt do go a long way in exerting significant influence on workers' welfare.

**Hypothesis Three**

$H_{03}$: Strikes does not have any significant effect on Compensation and Other Benefits.

Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .358[a] | .128 | .126 | 11.45672 | 1.731 |

a. Predictors: (Constant), Strikes

Dependent Variable: Compensation and Other Benefits

ANOVA[a]

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 11600.553 | 1 | 11600.553 | 88.381 | .000[b] |
| | Residual | 79147.638 | 603 | 131.256 | | |
| | Total | 90748.192 | 604 | | | |

a. Dependent Variable: Compensation and Other Benefits

b. Predictors: (Constant), Strikes

Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 57.457 | 1.931 | | 29.748 | .000 |
| | Strikes | -.227 | .024 | .358 | 9.401 | .000 |

Dependent Variable: Compensation and Other Benefits
Source: Author's computation (2025)

**Interpretation of the coefficients**

The above result was analyzed using linear regression analysis of the coefficients. The dependent variable of the model is Compensation and Other Benefits (COB) while the independent variable is Strikes (Strikes). The estimation results show that the variable- Strikes has significant impact on Compensation and Other Benefits at 5% alpha level of significant. Therefore, the estimation shows that the co-efficient of determination R-squared is 0.128, implying that explanatory variable accounted for 12.8% changes in Compensation and Other Benefits (COB). Un-standardized coefficient of determination value (β= -0.227), indicated that 1% increase in Strikes led to 22.7% decrease in Compensation and Other Benefits with (P-value of 0.000 < 0.05%).

**Interpretation of Durbin Watson and F- Statistics**

From the estimation, Durbin Watson statistics is (1.731), implying that there is no serial or no positive autocorrelation. So, there is no evidence of first order serial correlation in residuals regression analysis. While F-statistics value is (88.381) with a probability or significant level of P-value 0.000 < 0.05 shows the overall analysis of variance of the model. In conclusion, since at the overall level, strikes bring negative changes to the compensation and other benefits, therefore, $H_0$ that says, "*Strikes does not have any significant effect on Compensation and Other Benefits*", is rejected while the alternative $H_1$ hypothesis accepted. This result substantiates the finding of the study that was carried out by Gichaba (2013) which established that strikes by the labour organization exert significant influence on the employees' compensation, conditions and terms of service, and job security at Kisii University, Kenya.

## 8. Conclusion and Recommendations

From the first objective it indicated that collective bargaining enhances employee welfare with (P-value of 0.000 < 0.05%). Where employers give room for collective bargaining employee welfare will always receive the needed attention. From the second objective the estimation results show that the variable- Lobbying

has significant impact on the Working Conditions at 5% alpha level of significant. Lobbying by the trade union also connotes negotiation, arbitration, diplomacy, consensus and compromise. This process most of the time used by the union comes with benefit of improved and better working conditions. From the third objective the estimation shows that the co-efficient of determination R-squared is 0.128, implying that explanatory variable accounted for 12.8% changes in Compensation and Other Benefits (COB). Un-standardized coefficient of determination value (β= -0.227). Mostly where there is strike action compensation and other benefits are always affected because of man hour lost and production halted for a long time. This affects the bottom line therefore benefits such as bonuses, profit sharing, and even 13th month salary may be affected negatively. Based on the conclusion the study recommended that the management must do everything within its power to manage labour movement in the organization through employee engagement, ensuring employee welfare, working conditions and timely compensation and other benefits so that trade unionism does not turn to be a menace to organizational stability.

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# Diversity, Inclusion and Employee Productivity in Transport Companies in Nigeria

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## 1. Introduction

In today's globalized and diverse work environment, organizations recognize the importance of diversity and inclusion in enhancing employee productivity. Diversity refers to the presence of different groups or individuals with unique characteristics, experiences, and perspectives within an organization, while inclusion refers to the creation of an environment where all individuals feel valued, respected, and empowered to contribute (Rohwerder, 2017). Research has shown that organizations that promote diversity and inclusion experience higher employee engagement, job satisfaction, and productivity.

Studies have consistently demonstrated the positive impact of diversity and inclusion on employee productivity. For instance, a study by Goswami and Goswami (2018) found that workforce diversity and managerial support significantly influenced workplace inclusion, which in turn affected employee engagement. Similarly, Makudza, Muchongwe and Dangoiso (2020) found that workforce diversity was a significant predictor of employee productivity. However, other studies have highlighted the challenges and limitations of implementing diversity and inclusion initiatives, including the potential for negative outcomes.

Given the importance of diversity and inclusion in enhancing employee productivity, this study aims to investigate the relationship between diversity, inclusion, and employee productivity in a specific organizational context. The study will examine the impact of demographics, inclusion strategies, pay equity, and challenges of diversity and inclusion on employee productivity. By exploring these issues, this study seeks to contribute to the existing body of knowledge on diversity, inclusion, and employee productivity, and provide insights for organizations seeking to improve their diversity and inclusion practices.

Organizations today face the challenge of managing a diverse workforce and creating an inclusive culture that fosters employee productivity. Despite the growing recognition of the importance of diversity and inclusion, many organizations struggle to implement effective diversity and inclusion initiatives that positively impact employee productivity. According to a study by McKinsey (2021), diverse companies are more likely to outperform their less diverse peers, highlighting the importance of diversity and inclusion in driving business outcomes.

Managing diversity is a complex issue that requires organizations to create an inclusive culture that values and respects differences (Goswami & Goswami, 2018). Research has shown that employees who feel included and valued are more likely to be productive and engaged, highlighting the importance of creating an inclusive work environment (Nwosu, Amoke, Kinikanwo & Ikeotuonye, 2025). However, many organizations struggle to create an inclusive culture, with research suggesting that unconscious bias and micro aggressions can negatively impact employee productivity (Krieger, 2019). Inclusion strategies are critical in creating an inclusive culture that fosters employee productivity (Okatta, Ajayi, & Olawale, 2024). Research has shown that organizations that implement effective inclusion strategies, such as diversity training and mentorship programs, are more likely to experience positive business outcomes (Hunt, Layton & Prince, 2018). However, more research is needed to understand the impact of inclusion strategies on employee productivity, particularly in diverse work environments like Nigeria. Therefore, this study is focused on determining the relationship and impact of inclusion strategies and pay equity on employee productivity and the associated challenges faced by organizations in Nigeria in implementing diversity and inclusion initiatives

## 2. Literature Review

### 2.1 Conceptual Review

#### 2.1.1 Employee Productivity

Productivity is consistently accomplishing essential tasks while balancing all production elements to achieve the highest output with minimal effort. It involves adopting a mind-set that prioritizes progress and continually enhances existing processes (Locke & Latham, 2019). Employee productivity, or workforce productivity, is the quantifiable measure of an

employee's output or efficiency in completing their assigned tasks or responsibilities within a specific period. This can be measured in terms of the work's quantity, quality or timeliness.
Employee productivity measures how efficiently and effectively a worker or a group of workers contribute to accomplishing organizational goals (Huselid, 2018). It is a key performance indicator (KPI) that measures the output of work in relation to the inputs of time, effort and resources. Improving employee productivity is a critical component of organizational success (Manyika, Woetzel, Bission, Chui, Wong & Damales, 2017).

### 2.1.2 Consequences / Implications of Employee Productivity

Employee productivity has significant implications for organizational performance and overall business success. High productivity enhances profitability, operational efficiency, and competitiveness, as employees contribute more effectively toward achieving corporate goals (Deloitte, 2022). Productive employees enable organizations to deliver higher-quality outputs at lower costs, which strengthens their market position and customer satisfaction levels. Conversely, low productivity can lead to missed deadlines, reduced output quality, and increased operational costs, ultimately undermining an organization's growth potential (McKinsey & Company, 2021).

Another major consequence of employee productivity is its direct impact on organizational culture and morale. When employees are highly productive, it fosters a positive work environment characterized by motivation, teamwork, and engagement (Gallup report, 2023). Productivity improvements often stem from supportive leadership, effective communication, and recognition, all of which enhance job satisfaction. However, consistently low productivity may reflect disengagement or burnout, leading to dissatisfaction and high turnover rates (SHRM, 2022). Thus, maintaining balanced workloads and fair reward systems is essential for sustaining morale and long-term productivity.

Employee productivity also influences innovation and adaptability within organizations. Productive employees often demonstrate higher creativity and problem-solving capabilities, enabling firms to respond swiftly to market changes and technological advancements (World Economic Forum, 2023). Organizations that cultivate productivity through skills development and inclusive workplace practices benefit from greater innovation and resilience in dynamic environments. In contrast, low productivity may limit innovation capacity, making it harder for firms to adapt to competitive pressures or economic fluctuations (PWC, 2021).

### 2.2. Diversity and Inclusion

Diversity refers to the presence of differences among individuals within an organization, encompassing characteristics such as race, gender, age, ethnicity, religion, disability, sexual orientation, education, and cultural background (Roberson, 2019). It reflects the variety of unique experiences, perspectives, and identities that people bring to the workplace. Diversity is not only about representation but also about recognizing and valuing these differences as a source of innovation and organizational strength (Shore, Cleveland & Sanchez, 2018). Inclusion, on the other hand, is the practice of creating an environment in which all individuals feel respected, accepted, and valued for who they are (Deloitte, 2020). It involves actively engaging diverse individuals in decision-making processes, ensuring equal opportunities, and fostering a sense of belonging where everyone can contribute their full potential. Inclusion transforms diversity from mere representation into meaningful participation, enhancing collaboration and employee well-being (Ferdman & Deane, 2020).

Both aspects of diversity and inclusion (D&I) are essential in building a healthy and effective workplace culture. Diversity without inclusion can result in a toxic environment where employees feel isolated, while inclusion without diversity may lead to groupthink and a lack of innovation. Although many companies are beginning to prioritize diversity, they often overlook the inclusion component. However, without a strategic commitment to both, employees, especially those from underrepresented groups—may feel unsupported or alienated within the organization (Harvard Business Review, 2017).

Diversity in the workplace refers to the presence of different groups or individuals with unique characteristics, experiences, and perspectives (Rohwerder, 2017). Research has shown that diverse workforces can lead to increased creativity, innovation, and problem-solving (Goswami & Goswami, 2018). A study by Makudza et al. (2020) found that workforce diversity was a significant predictor of employee productivity. Inclusion strategies are critical in creating an inclusive culture that fosters employee productivity. Organizations that implement effective inclusion strategies, such as diversity training and mentorship programs, are more likely to experience positive business outcomes. Research has shown that employees who feel included and valued are more likely to be productive and engaged (Nwosu et al., 2025).

Implementing diversity and inclusion initiatives can be challenging, particularly in organizations with entrenched cultures and biases (Rohwerder, 2017). Research has shown that unconscious bias and micro aggressions can negatively impact employee productivity (Krieger, 2019). Organizations must prioritize creating an inclusive culture that values and

respects differences. The social exchange theory provides a framework for understanding the relationship between diversity, inclusion, and employee productivity. According to this theory, employees who feel valued and respected are more likely to engage in productive behaviours. Diversity and inclusion are an organization's effort, policies, and practices that ensure different groups or individuals of different backgrounds are culturally and socially accepted and integrated into the workplace. An organization that focuses on diversity and inclusion will employ a diverse team of people that reflects the society in which it operates.

### 2.2.1 Measures of Diversity and Inclusion

#### 2.2.1.1 Inclusion Strategies

An effective inclusion strategy involves creating organizational policies, practices, and cultures that actively embrace diversity and ensure equitable participation and opportunity for all employees. This includes fostering psychological safety, addressing unconscious bias, implementing equitable recruitment and promotion processes, and providing diversity and inclusion training. Recent studies emphasize that organizations with strong inclusion strategies not only improve employee engagement and innovation but also achieve higher financial performance and retention rates, as employees are more likely to feel valued and empowered to contribute their unique perspectives (Bourke & Espedido, 2020; Deloitte, 2023). Inclusive environments can lead to increased innovation, improved employee morale, and a stronger sense of belonging, which can contribute to overall organizational success. Some effective inclusion strategies include listening to employees, using inclusive language, holding leaders accountable, practice inclusive leadership and measuring progress.

#### 2.2.1.2 Pay Equity

Pay equity refers to the principle of compensating employees fairly and equally for work of equal value, regardless of gender, race, ethnicity, or other personal characteristics (Heldman, 2025). It ensures that employees performing similar roles with comparable skills, effort, and responsibility receive equitable compensation. Pay equity goes beyond simple wage comparison, it addresses systemic inequalities that influence salary decisions, such as unconscious bias or discriminatory practices in recruitment, promotion, and evaluation processes (World Economic Forum, 2023).

In the modern workplace, pay equity is increasingly recognized as a cornerstone of diversity, inclusion, and organizational fairness. Studies show that equitable pay enhances employee engagement, trust, and retention while reducing turnover and workplace conflict (Tucker, 2024). Moreover, organizations that prioritize pay equity are more likely to attract diverse talent and comply with global labour standards and legal frameworks promoting fair compensation (OECD, 2022). Ultimately, pay equity fosters a culture of transparency and equality, strengthening both organizational performance and social responsibility.

### 2.3. Challenges of Workplace Diversity and Inclusion

Challenges of workplace diversity and inclusion often arise because organizations bring together people with different backgrounds, experiences, values, and communication styles. Workplace diversity and inclusion (D&I) face several challenges despite growing awareness and organizational efforts to promote equity. One major challenge is unconscious bias, which affects hiring, promotion, and team dynamics. Even when organizations adopt inclusive policies, implicit stereotypes and prejudices often influence decision-making processes, leading to unequal opportunities for minority employees (Roberson, 2019). Such biases can undermine efforts to create a fair and inclusive environment, especially when leaders are unaware of their own prejudgments. Another significant challenge is communication and cultural barriers among employees from diverse backgrounds. Differences in language, cultural norms, and communication styles can lead to misunderstandings and conflict, ultimately affecting teamwork and productivity (Onyebueke, 2024). When employees do not feel understood or respected, it reduces engagement and collaboration, thereby weakening inclusion efforts. Organizations often underestimate the importance of cultural intelligence training to address these issues effectively.

Furthermore, resistance to change remains a major obstacle to diversity and inclusion. Some employees or managers perceive D&I initiatives as threats to established norms or favouritism towards certain groups, creating tension within the workplace (Lima, Rahman, Bhuiyan, & Rahman, 2025). This resistance can manifest in passive non-compliance or active opposition, which hinders the success of inclusion programs. Without strong leadership commitment and continuous education, these negative perceptions persist and weaken organizational culture. Lastly, lack of accountability and measurement limits progress in D&I implementation. Many organizations fail to track diversity metrics or evaluate the real impact of their initiatives, resulting in superficial compliance rather than meaningful change (Bourke & Espedido, 2020). Sustainable inclusion requires setting clear goals, monitoring progress, and holding leaders responsible for outcomes. Without data-driven accountability, diversity efforts risk becoming symbolic rather than transformative.

