



The Role of Forensic Accountants in Combating Procurement Fraud in the Public Sector: A Case Study of Osun State, Nigeria

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Abstract

Original Research Article

This paper examines the role of forensic accounting in combating procurement fraud within Nigeria's public sector, employing a primary case study of the Osun State Ministry of Works. The study investigates common fraud typologies such as bid rigging, false invoicing, and kickbacks. It demonstrates how a mixed-methods approach—integrating continuous data analytics, digital forensics, and investigative interviews—enables practitioners to detect anomalies, reconstruct illicit financial flows, and build compelling evidence for enforcement. Key findings reveal that interventions in Osun State led to the recovery of over ₦150 million and contract annulments, while efforts in Rivers State recovered ₦120 million through exposed invoice fraud. However, the effectiveness of these forensic measures is constrained by persistent challenges, including political interference, a shortage of skilled personnel, legal obstacles, and poor data quality. The paper concludes by recommending institutional reforms to embed continuous auditing, foster inter-agency collaboration, invest in specialized training, and enhance transparency. The institutionalization of these measures is crucial for fortifying public procurement systems and protecting public assets.

Keywords: Forensic Accounting, Procurement Fraud, Public Sector, Nigeria, Fraud Detection, Internal Controls.

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1.1 INTRODUCTION

In Nigeria, combined public expenditure at the state and federal levels constitutes over 70% of the budget, funding critical infrastructure and social services such as education and healthcare. However, the scale and complexity of this spending create significant vulnerabilities to corruption and mismanagement. These vulnerabilities often manifest in inflated costs, project delays, substandard service delivery, and a consequential erosion of public trust in government institutions.

Procurement fraud, in particular, is a pervasive issue. It is characterized by schemes such as bid rigging, where suppliers collude to manipulate tender outcomes; false invoicing, where

payments are made for undelivered goods or services; and kickbacks, where officials receive illicit payments for awarding contracts (Adebayo et al., 2024; Egwanwor & Edori, 2025). These practices directly divert public funds, resulting in substantial financial losses and deteriorating public welfare.

While traditional financial audits and compliance reviews are essential, their reliance on intermittent sampling and static testing limits their ability to detect sophisticated, collusive fraud (Aremu & Olayinka, 2023). This gap is addressed by forensic accounting, an interdisciplinary field that merges advanced data analytics, digital forensics, and investigative techniques to uncover and document complex financial crimes. Forensic accountants employ

tools such as ACL scripting for continuous data monitoring and Benford's Law analysis to detect anomalous numerical patterns, building detailed evidentiary narratives that can withstand legal scrutiny (Aremu & Olayinka, 2023; Franca et al., 2023).

This paper will demonstrate, through a primary case study from Osun State and supplementary evidence from Rivers State, how such forensic interventions have led to significant financial recoveries and systemic reforms. For instance, in Osun State, a forensic investigation led to the recovery of over ₦150 million and the cancellation of fraudulent contracts (Adebayo et al., 2024). A parallel intervention in Rivers State recovered ₦120 million by exposing inflated invoices (Franca et al., 2023). These cases illustrate the potential of forensic accounting to not only reclaim lost funds but also to instigate proactive policy changes, such as the adoption of continuous-audit dashboards and enhanced due diligence frameworks (Vutumu et al., 2025).

Nevertheless, the effectiveness of these interventions is not assured. Forensic accountants in Nigeria operate within a challenging environment characterized by political interference, which can halt investigations (Aliyu & Hussaini, 2024); a shortage of skilled personnel (Okoye et al., 2020