### 2.4. Theoretical Framework

The theoretical framework was developed from the integration of Cultural Intelligence (CQ) Theory and Social Exchange Theory (SET). It illustrates how

diversity and inclusion affect employee productivity. Developed by Ang and Dyne (2008), cultural Intelligence refers to the ability to effectively understand, adapt to, and work across different cultural contexts, a skill that is central to authentic inclusion. As organizations become more diverse, the presence of CQ enables individuals and teams to bridge cultural gaps, reduce misunderstandings, and foster trust, making inclusion a natural, everyday reality rather than a checkbox. This inclusive atmosphere promotes collaboration and cohesion, which are essential for optimizing employee productivity. Research also demonstrates that leaders with higher CQ drive better team performance, especially in culturally diverse environments, its predictive validity surpassing that of emotional intelligence in such contexts. Further, employee development of CQ enhances perceived inclusion and belonging, which both directly feed into improved engagement and productivity. Transforming diversity into productive strength thus hinges on cultivating CQ throughout the organization.

Social exchange theory emphasizes that workplace relationships are shaped by a dynamic of reciprocity and a subjective cost–benefit analysis: employees weigh what they invest against what they receive in return. When organizations demonstrate inclusive behaviours, for instance, by recognizing diverse contributions and maintaining fairness, employees experience a positive return on their engagement, fostering higher loyalty, trust, and motivation. This, in turn, enhances their willingness to perform at their best and boosts overall productivity. Moreover, empirical studies have confirmed that inclusive leadership grounded in SET leads to elevated work engagement and innovative behaviours—critical aspects of productivity, particularly through strengthened leader-member exchanges and increased psychological safety. Thus, when employees perceive equitable exchanges and inclusive support, their engagement and performance rise a clear pathway from diversity-sensitive practices to improved productivity.

### 2.5. Empirical Review

Nwosu et al., (2025) investigates the relationship between diversity management, inclusion, and employee productivity among bank employees in Lagos Metropolis. Specifically, it examines four key areas: the effect of diversity team building, the impact of diversity recruitment, the role of diversity training, and the influence of workplace inclusivity on employee productivity. Using a survey questionnaire, the study collected data from 120 participants, with 115 complete responses returned. The data was analyzed using SPSS software, employing frequency and percentage distributions for descriptive statistics, and multiple regression analysis for hypothesis testing at a 0.05 significance level. The findings from the study revealed that organizations that promote diversity and inclusion experience higher employee engagement, job satisfaction, and productivity. Employees in inclusive work environments, where diverse perspectives are valued, reported increased motivation and commitment to their roles.

Suparyanto, Fauzi, Nungraha, and Tarmizi (2025) explored the impact of diversity and inclusion in the workplace on employee performance and innovation in organizations. In the context of increasing globalization, companies are faced with the challenge of creating an inclusive work environment, where different cultural backgrounds, genders, and experiences can contribute to the maximum. This research methodology uses a quantitative approach with a survey involving 20 respondents from various industrial sectors. The data was analyzed using multiple regression techniques to identify the relationship between diversity, inclusion, employee performance, and level of innovation. The results showed that there is a significant positive relationship between team diversity and improved individual performance as well as collaboration between team members. In addition, an inclusive work environment was shown to encourage creativity and new product innovation.

Atmaja and Dewi (2024) explored diversity management to achieve employee engagement and determine the mediating role of organizational trust and motivation in the relationship between diversity management and employee engagement in e-commerce companies who provide fresh vegetables and fruits. The sampling method is purposive sampling by distributed questionnaires online to 135 respondents and analytical method used Partial Least Square-Structural Equation Modeling (PLS-SEM). The results of the research prove that there is a positive and significant influence of diversity management on employee engagement, diversity management has a positive and significant influence on organizational trust.

Makudza, Muchongwe, and Dangaiso (2020) examined the differential effect of workforce diversity on employee productivity and its subsequent impact on customer experience. A once-off cross-sectional research design was used in this study where the Zimbabwean civil service was targeted. Randomization was used to collect 324 validated responses. The study focused on both primary (age and gender) and secondary (education and political affiliation) dimensions of workforce diversity. The results were confirmatory that workforce diversity is a significant predictor of employee productivity ($\beta = 0.668$, $P < 0.05$), at the same time employee productivity holds explanation to customer experience by 37%. Results also revealed that gender diversity, educational diversity and political diversity were significant determinants of workforce diversity ($P < 0.05$). However, the study established that age diversity was not a significant factor in enhancing employee productivity ($P > 0.05$). The study concluded that workforce diversity is a powerful tool in enhancing both customer experience and

employee productivity. As such, the latter can be augmented through shrewd workforce diversity practices as championed by management. To that end, the study recommends the development of a workforce diversity framework which promotes inclusivity.

## 3. Methodology

This section covered a detailed account of how this research work was carried out, while revealing the research methods that are used in the research study. With focus on the diversity, inclusion, and employee productivity in Nigeria, land transport companies were understudied. To gather information and describe the phenomena as they are at the time, the survey research approach was adopted and this was justified by the fact that it is necessary to study the link that exists between two or more variables. The population comprises of employees from various departments of some selected transport companies in Nigeria. The employees include Logistics manager, Transport manager, Fleet manager, Dispatchers, Warehouse manager, Logistics analyst, Logistics coordinator, international logistics manager. The choice of transport companies was used based on the ease of accessibility and the surge in the number of transport companies in Nigeria. Their work environment often involves interactions with colleagues, departmental policies, and hierarchical structures, making them suitable for investigating how diversity and inclusion have a significant impact on employee productivity. As such, the population of 100 provided a rich source of data to examine variations in diversity and inclusion and employee productivity. With the Yaro Yamane formula, a total sample size of 88 respondents was arrived.

This paper made use of primary data as the main source of information as it was obtained directly from Transport staff members through the administration of a structured questionnaire. The questionnaire was developed based on previously validated instruments and adapted to suit the context of employees in the transport companies in Nigeria. Each of the variables in the question apart from the demographic section were measured using a 5-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5) on a scale.

## 4. Empirical Analysis and Results

### 4.1. Relationship between Workplace Diversity and inclusion and Employee Productivity

### Correlation Analysis

Bivariate Pearson correlation coefficients were conducted on the data for all the variables in the study. Table 1 shows the Pearson correlation coefficients among research variables.

**Table 1:** Pearson Correlation Coefficients among Research Variables

| Variable | | EP | IS | PE | WPD |
|---|---|---|---|---|---|
| Employee Productivity | Pearson Correlation | 1 | .521 | .446 | .344 |
| | Sig. (2-tailed) | | .000 | .000 | .001 |
| | N | 88 | 88 | 88 | 88 |
| Inclusion Strategies | Pearson Correlation | .521 | 1 | .606 | .542 |
| | Sig. (2-tailed) | .000 | | .000 | .000 |
| | N | 88 | 88 | 88 | 88 |
| Workplace Diversity | Pearson Correlation | .344 | .542 | .572 | 1 |
| | Sig. (2-tailed) | .001 | .000 | .000 | |
| | N | 88 | 88 | 88 | 88 |

***Source:*** *Researcher's computation (2026)*

Table 1 presents the correlation matrix showing the relationships between Employee Productivity (EP) and the two independent variables Inclusion Strategies (IS) and Workplace Diversity (WPD). The results reveal several significant positive correlations. Employee Productivity (EP) has a moderate positive correlation with Inclusion Strategies (IS) ($r = 0.521$, $p < 0.001$), indicating that improvements in inclusion strategies are associated with higher levels of productivity among employees. Additionally, EP exhibits a weaker but significant positive correlation with Workplace Diversity (WPD) ($r = 0.344$, $p = 0.001$), implying that diversity has a meaningful, though smaller, contribution to employee productivity. The independent variables also demonstrate strong and significant positive associations among themselves. Inclusion Strategies (IS) is also strongly correlated with Workplace Diversity (WPD) ($r = 0.542$, $p < 0.001$), suggesting that inclusion initiatives tend to coexist with a diverse work environment.

Overall, the findings indicate that inclusion strategies and workplace diversity both significantly and positively influence employee productivity, with inclusion strategies showing the strongest relationship. The strong inter-correlations among the independent variables also suggest that these organizational practices tend to reinforce one another, collectively contributing to a more productive and supportive work environment.

### 4.2 Hypotheses Testing

The hypotheses were tested using the p-values (Sig.) presented in the regression results.

Table 2: Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 3.137 | 3.292 | | .953 | .343 |
| | Inclusion strategies | .390 | .120 | .390 | 3.241 | .002 |
| | Pay Equity | .184 | .114 | .200 | 1.620 | .000 |
| | Challenges of WPD | .016 | .101 | .018 | .156 | .876 |

**Dependent Variable:** Employee Productivity

The interpretations based on Table 2 are presented below.

**Hypothesis 1**

$H_{01}$: Inclusion strategies have no significant relationship with employee productivity.

Table 2 shows that the regression coefficient for Inclusion Strategies is 0.390, with a p-value of 0.002, which is less than 0.05. Therefore, the null hypothesis is rejected. This implies that inclusion strategies have a significant positive effect on employee productivity. In other words, improvements in inclusion practices are associated with higher levels of employee productivity. This finding supports the conclusions of Shore et al. (2018), who noted that inclusive workplace cultures foster higher engagement, greater job satisfaction, and improved performance outcomes. Similarly, Barak (2016) emphasized that inclusion enhances employees' sense of belonging, which in turn strengthens their willingness to contribute positively to organizational goals.

**Hypothesis 2**

$H_{02}$: Pay equity has no significant relationship with employee productivity.

The regression coefficient for Pay Equity is 0.184, with a p-value reported as 0.000, which is below the 0.05 threshold, the null hypothesis is rejected. This indicates that pay equity has a significant positive influence on employee productivity. This suggests that when employees perceive compensation as fair, their productivity increases. This aligns with Adams' Equity Theory (1965), which posits that individuals compare their input–output ratios with those of others, and equitable treatment leads to positive work attitudes and improved performance. Empirical evidence from Heneman and Judge (2019) supports this finding, arguing that equitable pay structures reduce dissatisfaction, enhance morale, and promote higher levels of productivity.

**Hypothesis 3**

$H_{03}$: Challenges of workplace diversity have no significant relationship with employee productivity.

Table 2 reveals that the regression coefficient for Challenges of Workplace Diversity is 0.016, with a p-value of 0.876, which is greater than 0.05. Therefore, the null hypothesis cannot be rejected. This means that challenges associated with workplace diversity do not have a statistically significant effect on employee productivity. This suggests that diversity-related challenges do not meaningfully influence productivity levels among the respondents.

Table 3: Model Summary[b]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | .547[a] | .299 | .274 | 2.81436 | 1.603 |

Predictors: (Constant), Challenges of Workplace, Diversity, Inclusion Strategies, Pay Equity
b. Dependent Variable: Employee Productivity

Table 3 presents the model summary of the regression analysis. The model demonstrates a moderate level of explanatory power, with an R value of 0.547, indicating a moderate positive correlation between the independent variables (workplace diversity, inclusion strategies, pay equity, and challenges of the workplace) and the dependent variable (employee productivity).

The R-squared value of 0.299 shows that approximately 29.9% of the variation in employee productivity is explained by the predictors included in the model. The

adjusted R-squared value of 0.274, which adjusts for the number of predictors, confirms that the model retains a reasonable explanatory strength even after accounting for the number of variables. The standard error of the estimate, 2.81436, represents the average distance between the actual values and the predicted values of employee productivity, indicating the level of prediction accuracy within the model.

## 5. Conclusion

This study examined the impact of diversity and inclusion on employee productivity, with specific attention to the influence of demographic factors, inclusion strategies, pay equity, and the challenges associated with workplace diversity. The findings underscore the growing importance of inclusive practices in strengthening employee performance and improving organizational outcomes. The study revealed that inclusion strategies demonstrated a strong positive and significant influence on productivity, highlighting the role of supportive workplace environments where employees feel valued, respected, and included in decision-making processes. Furthermore, the study found that pay equity has a positive and significant impact on employee productivity, indicating that fair and transparent compensation systems encourage higher motivation, commitment, and work output. In addition, the study established that workplace diversity has a positive but moderately significant relationship with productivity, although certain challenges such as communication gaps, unconscious bias, and resistance to change limit its full potential when not adequately addressed.

Overall, the research concludes that diversity and inclusion are essential drivers of employee productivity, but their effectiveness depends on how well organizations implement supportive strategies and address existing barriers. Practices such as equitable compensation, inclusive leadership, effective communication, and continuous diversity training are crucial for maximizing the benefits of a diverse workforce. Organizations that embrace these principles are more likely to foster a productive, harmonious, and high-performing workplace capable of sustaining long-term success.

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# Supply Chain Disruption and Organisational Performance in Manufacturing Industry

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**Abstract.** The study explored the key dimensions of supply chain disruptions in the manufacturing industry. In the Nigeria manufacturing industry, especially the Nigeria bottling companies experience disruptions that can result from transportation delays, suppliers' failures, economic instability, or political unrest. Additionally, with the current rising cost of materials, insecurity and changing government policies in Nigeria, there was the need for this study. Supply chain disruption was proxy using these variables: supplier failure, defective products or materials and regulatory changes and then measured against organisational performance of bottling companies in Nigeria. The study further looked at the common causes of supply chain disruptions in bottling companies in Nigeria. The study population and sample size was 208 and 137 respectively. The stratified sampling technique was employed to ensure equal and fair representation of different departments, thereafter, simple random sampling was used to select the respondents. Primary data was collected using copies of structured questionnaire to elicit information from respondents. Data analysis was performed using Pearson correlation and regression analysis and the result showed that supplier failures, defective products or materials and regulatory changes has contributed to a minimal to decline in organizational performance. However, regulatory change was found to be the most significant factor influencing organisational performance.

**Keywords:** Supply Chain Disruption, Supplier Failure, Defective Products, Regulatory Changes, Organisational Performance.

## 1. Introduction

Supply chain disruption has become a central concern for organization globally, due to their significant impact on organizational performance. Supply chain which is seen as a network of individuals, organizations, resources, activities and technology involved in the creation and sales of a product, is affected by a variety of factors ranging from pandemic, natural disaster, geopolitical instability, and suppliers' failures interrupt the flow of goods and services. Over the past years events has provided stark of reminders of the destructive impact supply chain can have in organizational performance. For instance, the outbreak of COVID 19 which impacted supply chains around the world, the lockdown that took place to prevent the spread of the virus also prevented the flow of raw materials and impacted manufacturing, leaving shortages and long lead times on goods (Ivanov, 2020). A supply chain disruption is an event that disrupts the flow of goods or services in a supply chain system (Revilla and Saenz, 2017; Truong and Hara, 2018) and it have negative impact on the performance of the firm at different levels such as financial outcomes, customer satisfaction, market share, increased cost, production delay and reputation damage. For instance, a study carried out by PWC (2017) found that supply chain disruption cost companies an average of 30% in operational performance decline and up to 7% in market share loss.

While the literature discusses how disruption affect organizational performance, many organization in Nigeria still struggle to develop effective strategies for managing supply chain disruptions. The reason could include a mix of internal and external factors which includes lack of foresight and planning, inadequate data and analytics, reliance on a single source, global events and geopolitical instability and labour shortages and economic downturns. In Nigeria for example the issue is further exacerbated by factors such as inadequate infrastructure, limited technological capacities, poor coordination among supply chain partners, and lack of management systems and government policies often hinder their ability to response effectively to these disruptions (Niser, 2025).

Therefore, the objectives of the paper are to find the causes of supply chain disruptions in organisations; the impact of supplier failures, defective product or materials and regulatory changes on organizational performance in bottling companies in Nigeria.

## 2. Literature Review

### 2.1 Organisational Performance

Organisational performance refers to how well an organisation achieves its objectives, including

profitability, efficiency, customer satisfaction, innovation and adaptability. It involves comparing an organisations actual output or results with the intended ones. Recent research has highlighted how organisational performance is deeply influenced by supply chain disruptions. Disruption challenges the flow of goods, information, and finances, which in turn affects performance dimensions such as cost efficiency, customer satisfaction, and market competitiveness (Ivanov and Dolgui, 2020). In manufacturing industry, particularly for firms like Nigeria bottling companies which relies on extensive supply network for raw material such as sugar, concentrates, packaging materials, and distribution logistics, performance depends heavily on the smooth operation of supply chains. When disruption such as shortages, scarcity of materials, or transportation breakdown occurs, NBCs production and operations are directly affected (Adebiyi, Adediran, Shodiya, and Olusola, 2021). Thus, organisational performance in manufacturing industries cannot be fully understood without examining its relationship with supply chains disruption.

Supply chain disruption (SCDs) can have a significant long-term and immediate effects on organisational performance outcomes. For instance, the global crises such as the outbreak of COVID 19 pandemic and the Russia- Ukraine conflict which impacted supply chain around world also preventing the flow of raw materials and impacted manufacturing performance and reduced customer trust. According to Katsaliaki, Galetsi, and Kumar, (2022), such disruptions negatively influence key performance indicators such as operational efficiency, inventory turnover, and service levels.

In summary, for bottling companies, understanding and managing supply chain disruptions is essential not just for operational continuity but for sustaining its overall organisational performance. Supply chain stability enables bottling companies to meet its production targets, satisfy customers, and sustain profitability, reinforcing the strategic importance robust supply chain management within the manufacturing industry (Dolgui and Ivanov, 2021).

## 2.2 Supply Chain Disruptions

Supply chain disruption refers to any unexpected event that interrupts the normal flow of goods and services within a company's supply network. In the manufacturing industry, especially within the bottling companies in Nigeria, such disruptions can result from transportation delays, suppliers' failures, economic instability, or political unrest (Christopher and Holweg, 2017). In the case of bottling companies in Nigeria, supply chain disruptions often lead to production halts and shortages of finished products like soft drinks. Since bottling companies depends on both local and imported raw materials sugar concentrates, and packing materials any disruption in logistics-whether due to port congestion, road blockages, or foreign exchange challenges can slow down production (Moradeyo, Oke, and Muogboh, 2023).

Additionally, these disruption force bottling companies to spend more on emergency sourcing and logistics to compensate for the interruptions. The cost of bringing in materials through alternative, more expensive routes or suppliers impacts profitability (Eze, 2024). These extra operational costs directly reduce the company's margins (Choi, Rogers, and Vakil, 2021). However, Fiksel, Polyviou, Croxton, and Pettit (2015) asserted that these issues can be mitigated through better supply chain management strategies which includes diversifying its supplier base, investing in local sourcing where possible, and using technology for real-time supply chain monitoring.

### 2.2.1 Components of Supply Chain Disruption

Disruptions do not occur in isolation but often stem from interconnected issues within the supply chain structures (Christopher and Holweg, 2017). Among the components contributing are supplier failures, defectives products or materials, and regulatory changes. Each of these factors can independently or collectively interrupt production and distribution activities, thereby compromising operational efficiency and profitability (Baryannis, Dani, and Antoniou, 2019).

**Supplier Failures:** This is a critical component of supply disruption, especially in manufacturing industries where production depends heavily on timely delivery of raw materials and components. Supplier failures can arise from financial distress, operational inefficiencies, labour strikes, or even political instability in supplier regions (Ivanov, 2021). For manufacturing firms like the Nigeria Bottling Company (NBC), supplier failure can cause delays in sourcing essential items like packaging materials, concentrates, and sugar, leading to production slowdown or stoppages. According to Baryannis et al. (2019), supplier failure is one of the most unpredictable risks because companies often lack real time visibility into their suppliers' internal operations. Over dependence on a single supplier or limited suppliers base heightens vulnerability, making the supply chain brittle (Ekpudu, Odigie, Rahim, and Okpala, 2025).
*$Ho_1$: Supplier failure do not have association with organisational performance*

**Defective Products/Materials:** Defective product or raw materials constitute another serious form of supply chain disruption, particularly in manufacturing industry, where quality is tightly linked to brand reputation. Defective materials can disrupt production processes, results in product recalls, and incur significant financial losses due to waste and rework (Fiksel et al., 2015). According to Choi et al. (2021), defective inputs compromise operational flow as defective batches must be identified, isolated, and replaced causing time delays and resource wastage. Inconsistent quality from

suppliers or poor internal quality control mechanisms often exacerbates this issue.
*$Ho_2$: There is no significant relationship between defective product or raw materials and organisational performance*

**Regulatory Changes:** This includes shifts in government policies, tariffs, environmental regulations, and safety standards, can significantly disrupt supply chains (Christopher and Holweg, 2017). For manufacturing firms operating in developing economies like Nigeria, frequent changes in import/export regulations, taxation policies, and quality standards can delay procurement processes and increase compliance costs (Moradeyo, et al, 2023). For instance, bottling companies might face disruptions when sudden bans on certain packaging materials, alterations in excise duties, or stringent food safety laws are introduced without adequate adjustment periods. According to Remko (2020), regulatory changes create uncertainties that ripple through supply networks, affecting sourcing, production, and distribution.
*$Ho_3$: Regulatory changes is independent of organisational performance*

### 2.2.2 Causes of Supply Chain Disruption

Supply chain disruptions in manufacturing industry are caused by a variety of internal and external factors that interfere with the flow of goods, services, and information across supply network. One of the most common causes is supplier related issues, such as late deliveries, financial instability, or complete supplier shutdowns (Ivanov, 2021). Bottling Companies in Nigeria relies heavily on both local and foreign suppliers for raw materials, any delay on or failure on the suppliers' part can halt production and lead to unmet consumer demand. According to Ekpudu, et. al., (2025), suppliers' dependence without proper risk diversification can lead to a systematic breakdown when their suppliers face challenges.

Another major cause is logistics and transportation disruptions: poor infrastructure, fuel scarcity, port congestion, or road insecurity common issues in Nigeria can delay the movement of raw materials or finished products, especially for companies operating in cities like Nigeria (Moradeyo, et al., 2022). These disruptions not only increase transportation cost but also reduce responsiveness and flexibility. Additionally, natural disasters and pandemics, such as COVID-19, have exposed how global events can cause sudden breakdowns in supply chains by restricting movement, limiting workforce availability, or causing border closures (Choi et al., 2021). Technological failures also contribute significantly to supply chain breakdowns. When information systems used to track inventory, monitor supplier performance, or coordinate logistics fail, the entire chain can suffer delays and errors (Baryannis et al., 2019). For instance, delays in digital communication with suppliers or breakdown of inventory systems can results in stockouts or overstocking both of which are costly.

Lastly, regulatory and policy changes play a significant role in causing supply chain disruptions. Changes in import/export laws, tariffs, taxes, or product safety regulations can unexpectedly alter supply routes or restrict access to necessary materials (Remko, 2020). For example, if bottling companies faces new regulations banning a type of plastic used in packaging, they must quickly find alternatives or risk halting production. These types of disruptions require firms to remain agile and maintain strong relationships with both suppliers and regulators to adapt quickly when changes occur.

### 2.3 Theoretical Framework

This study is anchored on the contingency theory, this theory says there is no single best way to run a business. Instead, the right approach depends on the situation the organisation is facing (Donaldson, 2016). This idea is especially important in supply chain management, where unexpected events like supplier failures, transportation delays, or regulatory changes can suddenly affect how a company operates. When it comes to supply chain disruptions, contingency theory explains that organisations need to be flexible and adaptable in their strategies. This theory also highlights the importance of aligning internal processes with external realities. If an organisation continues to operate as though everything is normal during a disruption, its performance will likely suffer. But if it adjusts its operations such as speeding up decision-making, communicating more frequently with suppliers, or reallocating resources it stands a better chance of maintaining strong performance. In this way, contingency theory supports the idea that organisational success during disruptions depends on how well a company responds to changing conditions.

## 3. Methodology

To effectively obtain answers to the research objectives, this paper adopted the descriptive survey research design because it enabled the researcher to directly gather information from those involved about issues relating to supply chain interruptions and their effects on organizational success. The survey design also proved useful in exploring the connections between different elements, thus enabling the researcher to draw more general conclusions based on the study's findings. The study population comprised of personnel at the Nigeria Bottling Company Plc. According to company records from the Personnel Department (2024), there were a total of 208 employees, excluding domestic staff. This group was considered significant as its members actively participate in supply chain activities, production processes, and overall organizational operations, therefore making their perspectives valuable to the research. Given the population's size, the Taro

Yamane (1967) formula was employed to determine the suitable sample size which arrived at 137.The study made use of a stratified random sampling technique to ensure a fair representation of different departments, including production, procurement, logistics, sales/marketing, and administration. Within each department, simple random sampling was used to choose the respondents.

This study provides us with a model that explained the functional relationship between SCD and organizational performance. The model was regressed and stated functionally as:

Supply Chain Disruption and Organizational Performance

$OP = f(SF, DP, RC)$…….. (1)

Econometrically, the model can be specified as:

$OPi = \alpha 0 + \alpha 1SFi + \alpha 2DPi + \alpha 3RCi + \xi i$ …… (2)

Where:

OP = Organizational Performance; SF = Supplier Failure; DP = Defective Product; RC= Regulatory Changes; ξ = Error term; α0 = Parametric constant; β0= Parametric constant: α1, α2, and α3 = Parametric coefficients of elasticity of supply chain disruption displaying degrees of explanation power about organizational performance.

## 4. Empirical Analysis and Result

### 4.1 Data on Causes of Supply Chain Disruptions in the Organization

Below is a table indicating the level of common causes of supply chain disruptions in bottling companies in Nigeria

**Table 1:** Common Causes of Supply Chain Disruptions in the Organization

| Cause of Disruption | Frequency (n) | Percentage (%) |
|---|---|---|
| Logistics and Transportation Issues | 109 | 79.6% |
| Supplier Failure | 95 | 69.3% |
| Demand Fluctuations | 55 | 40.1% |

***Source:*** *Researchers' computation, 2026*

Table 1 presents the most commonly reported causes of supply chain disruptions based on respondents' experiences within the bottling company. The leading cause identified is logistics and transportation issues, reported by 79.6% of respondents, underscoring the criticality of efficient movement of goods and materials in maintaining supply chain continuity. This is followed by supplier failure (69.3%), which suggest environmental factors remain significant sources of instability in the supply chain. Demand fluctuations, though still notable, were reported by 40.1% of respondents, indicating that while market unpredictability is a concern, operational and environmental challenges appear more immediate or impactful in the organizational context surveyed. Overall, these findings suggest a need for robust risk management strategies focusing on logistics resilience, supplier relationships, and contingency planning against environmental shocks.

### 4.2 Correlation Analysis of Supply Chain Disruptions and Organizational Performance

The results from the correlation analysis provide insights into the character and orientation of the connection between the dependent and independent variables. While the correlation coefficient does not denote a direct functional dependence, it serves as a preliminary indicator of the strength and trend of this relationship. The details of these findings is as follows:

**Table 2:** Correlation Results of Supply Chain Disruptions and Organizational Performance

Correlations

| | | OP | SF | DP | RC | SCD |
|---|---|---|---|---|---|---|
| OP | Pearson Correlation | 1 | | | | |
| | Sig. (1-tailed) | | | | | |
| | N | 137 | | | | |
| SF | Pearson Correlation | .197* | 1 | | | |
| | Sig. (1-tailed) | .011 | | | | |
| | N | 137 | 137 | | | |
| DP | Pearson Correlation | .293** | .394** | 1 | | |
| | Sig. (1-tailed) | .000 | .000 | | | |
| | N | 137 | 137 | 137 | | |
| RC | Pearson Correlation | .507** | .389** | .643** | 1 | |
| | Sig. (1-tailed) | .000 | .000 | .000 | | |
| | N | 137 | 137 | 137 | 137 | |
| SCD | Pearson Correlation | .413** | .362** | .542** | .713** | 1 |
| | Sig. (1-tailed) | .000 | .000 | .000 | .000 | |
| | N | 137 | 137 | 137 | 137 | 137 |

*. Correlation is significant at the 0.05 level (1-tailed).

**. Correlation is significant at the 0.01 level (1-tailed).
***Source:*** *Researchers' computation, 2026*

Table 2 presents the Pearson correlation coefficients between organizational performance (OP) and key supply chain disruption factors: Supplier Failure (SF), Defective Products (DP), Regulatory Changes (RC), and Supply Chain Disruptions (SCD). The results reveal varying degrees of statistically significant positive relationships, indicating that these supply chain-related variables are meaningfully associated with organizational performance.

The correlation between supplier failure and organizational performance is positive and weak ($r = .197$, $p < 0.05$), suggesting that as organizations better manage supplier failures or when such disruptions are acknowledged, performance slightly improves. A moderate and positive correlation exists between defective products and organizational performance ($r = .293$, $p < 0.01$), implying that minimizing defective products contributes meaningfully to enhanced performance. More notably, regulatory changes exhibit a strong and statistically significant relationship with organizational performance ($r = .507$, $p < 0.01$), indicating that effective adaptation to regulatory dynamics considerably enhances operational outcomes. Additionally, supply chain disruptions (SCD) as a broad construct show a moderately strong positive correlation with organizational performance ($r = .413$, $p < 0.01$), reflecting the importance of resilience and adaptability in disrupted supply environments.

### 4.3 Hypothesis Testing

The research hypotheses were tested utilising regression analysis in order to achieve the current study's objectives.

**Table 3:** Regression Output of Supply Chain Disruptions and Organizational Performance
Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | 1.609 | .382 | | 4.215 | .000 | | |
| | SF | .000 | .070 | .000 | .003 | .998 | .805 | 1.242 |
| | DP | -.094 | .128 | -.073 | -.731 | .466 | .552 | 1.812 |
| | RC | .479 | .121 | .470 | 3.957 | .000 | .394 | 2.537 |
| | SCD | .138 | .126 | .118 | 1.089 | .278 | .475 | 2.105 |

a. Dependent Variable: OP
***Source:*** *Source: Researchers' computation, 2026*

Table 3 presents the regression coefficients for the model assessing the effect of supply chain disruption variables, including Supplier Failure (SF), Defective Products (DP), Regulatory Changes (RC), and Supply Chain Disruptions (SCD) on Organizational Performance (OP). Both unstandardized and standardized coefficients are reported, along with their significance levels and multicollinearity diagnostics. The regression model's constant (intercept) is 1.609, indicating the baseline value of organizational performance when all predictors are held at zero.

Hypothesis one revealed that supplier failures do not affect organizational performance. The regression result shows a coefficient (B = 0.000) with a p-value of 0.998, which is far greater than 0.05. Hypothesis 2 showed that defective products (B = -0.094) with a p-value of 0.466, which exceeds 0.05 do not impact organisational performance. However, Hypothesis 3 confirms that regulatory changes (B = 0.479) with a p-value of 0.000, which is less than 0.05 have a significant positive effect on organizational performance. The model indicates that there exists no significant relationship between supply chain disruptions and organizational performance, nevertheless, regulatory changes is the most significant variable impacting organisational performance.

The collinearity statistics indicate acceptable levels of multicollinearity. All Variance Inflation Factor (VIF) values are below the critical threshold of 5, with the highest being 2.537 for RC, and Tolerance values are well above 0.1, confirming that the independent variables do not suffer from severe multicollinearity. Thus, the regression output confirms that regulatory changes are the most influential factor in predicting organizational performance. The other variables, although conceptually important, do not show significant statistical contributions in this model. This suggests that strategic focus on regulatory compliance and adaptation is key to enhancing organizational outcomes in the face of supply chain disruptions.

## 5. Conclusion

This study has looked at how disruptions in the supply chain affect organizational performance, focusing on Bottling Companies in Nigeria. The study established that supply chain disruption factors like supplier failure, defective materials, and mostly changes in regulations have strong impacts on the performance of bottling companies. These disruptions result in a reduction of production efficiency and increased costs, thereby lowering customer satisfaction. Therefore, efficient supply chain management and resilience strategies are

essential in maintaining performance through disruptions. Organizations should diversify suppliers, operate quality assurance systems, and devise adaptive strategies that deal with policy and regulatory changes. This will result in the company ensuring better operation outcomes through proactive risk management, continuous product and process innovations, and strong partnerships across the supply chain. The study recommends that organisations should establish long-term partnerships with reliable suppliers and diversify its supply base to minimize risks of material shortages. There should be continuous monitoring and evaluation of input materials through advanced quality assurance systems to reduce the incidences of defective materials. Organisations should have a compliance group that would ensure constant surveillance regarding changes in regulations and rapid adaptation to changed requirements. Also, management should incorporate formal risk assessment and mitigation strategies into supply chain planning to anticipate and minimize potential disruptions. Lastly, there should be investment in digital supply chain systems, data analytics, and predictive software that will improve the visibility, traceability and responsiveness across the supply chain.

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# Credit Risk Management and Profitability of Deposit Money Banks in Nigeria: A Tobin's Q Approach

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**Abstract.** This study examines the effect of credit risk management on the profitability of quoted deposit money banks in Nigeria over the period 2015–2024, using a balanced panel of twelve deposit money banks. Adopting a longitudinal research design, the study employs descriptive statistics, correlation analysis, panel unit root and co-integration tests, and feasible generalized least squares (FGLS) estimation to analyse the long-run and short-run relationships among the variables. Bank performance is proxied by Tobin's Q, while credit risk management is measured using non-performing loan ratio, loan and advances to deposit ratio, loan loss provision ratio, and capital adequacy ratio, with leverage ratio included as a control variable. The empirical results reveal that non-performing loans, loan and advances to deposit ratio, loan loss provision ratio, and leverage ratio exert positive and statistically significant effects on bank performance, whereas capital adequacy ratio shows a positive but insignificant relationship. The findings suggest that Nigerian deposit money banks demonstrated resilience during the study period, as increases in credit risk indicators did not necessarily translate into declining market-based performance. Based on these results, the study recommends strengthening credit appraisal and monitoring systems, maintaining optimal loan-to-deposit ratios, adopting prudent provisioning policies, and ensuring balanced leverage management to enhance bank performance and stability.

**Keywords:** Credit Risk Management; Bank Performance; Tobin's Q; Deposit Money Banks; Nigeria

## 1. Introduction

In today's increasingly volatile financial environment, effective credit risk management has become essential to the stability and performance of financial institutions. Since the global financial crisis, the role of banks as central providers of credit to businesses and industries has grown significantly (Saeed & Zahid, 2016). However, this expansion has also heightened their exposure to credit risk, particularly due to uncertainties in global markets. Credit risk remains a core threat to the profitability and stability of banks (Berríos, 2013). It has been confirmed that a bank's performance is closely linked to the quality of its credit risk practices (Iwedi & Amako, 2014; Ali, 2015). For deposit money banks, which rely heavily on lending activities, the exposure to default is especially pronounced. While credit risk also extends to off-balance-sheet operations such as guarantees and swaps, loan defaults remain the most significant factor influencing performance (Aduda & Gitonga, 2011).

As the banking sector has evolved, so too have the types of risks that institutions must manage. Credit risk is no longer isolated to lending alone but is intertwined with broader financial risks, including market, liquidity, and operational risks (Li & Zou, 2014). In this context, risk management has shifted from being a support function to a strategic cornerstone in financial decision-making. The growing complexity of banking products and services demands a proactive approach to risk identification and control. Modern financial institutions operate in a space where profit maximization is inseparable from sound risk governance. Failures in credit risk management have led to significant losses globally, prompting banks to revise and upgrade their internal systems and policies to better anticipate and mitigate risk exposure (Osuka & Amako, 2015).

In the Nigerian banking sector, the persistent issue of non-performing loans (NPLs) continues to hinder both operational stability and market-based performance. Defaulted credit weakens asset quality and diminishes investor confidence, ultimately affecting the bank's valuation in capital markets (Osuka & Amako, 2015). In response, some banks have implemented structured credit assessment systems and adopted techniques such as hedging or risk-based pricing to manage their exposure more effectively (Iwedi & Onuegbu, 2014). While these efforts aim to mitigate potential losses, overly cautious risk avoidance may limit a bank's

competitive edge and growth potential. Therefore, striking a balance between risk mitigation and market value enhancement is crucial. This study investigates the impact of credit risk on bank performance by employing Tobin's Q as a measure of market-based performance. Unlike traditional accounting metrics, Tobin's Q provides insight into how efficiently a firm's assets are perceived by the market in relation to their replacement cost, offering a broader perspective on how credit risk management influences investor valuation (Li & Zou, 2014).

Previous research on the relationship between credit risk and bank performance has employed a wide range of empirical methodologies. These include panel data regression models (Adegbie & Otitoloye, 2020; Bhattarai, 2019; Annor & Obeng, 2017; Kishori & Jeslin, 2017), the generalized method of moments (Ajao & Oseyomon, 2019; Kithinji, 2010), and ordinary least squares (Nwude & Okeke, 2018; Ahmed & Ariff, 2007). Other techniques such as multiple regression analysis (Nwanna & Oguezue, 2017; Osuka & Amako, 2015; Li & Zou, 2014), two-stage least squares (Oduro, Asiedu & Gamali, 2019), and correlation analysis (Alalade, Binuyo & Oguntodu, 2014; Kolapo, Ayeni & Oke, 2012) have also been frequently applied. Additionally, some studies have utilized more advanced models, such as error correction models (Harcourt, 2017), structural equation modeling (Gadzo, Kportorgbi & Gatsi, 2019), and analysis of variance (Saeed & Zahid, 2016). While these approaches have their respective advantages and limitations, it is noteworthy that only one known study conducted in Sweden by Hosna and Manzura (2009) applied the feasible generalized least squares (FGLS) estimation. FGLS is particularly effective in addressing econometric challenges such as heteroskedasticity, autocorrelation, and cross-sectional dependence, making it a more efficient alternative to ordinary least squares. Given its robustness, this study adopts the FGLS technique to assess the relationship between credit risk management and market-based performance, using Tobin's Q as the dependent variable.

The findings from earlier studies are mixed. Some researchers report a significant positive association between credit risk indicators and bank performance (Adegbie & Otitolaiye, 2020; Kajola et al., 2019; Ajao & Oseyomon, 2019; Annor & Obeng, 2017; Harcourt, 2017; Abiola & Olausi, 2014), while others document a negative relationship (Oduro et al., 2019; Gadzo et al., 2019; Kajirwa & Katherine, 2019; Kishori & Jeslin, 2017; Alalade et al., 2014). Some studies reveal inconclusive or mixed results, highlighting the influence of context-specific factors (Bhattarai, 2019; Bayyoud & Sayyad, 2015). These variations in outcomes suggest the need for further investigation, particularly using more recent data, an alternative methodological framework, and a broader perspective of performance beyond traditional accounting measures. Accordingly, this study seeks to bridge the gap by evaluating how credit risk management affects the market performance of Nigerian deposit money banks listed on the Nigerian Exchange Group (NGX), using Tobin's Q as the key performance metric.

The remainder of this paper is structured as follows: the next section reviews the relevant literature; this is followed by the research methodology, data analysis, and discussion of findings. The paper concludes with key insights and policy recommendations.

## 2. Literature Review

### 2.1 Concept of Profitability

According to Li and Zou (2014), defined profitability as a gauge of capability of the bank to bear risk and/or raise the capital of bank and it implies effectiveness of the bank and gauges the excellence of management. Similar to all businesses, banks earn more money than what they pay in expense to make profit. The bank makes profit by charging fees for its services and the interest earned from its assets (Li & Zou, 2014). The key expense of the bank is due the interest paid for its liabilities. The foremost assets of a bank are the loans provided to individuals, businesses, and other organizations and the securities that it owns, while the liabilities are the deposits, money borrowed from other banks and commercial paper sold in the money market. Banks also increase its profits by using leverage and profits of the banks can be measured as a return on assets and as a return on equity. Leverage has the tendency to make banks earn larger return on equity than on assets. There are several measures of profitability, including Return on assets (ROA), return on equity (ROE), TOBINSQ, among others (Poudel, 2012; Ross, Westerfield, Jaffe & Jordan, 2011). However, this study adopts TOBINSQ as a result of the fact that it provides insight into how efficiently a firm's assets are perceived by the market in relation to their replacement cost, offering a broader perspective on how credit risk management influences investor valuation (Li & Zou, 2014)

### 2.2 Credit Risk Management

Credit risk management refers to the systematic process by which banks identify, assess, monitor, and control the risk arising from borrowers' failure to meet their contractual debt obligations. Credit risk itself reflects the possibility that actual loan returns will deviate from expected returns due to partial or total default, potentially resulting in the loss of both principal and accrued interest (Boland, 2012). Given

the intermediation role of banks, credit risk has long been recognised as a core source of banking risk, as highlighted by the Basel Committee in the early Basel Accords. Effective credit risk management is therefore essential for safeguarding bank profitability, ensuring institutional viability, and promoting financial system stability. Advances in banking technology have further strengthened credit risk management by enabling faster credit decisions and lowering monitoring costs, thereby improving loan quality and capital allocation efficiency (Das & Ghosh, 2007; Iwedi & Onuegbu, 2014).

The Basel Committee on Banking Supervision (2001) defines credit risk as the potential loss arising from default events on outstanding loans, a view reinforced by Rose (2002), who describes it as the tendency of loan assets to lose value. Empirical studies attribute elevated credit risk to weak credit policies, inadequate capital and liquidity buffers, poor loan underwriting, ineffective credit assessment, weak governance, and insufficient regulatory supervision (Kithinji, 2010). Credit risk commonly manifests through exposure risk, recovery risk, and default risk, and is typically measured using indicators such as non-performing loans, loan loss provisions, capital adequacy ratios, portfolio-at-risk, and operating efficiency (Ahmad & Ariff, 2007; Epure & Lafuente, 2012; Gizaw et al., 2015). When poorly managed, rising credit risk can escalate into liquidity and solvency challenges, underscoring the importance of robust credit risk management frameworks in modern banking systems.

### 2.2.1 Non-Performing Loans and Profitability

Non-performing loans (NPLs) represent a primary indicator of credit risk in deposit money banks and are commonly measured as the ratio of non-performing loans to total loans and advances. This ratio reflects the quality of a bank's loan portfolio and the proportion of credit facilities that are at risk of default. A persistently high NPL ratio signals weaknesses in credit appraisal, monitoring, and recovery processes, and indicates a higher likelihood that loan principal and interest may not be recovered, thereby eroding profitability (Felix & Claudine, 2008; Kargi, 2011). Regulatory frameworks typically require non-performing facilities to be classified as substandard, doubtful, or lost based on clearly defined criteria, reinforcing the role of NPLs as a critical measure of asset quality and managerial efficiency (Ahmad & Ariff, 2007; Epure & Lafuente, 2012).

### 2.2.2 Loans, Advances and Profitability

The loans-to-deposit ratio is widely used to assess both the liquidity position and income-generating capacity of banks. It measures the extent to which customer deposits are transformed into earning assets and indicates a bank's ability to satisfy loan demand while meeting withdrawal obligations. While a higher ratio may enhance profitability through increased interest income, excessive loan expansion can expose banks to liquidity pressure and insolvency risk if not supported by sound risk management practices (Kithinji, 2010; Brealey & Myers, 2003). To ensure financial soundness, regulatory authorities require banks to make adequate provisions for expected credit losses based on prescribed loan classification systems. These provisions include specific provisions for identified non-performing facilities and general provisions to cover inherent risk in performing loans, thereby ensuring a more accurate representation of banks' financial condition (Basel Committee on Banking Supervision, 2001; Ahmad & Ariff, 2007).

### 2.2.3 Loan Loss Provision Ratio and Profitability

Loan loss provisions constitute expenses set aside by banks to absorb expected losses arising from loan defaults and serve as an internal risk-buffering mechanism. By allocating part of current earnings to cover potential future losses, banks protect depositors' funds and enhance balance sheet resilience. The loan loss provision ratio (LLPR) reflects management's assessment of asset quality and anticipated credit losses. An increase in LLPR generally indicates deterioration in loan portfolio quality and is often associated with reduced profitability due to higher provisioning expenses (Gizaw et al., 2015; Epure & Lafuente, 2012). Consequently, while adequate provisioning strengthens financial stability, excessive or persistent increases in LLPR may constrain earnings performance.

### 2.2.4 Capital Adequacy Ratio and Profitability

Capital adequacy ratio (CAR) measures a bank's capital strength by expressing regulatory capital as a proportion of risk-weighted assets. Adequate capital buffers enhance banks' ability to absorb losses arising from credit risk and reduce the probability of insolvency, which in theory should support profitability and long-term stability (Basel Committee on Banking Supervision, 2001). Empirical evidence on the CAR–profitability relationship remains mixed. While some studies report a positive association between CAR and return on equity, suggesting that well-capitalized banks are better positioned to undertake profitable investments (Hosna et al., 2009), others argue that excessive capital may depress returns or yield ambiguous effects (Goddard et al., 2004). Higher capital levels can enable banks to expand into higher-return activities such as loan commitments and standby credit facilities, but profitability also depends on

effective asset allocation, net interest margins, and liquidity management (Ommeren, 2011; Li & Zou, 2014). Theoretical perspectives such as shiftability theory further suggest that profitability and liquidity are influenced not only by loan portfolios but also by banks' ability to convert assets into cash at predictable prices, highlighting the complex interaction between capital adequacy, risk management, and profitability (Hosna & Manzura, 2009; Kargi, 2011).

**2.3 Theoretical Review**

This study is anchored on four major theories that explain bank lending behavior, liquidity management, and credit risk exposure, namely the commercial loan theory, shiftability theory, anticipated income theory, and credit risk theory.

Commercial Loan Theory, also known as the real bills doctrine, is one of the earliest banking theories, originally advanced by Adam Smith in The Wealth of Nations (1776). The theory posits that banks should restrict lending to short-term, self-liquidating commercial loans that finance the production, processing, and distribution of goods. Such loans are expected to liquidate themselves through the normal course of business operations, thereby ensuring bank liquidity and reducing the likelihood of loan default. Ugwu et al. (2020) argue that these self-liquidating loans enhance economic liquidity and minimize bad debt occurrence. The theory further suggests that bank lending should adjust in line with aggregate economic activity, serving as a stabilizing force for monetary supply (Hosna & Manzura, 2009). Its appeal lies in the short-term nature of credit, which promotes productivity and steady income generation for banks, although its rigid application has been criticized in modern banking systems.

Shiftability Theory expands the scope of acceptable bank assets beyond self-liquidating commercial loans to include marketable securities that can be easily transferred or sold in secondary markets, such as government bonds (Moti et al., 2012). Rather than invalidating the commercial loan theory, shiftability theory complements it by emphasizing asset marketability as a key determinant of bank liquidity. The theory assumes that liquidity depends on a bank's ability to shift assets at predictable prices when needed. Hosna and Manzura (2009) note that this perspective redirected regulatory and managerial focus from loans to investments as liquidity sources. However, Kargi (2011) criticizes the theory for its systemic limitation, arguing that while an individual bank may achieve liquidity by selling assets, such a strategy may fail if all banks attempt to do the same simultaneously. Additionally, the theory has been criticised for its limited relevance in developing economies, such as Nigeria, where long-term financing is crucial for capital formation and economic growth.

Anticipated Income Theory, developed by Prochnow in 1944, challenges the liquidation-based focus of earlier theories by emphasizing borrowers' future income streams as the primary basis for loan repayment. The theory holds that banks should grant credit based on the expected earnings and cash flows of borrowers rather than relying on asset liquidation or loan transferability (Afriyie & Akotey, 2011). Kolapo et al. (2012) describe this theory as forward-looking and cash-flow oriented, making it particularly relevant for term lending and modern banking practices. While it does not dispute the role of secondary reserves highlighted by shiftability theory, it redefines appropriate lending by aligning credit decisions with projected income rather than current asset values. This approach broadens banks' lending capacity and supports long-term investment financing while maintaining credit discipline (Moti et al., 2012).

Credit Risk Theory focuses on the probability of borrower default and the potential loss faced by lenders when debt obligations are not met. According to Anderson et al. (2002), credit risk arises when borrowers fail to repay principal or interest, leading to partial or total financial loss. The theory emphasizes risk assessment mechanisms such as credit screening, collateral requirements, guarantees, and risk-based pricing, where higher risk exposures attract higher interest rates (Owojori et al., 2011). While recognizing the importance of asset quality, the theory also acknowledges the role of liability management and money markets in addressing liquidity shortages. Shafiq and Nasr (2010) argue that banks actively manage both assets and liabilities to meet deposit withdrawals and loan demand, underscoring the interdependence between credit risk management, liquidity provision, and profitability. The theory thus provides a strong conceptual foundation for examining how credit risk influences bank performance and financial stability.

**2.4 Empirical Review**

Ugwu and Okwo (2025) examined the effect of credit risk management on financial performance of deposit money banks in Nigeria from 2014 t0 2023 adopting panel ordinary least squares as method of data analysis. The study revealed that loan loss provision and capital adequacy ratio have positive and significant impact on return on asset why non-performing loan has negative and significant impact on financial performance of deposit money banks in Nigeria. Onyegiri et al. (2024) assessed how risk management strategies impact the financial

performance of DMBs in Nigeria. Using an ex post facto research design and the Auto-Regressive Distributed Lag (ARDL) model on data covering 29 years (1994–2022), the findings indicated that credit and liquidity risks were not significant determinants of return on assets, while operational risk and capital adequacy risk exerted significant influence on ROA.

Olawale (2024) investigated the role of capital adequacy in enhancing the stability of Nigerian banks within a volatile economic environment. Employing OLS analysis on data from 2005 to 2020, the study found that capital adequacy ratio (CAR) and firm size positively contributed to stability, whereas non-performing loans (NPL) and loans and advances (LA) had adverse effects; monetary policy and capital regulation were also found to be important. Ojiegbe (2024) evaluated the effect of capital adequacy on profit before tax in Nigerian banks using time-series data from 2004 to 2022 and an ARDL approach. The results showed that total qualifying capital negatively affected profit before tax, while adjusted shareholders' funds had a positive and significant impact on profitability.

Ajagbe et al. (2024) analyzed the relationship between financial risk management and the performance of Nigerian commercial banks over the period 2009 to 2022. Using return on assets (ROA) as the performance indicator and capital risk (CAR), liquidity risk (LQR), market risk (MKR), and operational risk (OPR) as proxies for financial risk, the study employed fixed effects panel regression on 70 observations drawn from five major banks. The findings indicated that none of the individual risk variables had a statistically significant effect on ROA.

Al Zaidanin and Al Zaidanin (2021) conducted a study on the impact of credit risk management on the financial performance of commercial banks in the United Arab Emirates using audited financial statements covering 2013–2019 and applying descriptive statistics and random effects panel regression. Their findings revealed that non-performing loans and cost–income ratios exerted a significant negative effect on profitability, while capital adequacy, liquidity, and loan-to-deposit ratios were statistically insignificant. Similarly, Uzoedika and Orjinta (2021) examined deposit money banks in Nigeria and Botswana using panel regression analysis on data from 2010–2019 and found that non-performing loans negatively and significantly affected profitability in Nigeria but positively in Botswana, while capital adequacy, liquidity risk, and loan loss provisions were insignificant in both countries. Alnajjar and Othman (2021), using fixed and random effects models on panel data from Islamic banks in selected MENA countries between 2017Q1 and 2019Q4, reported a statistically significant negative effect of capital adequacy ratio on both ROA and ROE, while Omiagbo and Daniel (2021) found a positive and significant relationship between credit and liquidity risk management and return on assets of Nigerian commercial banks using panel regression techniques.

Adegbie and Otitolaiye (2020) investigated the relationship between credit risk management and financial performance of Nigerian deposit money banks using panel data from 2006–2018 and random effects regression, concluding that credit risk management significantly influences bank performance. Adegbie and Adebanjo (2020), focusing on financial stability rather than profitability, analysed data from quoted Nigerian banks between 2008 and 2017 using multiple regression and found that non-performing loans, loan loss provisions, and loan-to-deposit ratios significantly affected financial stability. Onyefulu, Okoye, and Orjinta (2020) extended the analysis to West Africa by examining banks in Nigeria and Ghana using correlation, descriptive, and panel regression analyses on data from 2009–2018, revealing that credit risk indicators exerted a significant negative effect on return on equity.

Empirical studies published in 2019 provide cross-country insights from Africa and Asia. Oduro, Asiedu, and Gamali (2019) examined Ghanaian banks listed on the stock exchange using financial data from 2003–2017 and two-stage least squares estimation, finding that capital adequacy, operating efficiency, profitability, and net interest margin were inversely related to credit risk, while bank size increased credit risk exposure. Bhattarai (2019) analysed ten commercial banks in Nepal using balanced panel data from 2001–2016 and regression analysis, showing that capital adequacy, non-performing loans, and management quality significantly influenced ROA, while credit-to-deposit ratio and risk sensitivity were insignificant. In Kenya, Kajirwa and Katherine (2019) employed correlation and regression techniques on listed banks from 2014–2018 and found that credit risk had a significant negative impact on financial performance. Similarly, Ajao and Oseyomon (2019) used dynamic GMM and Granger causality methods on Nigerian banks from 2006–2016 and reported that capital adequacy, non-performing loans, and loan loss provisions positively and significantly affected ROA, while liquidity risk exerted a negative influence.

Further African evidence from 2019 and earlier years highlights the complexity of credit risk–profitability relationships. Kajola et al. (2019) examined Nigerian deposit money banks between 2005 and 2016 using random effects GLS regression and found that non-performing loans, capital adequacy, and loan-to-

deposit ratios significantly influenced ROA and ROE. Gadzo, Kportorgbi, and Gatsi (2019) analysed universal banks in Ghana using structural equation modelling and found that both credit risk and operational risk negatively affected financial performance. Gambo et al. (2019), using OLS and GLS panel regression on Nigerian banks from 2010–2018, reported that solvency risk and firm size positively affected profitability, while credit risk and capital adequacy were insignificant. Nwude and Okeke (2018) also found that credit risk management significantly improved ROA, ROE, and total loans and advances of Nigerian banks using OLS regression on data from 2000–2014.

Nwanna and Oguezue (2017) analysed Nigerian banks using multiple regression on data from 2006–2015 and found that sound credit management improved profitability, although non-performing loans had a negative but insignificant effect. Annor and Obeng (2017) examined Ghanaian banks using random effects panel estimation and reported a significant relationship between credit risk management and profitability. Kishori and Jeslin (2017) found a significant negative impact of credit risk management on bank performance in India using data from 2001–2011. Harcourt (2017), applying ECM and Granger causality techniques to Nigerian data from 1989–2014, confirmed that credit risk indicators significantly influenced ROA and ROE. Saeed and Zahid (2016), studying UK banks during the financial crisis period using correlation, ANOVA, and OLS, found a positive association between credit risk indicators and profitability.

Li and Zou (2014) analysed 47 large European banks using descriptive statistics and multiple regression on data from 2007–2012 and found that credit risk management did not positively affect profitability. Abiola and Olausi (2014) reported a significant relationship between non-performing loans, capital adequacy, and profitability of Nigerian banks using panel regression, while Aialade et al. (2014) found that credit risk reduced profitability based on survey and correlation analysis. Kaaya and Pastory (2013) observed a negative relationship between credit risk and ROA in Tanzanian banks using regression analysis, while Samuel (2013) and Poudel (2012) found that non-performing loans and default-related indicators adversely affected profitability in Nigerian and Nepalese banks, respectively. Earlier studies by Kargi (2011), Al-Khouri (2011), Kithinji (2010), Hosna and Manzura (2009), Felix and Claudine (2008), and Ahmad and Ariff (2007) consistently emphasised that poor credit risk management, particularly high non-performing loans and weak provisioning practices, undermines bank profitability, with stronger effects observed in emerging economies.

## 3. Methodology

This study adopts a longitudinal research design to examine the effect of credit risk management and profitability of deposit money banks in Nigeria, a design that is particularly suitable given the historical and non-manipulable nature of the data. The population comprises all thirteen (13) deposit money banks listed on Nigerian Exchange Limited as at 31 December 2024; however, a census approach was employed in which all listed banks were initially included, with Ecobank Plc excluded due to data inconsistencies. The final sample therefore consists of twelve deposit money banks, namely Access Bank Plc, First Bank of Nigeria Plc, FCMB, Fidelity Bank Plc, Guaranty Trust Bank Plc, Stanbic IBTC Plc, Sterling Bank Plc, United Bank for Africa Plc, Union Bank Plc, Unity Bank Plc, Wema Bank Plc, and Zenith Bank Plc. The study covers a ten-year period from 2015 to 2024, selected to capture developments in the post-consolidation era and ensure contemporary relevance. Data for the study were obtained exclusively from secondary sources, specifically audited annual financial statements of the sampled banks and the Central Bank of Nigeria Statistical Bulletins.

### 3.1 Model Specification

This model was hinged on the anticipated income theory postulated by Prochanow (1944) adopted as the theoretical framework as discussed in chapter two. In order to examine the impact of credit risk management on the performance of deposit money banks, this study adopted the model of Annor and Obeng (2017).

The model of Annor and Obeng (2017) is stated as;

$ROE_{it} = \alpha 0 + \beta_1 NPL_{it} + \beta_2 LLPR_{it} + \beta_3 CAR_{it} + \beta_4 LARt + \varepsilon_{it}$…….. ..(1)

The model introduces the variables; loan and advances and leverage ratio to suit our study.

The functional forms of the models are stated below as:

Tobin Q = F (NPL, LA, LLP, CAR, LR) ……. (2)

The econometric forms of the models are expressed in the equation below:

Tobin Qit = $\alpha_0 + \beta_1 NPLit + \beta_2 LAit + \beta_3 LLPit + \beta_4 CARit + \beta_5 LRit + \varepsilon it$ ……..(3)

Where;

Tobin Q = Market base measure of Performance

NPL = Non-performing Loans

LA = Loans and Advances

LLP = Loans Loss Provision

CAR = Capital Adequacy Ratio

LR = Leverage Ratio

εit = error term

$\beta_0$, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$ and $\beta_5$= are parameters to be estimated

Apriori expectation = $\beta_1$ to $\beta_5 > 0$

### 3.2 Methods of Data Analysis

This study employed a combination of descriptive statistics, correlation analysis, panel unit root tests, panel co-integration analysis, and feasible generalized least squares (FGLS) estimation. Descriptive statistics were used to provide a preliminary overview of the distributional properties and normality of the variables, while correlation analysis examined the strength and direction of relationships among the model variables. Panel unit root tests were conducted to assess the stationarity of the series and ensure the reliability of the data, given that non-stationary variables may produce spurious results. Based on the unit root outcomes, panel co-integration tests were applied to determine the existence of long-run relationships among the variables. The study ultimately adopted the FGLS estimation technique because of its robustness to heteroskedasticity, serial correlation, and cross-sectional dependence, making it more efficient and reliable than the ordinary least squares estimator for panel data analysis.

### 3.3 Operationalization and Measurement of Variable

| S/N | Variables | Definition | Type of Variables | Measurement | Authors |
|---|---|---|---|---|---|
| 1 | Tobin Q | Market measurement of performance. | Dependent | Ratio of market values to replacement cost | Daines (2001) |
| 2 | NPL | Non-Performing Loans | Independent | Proportion of loan loses amount in relation to total loans amount | Ara, Bakaeva and Sun (2009) |
| 3 | LA | Loans and Advances | Independent | Total loans divided by total deposits | Ogboi and Unuafe (2013) |
| 4 | LLP | Loan Loss Provisions Ratio | Independent | Ratio of loan loss provision to average gross loans in Naira | Zheng, Perhiar, Gilal and Gilal (2019) |
| 5 | CAR | Capital Adequacy Ratio | Independent | Shareholders' fund divided by total risk weighted assets. | Poudel (2012) |
| 6 | LR | Leverage Ratio | Independent | Total debts divided by total equity. | Ali (2015). |

***Source:*** *Researcher's Compilation, (2025)*

## 4. Findings and Discussions

The empirical results are presented in this section using descriptive, correlation, unit root, Estimated/Feasible Generalized Least Squares (EGLS or FGLS) technique, and granger causality.

**Table 2:** Descriptive Statistics of all Variables Employed

| stat | Mean | Median | Maximum | Minimum | Std. Dev. | Skewness | Kurtosis | Jarque-Bera | Probability | Sum | Obs |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Capital Adequacy Ratio | 13.06 | 19.73 | 44.00 | -213.6 | 36.53 | -5.41 | 32.35 | 4852.27 | 0.00 | 1554.09 | 119 |
| Loan and advances to deposit ratio | 0.67 | 0.66 | 1.43 | 0.03 | 0.20 | 0.33 | 4.66 | 15.98 | 0.00 | 80.80 | 120 |
| Loan Loss Provision Ratio | 0.06 | 0.02 | 2.93 | -0.02 | 0.27 | 10.15 | 108.02 | 57203.50 | 0.00 | 6.79 | 120 |
| Leverage Ratio | 8.06 | 6.26 | 191.21 | -9.64 | 17.27 | 10.08 | 107.30 | 56420.72 | 0.00 | 967.21 | 120 |
| Non-Performing Loan Ratio | 7.43 | 4.03 | 98.00 | 0.00 | 12.23 | 4.61 | 29.19 | 3855.83 | 0.00 | 891.57 | 120 |
| Tobin's Q | 1.18 | 0.70 | 20.72 | -2.25 | 2.23 | 6.29 | 51.77 | 12680.51 | 0.00 | 141.19 | 120 |

***Source:*** *Author's Computation (2025) using E-Views 12*

The descriptive statistics show substantial variation across the variables over the 120 observations, indicating heterogeneous financial conditions among the sampled banks. Capital adequacy ratio recorded a mean of 13.06 with a wide range from –213.60 to 44.00 and a high standard deviation of 36.53, suggesting significant dispersion and extreme observations. The loan and advances to deposit ratio averaged 0.67 with relatively low variability (standard deviation of 0.20), indicating moderate lending activity relative to deposits. Loan loss provision ratio and non-

performing loan ratio had mean values of 0.06 and 7.43 respectively, but both exhibited high skewness, kurtosis, and large Jarque–Bera statistics, reflecting the presence of outliers and non-normal distributions. The leverage ratio, included as a control variable, showed a mean of 8.06 with considerable dispersion (standard deviation of 17.27), highlighting differences in banks' capital structures. Tobin's Q averaged 1.18, indicating that market valuation slightly exceeded book value on average, though its wide range and non-normality further confirm significant cross-bank variability in performance.

**Table 3:** Correlation Statistics of All Variables Employed

| correlation | Capital Adequacy Ratio (CAR) | Loan and advances to deposit ratio | Loan Loss Provision Ratio | Leverage Ratio | Non-Performing Loan Ratio | Tobin's Q |
|---|---|---|---|---|---|---|
| CAR | 1.000 | 0.330 | -0.520 | 0.090 | -0.078 | 0.031 |
| LA | 0.330 | 1.000 | -0.318 | -0.077 | 0.267 | 0.099 |
| LLP | -0.520 | -0.318 | 1.000 | -0.038 | 0.017 | -0.059 |
| LR | 0.090 | -0.077 | -0.038 | 1.000 | 0.036 | 0.200 |
| NPL | -0.078 | 0.267 | 0.017 | 0.036 | 1.000 | 0.110 |
| TOBINQ | 0.031 | 0.099 | -0.059 | 0.200 | 0.110 | 1.000 |

***Source:*** *Author's Computation (2025) using E-Views 12.*

The correlation results indicate generally weak to moderate associations among the variables, suggesting the absence of severe multicollinearity in the model. Capital adequacy ratio shows a moderate positive relationship with loan and advances to deposit ratio (0.330) but a relatively strong negative association with loan loss provision ratio (–0.520), implying that better-capitalised banks tend to make lower provisions for credit losses. Loan and advances to deposit ratio is negatively related to loan loss provisions (–0.318) but positively associated with non-performing loans (0.267), indicating that higher lending intensity may increase credit risk exposure. The leverage ratio, used as a control variable, exhibits weak correlations with most variables but shows a modest positive relationship with Tobin's Q (0.200), suggesting a limited link between leverage and market valuation. Overall, the low magnitude of most correlation coefficients confirms that the explanatory variables can be jointly included in the regression model without multicollinearity concerns.

**Table 4a:** Panel Unit Root Test at Levels- The Levin, Lin and Chu; Im, Pesaran and Shin; ADF - Fisher and PP - Fisher Approaches

| Variables | Levin, Lin and Chu | | | Im, Pesaran and Shin W-stat | | | ADF - Fisher Chi-square | | | PP - Fisher Chi-square | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Null Hypothesis: Unit root (assumes common unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | |
| | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* |
| **CAR** | -7.89099 | 0.0000 | Stationary | -3.92848 | 0.0000 | Stationary | 60.2001 | 0.0001 | Stationary | 81.5468 | 0.0000 | Stationary |
| **LA** | -2.79 | 0.0027 | Stationary | -0.33 | 0.3716 | Non-Stationary | 24.5186 | 0.4323 | Non-Stationary | 32.3846 | 0.1177 | Non-Stationary |
| **LLP** | -17.35 | 0.0000 | Stationary | -6.86 | 0.0000 | Stationary | 81.1891 | 0.0000 | Stationary | 105.280 | 0.0000 | Stationary |
| **LR** | -9.37 | 0.0000 | Stationary | -3.67 | 0.0001 | Stationary | 52.9170 | 0.0006 | Stationary | 56.9656 | 0.0002 | Stationary |
| **NPL** | -22.23 | 0.0000 | Stationary | -9.11 | 0.0000 | Stationary | 83.1251 | 0.0000 | Stationary | 89.7005 | 0.0000 | Non-Stationary |
| **TOBINQ** | -14.84 | 0.0000 | Stationary | -5.85 | 0.0000 | Stationary | 66.6349 | 0.0000 | Stationary | 80.1106 | 0.0000 | Stationary |

**Note:** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.
*Source: Author's Computation (2025) using E-Views 12.*

**Table 4b:** Panel Unit Root Test at First Difference- The Levin, Lin and Chu; Im, Pesaran and Shin; ADF - Fisher and PP - Fisher Approaches

| Variables | Levin, Lin and Chu | | | Im, Pesaran and Shin W-stat | | | ADF - Fisher Chi-square | | | PP - Fisher Chi-square | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Null Hypothesis: Unit root (assumes common unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | | Null Hypothesis: Unit root (assumes individual unit root process) | | |
| | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* | *Stat* | *Prob* | *Remark* |
| CAR | -13.4 | 0.00 | Stationary | -5.95 | 0.00 | Stationary | 82.70 | 0.00 | Stationary | 101.0 | 0.00 | Stationary |
| LA | -6.05 | 0.00 | Stationary | -2.75 | 0.00 | Stationary | 49.70 | 0.00 | Stationary | 51.1 | 0.00 | Stationary |
| LLP | -13.2 | 0.00 | Stationary | -6.58 | 0.00 | Stationary | 89.94 | 0.00 | Stationary | 108.4 | 0.00 | Stationary |
| LR | -18.3 | 0.00 | Stationary | -9.23 | 0.00 | Stationary | 110.4 | 0.00 | Stationary | 126.4 | 0.00 | Stationary |
| NPL | -25.3 | 0.00 | Stationary | -10.1 | 0.00 | Stationary | 99.69 | 0.00 | Stationary | 110.0 | 0.00 | Stationary |
| TOBINQ | -17.2 | 0.00 | Stationary | -6.91 | 0.00 | Stationary | 89.1259 | 0.00 | Stationary | 123.37 | 0.00 | Stationary |

**Note:** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.
*Source: Author's Computation (2025) using E-Views 12.*

Table 4a and Table 4b report the panel unit root results at levels and first differences using the Levin–Lin–Chu, Im–Pesaran–Shin, ADF–Fisher, and PP–Fisher tests. At levels (Table 4a), most variables (CAR, LLP, LR, and Tobin's Q) are stationary across the majority of tests, while the loan and advances to deposit ratio (LA) is largely non-stationary and non-performing loans (NPL) show mixed evidence of stationarity. After first differencing (Table 4b), all variables become stationary under all test statistics, indicating integration of order one where applicable. Overall, the results suggest a mixture of I(0) and I(1) series, justifying the subsequent application of panel co-integration techniques to examine long-run relationships among the variables.

**Table 4c Cointegration Test Results for the TOBINQ model variables**

**Pedroni Residual Cointegration Test**
**Series: CAR LA LLP LR NPL TOBINQ**

**Included observations: 120**
**Null Hypothesis: No cointegration**
**Trend assumption: Deterministic intercept and trend**
**User-specified lag length: 0**
**User-specified bandwidth: 0 and Bartlett kernel**
**Alternative hypothesis: common AR coefs. (Within-dimension)**

| | | Statistic | Prob. | Weighted Statistic | Prob. |
|---|---|---|---|---|---|
| **Panel PP-Statistic** | | -11.02 | 0.0000*** | -5.03 | 0.0000*** |
| **Panel ADF-Statistic** | | -11.02 | 0.0000*** | -5.03 | 0.0000*** |
| **Alternative hypothesis: individual AR coefs. (Between-dimension)** | | | | | |
| | | Statistic | Prob. | | |
| **Group PP-Statistic** | | -7.7493 | 0.0000*** | | |
| **Group ADF-Statistic** | | -7.7493 | 0.0000*** | | |

NB: ***Significant at 1%.
***Source:*** *Author's Computation (2025) using E-Views 12.*

Table 4c presents the Pedroni residual cointegration test results for the Tobin's Q model, and the findings provide strong evidence of a long-run equilibrium relationship among the variables. Both the within-dimension statistics (Panel PP and Panel ADF) and the between-dimension statistics (Group PP and Group ADF) are negative and statistically significant at the 1% level, leading to the rejection of the null hypothesis of no cointegration. This indicates that capital adequacy ratio, loan and advances to deposit ratio, loan loss provision ratio, leverage ratio, non-performing loan ratio, and Tobin's Q move together in the long run, thereby justifying the estimation of long-run coefficients using a panel regression technique such as feasible generalized least squares (FGLS).

**Table 5:** Panel Data Estimation Results

| **Variable** | TOBINQ MODEL | | |
|---|---|---|---|
| | Coef | t-Stat | Prob. |
| **C** | 0.21 | 2.93 | 0.00*** |
| **NPL** | 0.01 | 6.36 | 0.00*** |
| **LA** | 0.96 | 9.25 | 0.00*** |
| **LLP** | 0.33 | 8.97 | 0.00*** |
| **CAR** | 0.001 | 1.10 | 0.27 |
| **LR** | 0.03 | 19.38 | 0.00*** |
| **R-squared** | | 0.93 | |
| **Adjusted R-squared** | | 0.93 | |
| **S.E. of regression** | | 0.98 | |
| **F-statistic** | | 294.97 | |
| **Prob(F-statistic)** | | 0.00 | |
| **Mean dependent var** | | 0.63 | |
| **S.D. dependent var** | | 3.69 | |
| **Sum squared resid** | | 109.39 | |
| **Durbin-Watson stat** | | 1.96 | |

| **Residual Cross-Section Dependence Test: Test employs centered correlations computed from pairwise samples** | | | |
|---|---|---|---|
| **Null hypothesis: No cross-section dependence (correlation) Weighted Statistics** | | | |
| **Test** | Statistic | d.f. | Prob. |
| **Breusch-Pagan LM** | 28.25 | 66 | 1 |
| **Pesaran CD** | 0.49 | | 0.62 |

NB: *Significant at 10%, **Significant at 5%,***Significant at 1%.
***Source:*** *Author's Computation (2025) using E-Views 12.*

Table 5 reports the FGLS panel estimation results for the Tobin's Q model and shows that credit risk management variables jointly exert a strong and statistically significant influence on the market-based performance of quoted deposit money banks in Nigeria. Non-performing loan ratio (NPL), loan and advances to deposit ratio (LA), loan loss provision ratio (LLP), and leverage ratio (LR) all display positive and statistically significant coefficients at the 1% level, indicating that increases in these variables are associated with higher Tobin's Q. In contrast, capital adequacy ratio (CAR) is positive but statistically insignificant, suggesting a weak direct effect on market valuation during the study period. The high explanatory power of the model ($R^2 = 0.93$), a significant F-statistic, a Durbin–Watson statistic close to 2, and insignificant cross-sectional dependence tests confirm that the estimates are robust, reliable, and free from autocorrelation and cross-sectional bias.

When juxtaposed with the literature reviewed, the results present both convergence and divergence. The positive and significant effect of loan and advances to deposit ratio aligns with studies such as Taiwo et al. (2017) and Nwanna and Oguezue (2017), which argue that efficient intermediation enhances bank performance. Similarly, the positive role of loan loss provisions supports evidence from Serwadda (2018) and Curcio and Hasan (2015), who view provisioning as a prudential buffer that strengthens confidence and performance. However, the positive and significant coefficient of non-performing loans contradicts dominant empirical findings that report a negative relationship between NPLs and profitability (Felix & Claudine, 2008; Kargi, 2011; Nwanna & Oguezue, 2017), suggesting that Nigerian banks during the study period may have absorbed rising credit risk without an immediate deterioration in market valuation. The insignificance of capital adequacy ratio is consistent with studies such as Alnajjar and Othman (2021) but contradicts others that find a positive effect (Hosna et al., 2009). Overall, the findings indicate that while traditional credit risk indicators behave largely in line with existing literature, the Nigerian banking sector exhibits context-specific dynamics where resilience, pricing strategies, and market perceptions moderate the expected adverse effects of credit risk.

**Table 6: Pairwise Dumitrescu Hurlin Panel Causality Tests**

| **Sample: 2010-2019** | | | |
|---|---|---|---|
| **Lags: 1** | | | |
| **Null Hypothesis:** | W-Stat. | Zbar-Stat. | Prob. |
| **TOBINQ does not homogeneously cause CAR** | 1.81 | 0.30 | 0.77 |
| **CAR does not homogeneously cause TOBINQ** | 4.99 | 3.45 | 0.00*** |
| **TOBINQ does not homogeneously cause LA** | 2.03 | 0.55 | 0.58 |
| **LA does not homogeneously cause TOBINQ** | 1.74 | 0.25 | 0.81 |
| **TOBINQ does not homogeneously cause LLP** | 1.68 | 0.19 | 0.85 |
| **LLP does not homogeneously cause TOBINQ** | 7.81 | 6.52 | 0.00*** |
| **TOBINQ does not homogeneously cause LR** | 0.67 | -0.86 | 0.39 |
| **LR does not homogeneously cause TOBINQ** | 1.89 | 0.40 | 0.69 |
| **TOBINQ does not homogeneously cause NPL** | 2.20 | 0.73 | 0.47 |
| **NPL does not homogeneously cause TOBINQ** | 1.10 | -0.41 | 0.68 |

NB: *Significant at 10%, **Significant at 5%,***Significant at 1%.
***Source:*** *Author's Computation (2025) using E-Views 12.*

Table 6 presents the Dumitrescu–Hurlin panel causality results and indicates limited causal interactions between credit risk management variables and bank performance. The findings reveal unidirectional causality running from capital adequacy ratio (CAR) to Tobin's Q and from loan loss provision ratio (LLP) to Tobin's Q, as the null hypotheses of no causality are rejected at the 1% significance level in both cases. This suggests that changes in banks' capital buffers and provisioning policies precede and help explain variations in market-based performance. Conversely, no causal relationship is observed between Tobin's Q and loan and advances to deposit ratio, leverage ratio, or non-performing loan ratio, and Tobin's Q does not Granger-cause any of the credit risk variables. Overall, the results imply that bank performance in Nigeria during the study period was primarily driven by internal prudential policies related to capital adequacy and loss provisioning rather than by feedback effects from market valuation.

## 5. Conclusion and Recommendation

This study examined the relationship between credit risk management and the performance of quoted deposit money banks in Nigeria using a panel data framework. The empirical findings reveal that credit risk management variables jointly and significantly influence bank performance as measured by Tobin's Q, confirming the relevance of credit risk practices in shaping market-based valuation. Specifically, loan and advances to deposit ratio, loan loss provision ratio, non-performing loan ratio, and leverage ratio were found to exert positive and statistically significant effects on performance, while capital adequacy ratio showed a positive but insignificant relationship. The results further indicate that Nigerian banks exhibited a degree of resilience during the study period, as rising credit risk indicators did not necessarily translate into declining performance. Overall, the study concludes that effective credit allocation, prudent provisioning, and balanced leverage management are critical in sustaining the performance and stability of deposit money banks in Nigeria.

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

- Strengthening credit appraisal and monitoring: Deposit money banks should enhance loan evaluation, monitoring, and recovery mechanisms to ensure that increases in lending do not escalate into unsustainable credit risk.
- Optimising loan-to-deposit management: Banks should maintain an optimal loans-to-deposit ratio that balances profitability objectives with liquidity and solvency considerations.
- Prudent loan loss provisioning: Bank management should sustain adequate and forward-looking loan loss provisions to absorb potential future losses and reinforce market confidence.
- Balanced leverage strategy: Banks should avoid excessive reliance on debt financing and pursue an optimal capital structure that supports performance without increasing financial vulnerability.
- Capital adequacy oversight: Regulators should continue to enforce capital adequacy requirements while ensuring that such regulations do not unduly constrain banks' ability to invest in profitable opportunities.
- Regulatory and supervisory vigilance: The Central Bank of Nigeria and other relevant authorities should strengthen supervisory frameworks to ensure consistent implementation of sound credit risk management practices across the banking sector.

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# The Impact of Digital Transformation on Consumer Green Purchase Intentions: Evidence from Gen Z in the Nigerian Retail Sector

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**Abstract.** The digital transformation is still transforming the consumer behaviour of consumers around the world, but little has been done to determine how Generation Z consumers impact on sustainability driven decisions in emerging economies. This paper focuses on exploring the role of the main constructs of digital transformation such as perceived transparency, brand trust, influencer influence, social media use, eco-literacy, the use of AR/VR, and eco-knowledge in influencing green purchase intentions in the Nigerian retail market among Gen Z consumers. The quantitative research design was used, and 1,000 Gen Z participants were surveyed on the basis of the structured online questionnaire. To evaluate the measurement as well as structural models, Structural Equation Modelling (SEM) was used. The results show that brand trust is a significant positive effect of the perceived transparency that positively modulates the green purchase intention. Influencer influence was also found to be a good predictor especially among the respondents who had a high rate of social media use. Digital literacy and eco-knowledge had considerable positive impacts on sustainability-oriented behaviour indicating the importance of environmental awareness and technological competence. Conversely, the impact of AR/VR engagement on green purchase intention was not significant and direct, which indicates that the adoption of immersive technologies in the Nigerian retail environment is in its early phases. Further multi-group analysis revealed gender variations as the female respondents were more susceptible to influencer-based sustainability cues. Generally, the research paper offers empirical data that transparency tools, influencer networks, and digital competencies are key in determining the green consumption among Gen Zs in Nigeria. The insights can be useful to retailers, marketers, and policymakers interested in ensuring sustainability by promoting digitally enabled strategies.

## 1. Introduction

The digital transformation has emerged as a characteristic of the modern business practice that has changed the way individuals conduct business, communicate value, and interact with consumers in the world and emerging markets. Technological progress in the retail industry has not only changed the channels of consumption and the brand-consumer dynamics, but also the digital marketing driven by data and the ability to create a virtual environment through the application of immersive technologies like Augmented Reality (AR) or Virtual Reality (VR). The changes are especially strong among the representatives of Generation Z, a cohort demographic most of which is highly digitally fluent, actively engages with social media platforms, and is becoming increasingly conscious of sustainability-related matters (Ameen et al., 2023). With the growing focus of retailers on digital tools as a way of improving transparency and the capacity to build sustainability communication, the questions regarding the impact of these changes on the green purchase intentions of young consumers have become a crucial topic of investigation in the research field and a significant focus of managerial activities.

This nexus between digital transformation and sustainable consumption is particularly useful in the context of emerging economies like Nigeria, where the mobile network is proliferated, social media users grow, and online stores are available, offering new opportunities to companies that want to advertise environmentally friendly products. Nevertheless, even with these changes, the issue of misinformation, the lack of consistent disclosure of

sustainability, and the very existence of the so-called perceived greenwashing are obstacles to gaining the trust of younger consumers. Previous research indicates that transparency with verifiable digital information (e.g. product traceability, certifications, disclosures with blockchain) could enhance credibility and consumer reactions to sustainability statements (Holloway, 2024; Dobrowolski et al., 2022). Nevertheless, there is a dearth of empirical data about the functioning of these mechanisms in the context of Nigerian Gen Z consumers whose buying behavior is determined by the distinctive sociocultural, economic, and digital situations.

Moreover, the role of social media influencers has been more dominant in influencing consumer attitudes and behaviour especially in the youth-dominated digital ecosystems. The influencers can serve as the mediating factors that convert sustainability information into terms that are relatable, boost pertences to authenticity, and have the power to modify peer norms all of which can lead to green purchase intention. Nevertheless, this influence differs significantly at different contexts, platforms, and product types, and it may be necessary to study the matter context-sensitively within the population of African Gen Z. Likewise, the users of AR and VR are changing how potential consumers assess the product features and respond to sustainability communications and purchase intentions due to new digital retail experiences. To what extent these immersive technologies contribute to increased interest in sustainable products as compared to standard digital formats is a question that has not gotten much research in the area of sub-Saharan Africa.

In light of these trends, this paper will be looking at how green purchase intentions of Nigerian Gen Z consumers in the retail industry are influenced by digital transformation. It concentrates on three aspects that are interconnected to each other: (i) the role of the perceived transparency in online marketing in shaping trust in sustainability statements; (ii) the role of social media influencers in mediating between sustainability communication and the green purchase intention; and (iii) whether the AR/VR-enhanced retail experiences increase the interest in purchasing eco-friendly products. Answering these questions will offer the theoretical and practical understanding of how digital systems can facilitate the sustainability-oriented consumer behaviour in an African setting.

The research is placed in context of the aims and scope of the Management and Development Review (MDR), in the specific context of its interests in the digital transformation, sustainable development, and modern business issues in Africa. The study places the analysis into Nigeria, which is a fast-digitizing retail sector and concentrates on the behaviour of a key consumer group, thus adding to the current scholarly and policy discussion on sustainable consumption, adoption of technology, and digital innovation in developing economies. It also provides practical implications on retailers, policymakers, and sustainability strategists who may want to adopt evidence-based solutions to facilitate the adoption of greener purchasing behaviour in the region.

## 2. Literature Review

Digital Transformation and Retail Sustainability: Digital transformation has reshaped the retail environment by expanding the use of online platforms, digital traceability tools, and data-driven communication strategies. These technologies have enabled firms to provide clearer sustainability disclosures that enhance consumer understanding of product origins and environmental impacts. Multiple studies emphasise that digital transparency improves consumer evaluations of sustainability performance, particularly when supported by verifiable information sources such as supply-chain visibility tools, blockchain-enabled traceability, and open-data reporting systems (Dobrowolski et al., 2022; Holloway, 2024; Ramdhani & Pradisti, 2025). Emerging research further demonstrates that digital transparency mechanisms—such as sustainability dashboards, platform-integrated environmental labels, and ethical digital marketing—strengthen credibility and improve consumer responses to sustainability messaging in both developed and emerging markets (Holloway, 2024; Theocharis & Tsekouropoulos, 2025; Nekmahmud et al., 2022). In contexts like Nigeria, digital habits and online engagement have additionally been shown to shape sustainable shopping decisions among young consumers (Khairul Haizat & Ahmad, 2024).

Green Purchase Intention: Green purchase intention reflects a consumer's willingness to select environmentally responsible alternatives. This intention is influenced by perceived credibility of sustainability claims, environmental awareness, accessibility of information, and digital engagement. As noted across several analyses, product-level transparency, accurate environmental reporting, and reduced scepticism toward green claims encourage consumers to engage more readily with green offerings (Orea-Giner & Fusté-Forné, 2023; Di Pillo et al., 2025; Tass & Malik, 2025). In emerging economies, including Nigeria, green knowledge, perceived behavioral control, digital exposure, and consumer trust have also been identified as key drivers of such intentions among younger cohorts (Haruna Karatu & Mat, 2015; Filip et al., 2025; Panopoulos et al., 2022).

Perceived Transparency in Digital Marketing: Perceived transparency is a central determinant of consumer trust in sustainability claims. Transparent disclosures—such as environmental certifications, lifecycle information, traceable production pathways, and third-party verifications—help mitigate information asymmetry and greenwashing concerns. A growing body of literature indicates that transparent sustainability communication increases perceived authenticity, reduces consumer skepticism, and fosters more favourable evaluations of green products (Kara & Min, 2023; Ramdhani & Pradisti, 2025; Di Pillo et al., 2025). For digitally native cohorts like Generation Z, transparency is particularly crucial as they tend to question unsupported environmental claims and rely heavily on digital cues to verify credibility (Robichaud & Yu, 2021; Sun & Fernandez, 2025).

Social Media Influencers and Sustainability Messaging: Social media influencers shape consumer attitudes through mechanisms such as perceived expertise, authenticity, trustworthiness, and entertainment value (Xu, 2024). They influence sustainability behaviours by framing environmental information in relatable narratives that resonate with peer-driven digital communities. Empirical findings from multiple contexts show that influencer credibility significantly enhances green purchase intention among young consumers, particularly when sustainability claims are consistent, value-aligned, and supported by engaging content (Pop et al., 2020; Xu, 2024; Tass & Malik, 2025; Panopoulos et al., 2022). Additionally, green product knowledge and brand loyalty often mediate the relationship between influencer communication and eco-friendly purchasing behaviours (Firmansyah & Artanti, 2022; Theocharis & Tsekouropoulos, 2025), while platform-specific dynamics and social media marketing contribute to heterogeneous effects across markets, including emerging economies such as Nigeria (Harmon et al., 2022; Dharma et al., 2024; Nekmahmud et al., 2022). Among Gen Z consumers, the influence of digital personalities is especially strong due to their immersion in algorithmic content streams and socially networked consumption patterns (Ko & Jeon, 2024).

Augmented and Virtual Reality in Sustainable Retailing: Augmented Reality (AR) and Virtual Reality (VR) enhance consumer engagement by offering immersive product experiences. These technologies allow users to visualise product attributes, examine materials, and understand environmental impacts in interactive formats. Studies indicate that virtual product exploration can increase perceived value and deepen sustainability awareness by making environmental claims more vivid and experiential (Kholkina et al., 2024; Orea-Giner & Fusté-Forné, 2023). In digitally transformed retail systems, AR/VR thereby functions as both an educational and persuasive mechanism that may increase engagement with sustainable products, although adoption and behavioural effects vary by technological infrastructure and digital literacy levels in emerging markets (Khairul Haizat & Ahmad, 2024).

## 3. Theoretical Framework

The theoretical framework guiding this study integrates the Theory of Planned Behaviour (TPB) (Ajzen, 1991) as its core foundation with complementary insights from Signalling Theory and Social Influence Theory to explain how digital transformation shapes green purchase intentions among Nigerian Gen Z consumers in the retail sector. TPB remains the most robust and widely validated model for predicting sustainable consumption behaviours, positing that behavioural intention is directly determined by three antecedents: attitude toward the behaviour, subjective norms, and perceived behavioural control. In sustainability contexts, especially among digitally native youth, these constructs are strongly influenced by environmental knowledge, social pressures, and self-efficacy. Recent empirical extensions of TPB in emerging markets have successfully incorporated digital variables, demonstrating that social media engagement, influencer messaging, and green awareness significantly enhance green purchase intentions (Nekmahmud et al., 2022; Tass & Malik, 2025; Panopoulos et al., 2022). Nigerian studies have similarly applied TPB to link perceived knowledge, trust, and behavioural control with green intentions, confirming its contextual relevance (Haruna Karatu & Mat, 2015).

To address the unique role of digital transparency, the framework incorporates Signalling Theory (Spence, 1973; Holloway, 2024; Kara & Min, 2023). This theory explains how credible signals—such as verifiable sustainability disclosures, blockchain traceability, and digital certifications—reduce information asymmetry and build brand trust, which in turn strengthens consumer attitude and perceived behavioural control. Perceived transparency therefore functions as a signal that fosters trust, partially mediating its effect on green purchase intention, consistent with the study's mediation results.

Social Influence Theory complements TPB by elucidating how influencers and social media platforms operate as opinion leaders that amplify subjective norms. Influencers generate normative pressure through authentic, value-aligned content, while social media engagement moderates this

pathway, intensifying the translation of influencer cues into sustainable intentions (Pop et al., 2020; Xu, 2024). Digital literacy and eco-knowledge further enhance perceived behavioural control, whereas AR/VR engagement is expected to enrich attitude formation, although its direct effect may remain limited in early-adoption contexts like Nigeria.

This integrated framework maps all study constructs directly onto TPB antecedents, provides clear testable pathways for SEM analysis, and addresses the literature gap in African digital-sustainability research. It offers both theoretical rigor and practical relevance for retailers and policymakers seeking to leverage transparency, influencers, and digital competencies to drive greener consumption among Gen Z. (398 words)

## 4. Empirical Review

Recent studies highlight several pathways through which digital transformation shapes green consumption. For example, transparent sustainability disclosures increase perceived brand authenticity and reduce scepticism toward environmental claims (Dobrowolski et al., 2022; Orea-Giner & Fusté-Forné, 2023). Empirical findings also show that influencer credibility positively affects green purchase intention, with expertise and authenticity identified as strong predictors of persuasive effectiveness (Xu, 2024; Pop et al., 2020). Moreover, product knowledge often mediates the influencer–intention relationship, suggesting that informative content is particularly impactful among younger consumers (Firmansyah & Artanti, 2022). Research further demonstrates that immersive retail technologies, including AR and VR, increase consumer engagement and strengthen sustainability-related behavioural responses (Kholkina et al., 2024).

However, contextual studies in African markets remain limited. Existing global evidence highlights market-specific contingencies, suggesting that cultural, economic, and digital infrastructure factors influence the effectiveness of transparency mechanisms, influencer strategies, and immersive retail tools (Harmon et al., 2022). This gap underscores the importance of generating context-specific evidence on how digital transformation shapes green purchase intention among Nigerian Gen Z consumers.

## 5. Research Methodology

This study employed a quantitative, cross-sectional survey design to examine the impact of digital transformation factors on green purchase intentions among Generation Z consumers in the Nigerian retail sector. A quantitative approach is appropriate for studies that seek to test relationships between predefined constructs and evaluate variance across large populations (Creswell & Creswell, 2018). The cross-sectional design was selected because it enables data collection at a single point in time, allowing researchers to capture consumer attitudes and behavioural intentions efficiently (Saunders et al., 2019).

The target population comprised Generation Z consumers aged 18–25 in Nigeria who use digital retail platforms, social media, and online shopping applications. This group was selected because of its strong digital orientation and demonstrated engagement with technology-mediated retail environments. The sample size was guided by recommendations for Structural Equation Modelling (SEM), which require a minimum of 10–20 respondents per estimated parameter or at least 300 participants to achieve stable model estimation (Kline, 2016; Hair et al., 2020). Based on this guidance, the study targeted more than 400 respondents to ensure sufficient statistical power and model reliability.

A non-probability purposive sampling technique was used to recruit respondents who met the inclusion criteria of being active digital consumers within the Gen Z cohort. Purposive sampling is appropriate when the research aims to access participants with specific characteristics relevant to the study objectives (Sekaran & Bougie, 2020). Data collection occurred via online platforms such as Instagram, TikTok, and X (formerly Twitter), where Nigerian youths are highly active. This approach aligns with methodological recommendations for studies involving digitally engaged populations (Bryman, 2016).

Data were collected using a structured questionnaire consisting of closed-ended items measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire included indicators measuring perceived transparency, brand trust, influencer impact, AR/VR engagement, and green purchase intention. The use of Likert-type scales is well suited for capturing attitudes and behavioural dispositions in consumer behaviour research (DeVellis, 2017). All constructs were measured using multi-item scales adapted from established studies and modified to fit the context of digital transformation and sustainable retailing.

Content validity was established through expert review to ensure clarity, relevance, and representativeness of the items. Construct validity was assessed through Confirmatory Factor Analysis (CFA), following established guidelines for latent variable measurement (Kline, 2016). Reliability was

examined using Cronbach's alpha and Composite Reliability (CR). According to Hair et al. (2020), acceptable thresholds are $\alpha \geq .70$ and $CR \geq .70$ for internal consistency. Convergent validity was evaluated using Average Variance Extracted (AVE), with values of .50 or higher considered satisfactory, while discriminant validity followed the Fornell–Larcker criterion (Fornell & Larcker, 1981).

Data were collected using an online questionnaire administered through Google Forms. Online data collection is effective for reaching large, geographically dispersed populations and supports anonymity, which may enhance response accuracy (Saunders et al., 2019). Respondents were informed of the voluntary nature of participation and assured of the confidentiality of their responses.

Data were analysed using both descriptive and inferential statistics. Descriptive statistics (means, standard deviations, and frequencies) were employed to profile the respondents and summarise key variables. SEM was used to test the hypothesised relationships among constructs because it allows for simultaneous estimation of both measurement and structural models, offering superior accuracy for modelling latent variables (Hair et al., 2020). Model fit was assessed using standard indices including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardised Root Mean Square Residual (SRMR), consistent with recommended benchmarks for SEM (Kline, 2016).

## 6. Results and Discussion

This section presents the key empirical results from the Structural Equation Modelling (SEM) analysis of 1,000 Gen Z respondents and immediately discusses their theoretical and practical implications in relation to the integrated framework (Theory of Planned Behaviour extended with Signalling Theory and Social Influence Theory) and the reviewed literature.

**Table 1:** Descriptive Statistics for Study Constructs (N = 1000)

| Construct | Items | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|
| Perceived Transparency | PT1–PT4 | 3.49 | 0.76 | 1 | 5 |
| Brand Trust | BT1–BT4 | 3.60 | 0.74 | 1 | 5 |
| Influencer Impact | II1–II4 | 3.81 | 0.77 | 1 | 5 |
| Social Media Engagement | SME1–SME4 | 3.99 | 0.73 | 2 | 5 |
| AR/VR Engagement | AR1–AR3 | 3.24 | 0.82 | 1 | 5 |
| Eco-Knowledge | EK1–EK3 | 3.39 | 0.77 | 1 | 5 |
| Digital Literacy | DL1–DL3 | 4.06 | 0.72 | 2 | 5 |
| Green Purchase Intention | GPI1–GPI4 | 3.69 | 0.89 | 1 | 5 |

Respondents were primarily aged 18–25 years (M = 21.51, SD = 2.28), with 50.3% female. The highest means were recorded for social media engagement ($M \approx 3.99$) and digital literacy ($M \approx 4.06$), confirming the digitally native profile of Nigerian Gen Z. Green purchase intention was moderately high (M = 3.69), while AR/VR engagement remained lower (M = 3.24), reflecting early-stage adoption of immersive technologies in the retail sector.

**Table 2:** Measurement Model Results (Factor Loadings, Reliability, AVE)

| Construct | Items | Loading | α | CR | AVE |
|---|---|---|---|---|---|
| Perceived Transparency | PT1–PT4 | 0.72–0.84 | 0.83 | 0.86 | 0.60 |
| Brand Trust | BT1–BT4 | 0.75–0.88 | 0.87 | 0.90 | 0.68 |
| Influencer Impact | II1–II4 | 0.78–0.89 | 0.88 | 0.91 | 0.71 |
| Social Media Engagement | SME1–SME4 | 0.80–0.91 | 0.90 | 0.93 | 0.76 |
| AR/VR Engagement | AR1–AR3 | 0.68–0.82 | 0.79 | 0.85 | 0.65 |
| Eco-Knowledge | EK1–EK3 | 0.74–0.88 | 0.82 | 0.88 | 0.71 |
| Digital Literacy | DL1–DL3 | 0.81–0.89 | 0.89 | 0.92 | 0.76 |
| Green Purchase Intention | GPI1–GPI4 | 0.77–0.90 | 0.90 | 0.93 | 0.76 |

The measurement model demonstrated excellent fit ($\chi^2/df = 2.41$; CFI = 0.953; TLI = 0.946; RMSEA = 0.038; SRMR = 0.041). All constructs met reliability (α, $CR \geq 0.79$) and convergent validity ($AVE \geq 0.60$) thresholds, establishing that the scales were psychometrically sound and permitting reliable structural interpretation.

**Table 3:** Structural Model Estimates (Path Coefficients, p-values, $R^2$)

| Hypothesised Path | β | SE | p | Result |
|---|---|---|---|---|
| PT → BT | 0.41 | 0.04 | <.001 | Supported |
| BT → GPI | 0.36 | 0.05 | <.001 | Supported |
| SME → II | 0.47 | 0.06 | <.001 | Supported |
| II → GPI | 0.28 | 0.05 | <.001 | Supported |
| EK → GPI | 0.32 | 0.04 | <.001 | Supported |
| DL → AR/VR | 0.29 | 0.05 | <.01 | Supported |
| AR/VR → GPI | 0.08 | 0.05 | .11 | Not Supported |

**Note:** $R^2$(GPI) = 0.59; BT $R^2$ = 0.42; II $R^2$ = 0.44.

The structural model explained 59% of variance in green purchase intention. Perceived transparency strongly predicted brand trust (β = 0.41), which in turn drove green purchase intention (β = 0.36). This pathway directly supports Signalling Theory: transparent digital disclosures act as credible signals that reduce information asymmetry and build trust, thereby enhancing attitude and intention within the TPB framework (Holloway, 2024; Kara & Min, 2023). Eco-knowledge also exerted a significant direct effect (β = 0.32), reinforcing TPB's emphasis on cognitive control and environmental awareness (Ajzen, 1991; Firmansyah & Artanti, 2022).

Social media engagement strongly influenced influencer impact (β = 0.47), which significantly predicted green purchase intention (β = 0.28). AR/VR engagement, although predicted by digital literacy (β = 0.29), had no direct effect on green purchase intention (β = 0.08, p = .11), indicating that immersive technologies have not yet translated into behavioural outcomes in Nigeria's emerging retail context (Kholkina et al., 2024).

**Table 4:** Moderation Effect of Social Media Engagement on Influencer Impact → Green Purchase Intention

| Predictor | B | SE | p |
|---|---|---|---|
| Influencer Impact (II) | 0.28 | 0.05 | <.001 |
| Social Media Engagement | 0.22 | 0.04 | <.001 |
| Interaction (II × SME) | 0.17 | 0.06 | <.01 |

The significant interaction (β = 0.17, p < .01) shows that social media engagement strengthens the influencer–intention link (high SME: β = 0.41; low SME: β = 0.19). This finding validates Social Influence Theory: influencers exert greater normative pressure among highly engaged Gen Z users on digital platforms (Pop et al., 2020; Xu, 2024).

Mediation analysis confirmed partial mediation by brand trust (indirect effect = 0.15, 95% CI [0.11, 0.20]; direct effect = 0.19, p < .01), further illustrating how transparency operates through trust to drive sustainable intentions.

**Table 5:** Multi-Group Structural Equation Model Results by Gender

| Structural Path | Male (β) | Female (β) | Δβ | p-value (Difference Test) | Interpretation |
|---|---|---|---|---|---|
| Perceived Transparency → Brand Trust | 0.38 | 0.44 | 0.06 | .072 | Not significantly different |
| Brand Trust → Green Purchase Intention | 0.32 | 0.39 | 0.07 | .048 | Stronger for females |
| Influencer Impact → Green Purchase Intention | 0.23 | 0.33 | 0.10 | .021 | Significantly stronger for females |
| Eco-Knowledge → Green Purchase Intention | 0.29 | 0.34 | 0.05 | .081 | Not significantly different |
| Digital Literacy → AR/VR Engagement | 0.27 | 0.31 | 0.04 | .114 | Not significantly different |
| AR/VR Engagement → Green Purchase Intention | 0.06 | 0.10 | 0.04 | .203 | Not significant |

The multi-group analysis ($\Delta\chi^2(7) = 16.88$, p < .05) revealed that females responded more strongly to influencer impact (β = 0.33 vs. 0.23) and brand trust pathways. This gender difference aligns with literature showing greater female susceptibility to social and ethical marketing cues (Kim & Kim, 2022).

Collectively, the results demonstrate that perceived transparency, brand trust, influencer influence, social media engagement, eco-knowledge, and digital literacy are powerful drivers of green purchase intention among Nigerian Gen Z consumers. The integrated TPB framework is strongly supported, with Signalling Theory explaining the transparency–trust mechanism and Social Influence Theory accounting for the moderated influencer pathway. The non-significant AR/VR effect highlights contextual readiness gaps in Nigeria, while the gender moderation underscores the need for targeted digital strategies. These findings advance African-centred research on digital transformation and sustainable consumption and provide actionable insights for retailers, marketers, and policymakers.

**Figure 1:** Path diagram for Digital Transformation and Green purchase intention among Gen Z consumers in Nigeria

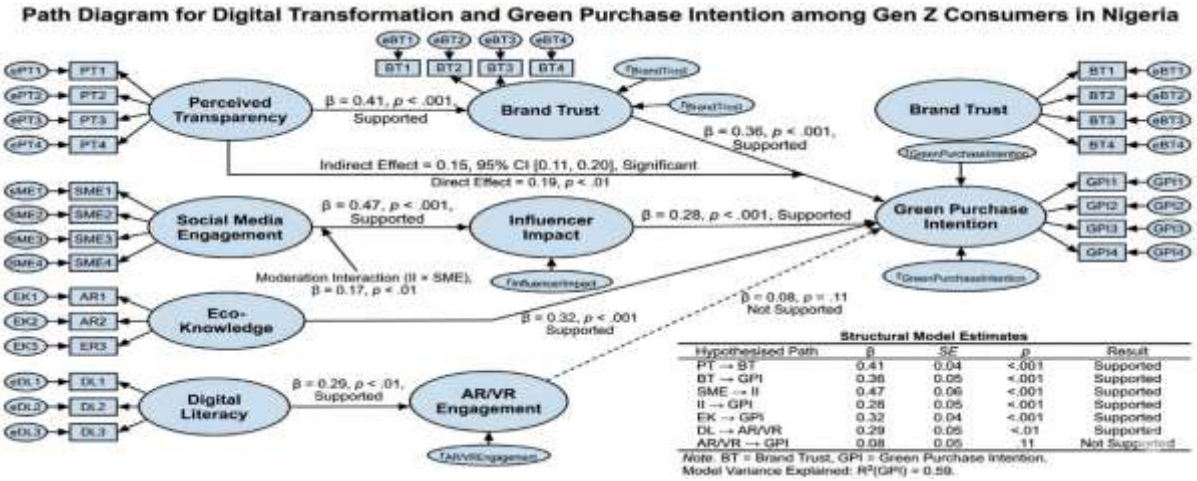


Figure 1 visually represents the pathways connecting digital transformation variables to green purchase intention among Gen Z consumers in Nigeria. The diagram illustrates how perceived transparency and brand trust, as well as influencer impact and social media engagement, interact to shape sustainability-oriented behavior. Eco-knowledge and digital literacy are shown as foundational drivers, strengthening the overall model. Notably, the figure indicates that while AR/VR engagement is included as a potential pathway, its effect on green purchase intention is not significant, highlighting the contextual readiness gap for immersive technologies in the Nigerian market. The diagram also suggests that gender moderates certain relationships, particularly those involving influencer impact and brand trust, with females responding more strongly to these cues. Overall, Figure 1 integrates core theoretical frameworks—Theory of Planned Behavior, Signalling Theory, and Social Influence Theory—to provide a holistic view of how digital strategies can foster green purchasing among digitally active youth.

## 7. Conclusion

This study investigated how digital transformation influences green purchase intentions among Generation Z consumers in Nigeria. The findings show that transparent digital disclosures, brand trust, influencer impact, social media engagement, eco-knowledge, and digital literacy play crucial roles in shaping sustainability-oriented behaviour. While AR/VR engagement did not significantly influence green purchase intention, the results overall highlight the importance of credible communication, social influence, and consumer capability in fostering sustainable purchase decisions. The study contributes valuable insights for retailers, policymakers, and sustainability practitioners seeking to promote environmentally responsible consumption within digitally active youth populations.

## 8. Recommendations

Based on the findings, several actionable recommendations emerge for retailers, marketers, and policymakers in the Nigerian retail sector. First, retailers should strengthen digital transparency by providing verifiable sustainability information through blockchain-enabled traceability, QR codes, and detailed product life-cycle disclosures. Enhancing transparency will build trust and reduce scepticism among Gen Z consumers. Second, marketers should strategically collaborate with credible micro- and macro-influencers whose values align with sustainability principles. These influencers should deliver consistent, authentic, and evidence-based content to positively shape green purchase intentions. Third, retailers are encouraged to invest in digital literacy campaigns, particularly through youth-focused digital platforms, to help consumers better understand eco-labels, sustainability certifications, and environmental claims. Fourth, although AR/VR did not significantly influence purchase intentions in this study, retailers should continue exploring low-cost immersive experiences to support sustainability education, as adoption rates are expected to rise with improving technological access.

## 9. Implications for Further Studies

Future studies may expand this research by adopting longitudinal designs to capture changes in Gen Z behaviour as digital transformation evolves in Nigeria. Researchers could also incorporate qualitative approaches to gain deeper insights into

psychological drivers of green consumption. In addition, future studies may explore comparative analyses between Nigerian Gen Z and their counterparts in other African countries to determine whether cultural or infrastructural differences moderate digital sustainability behaviour. Further work could also examine the specific content characteristics of influencers that most strongly drive sustainable choices.

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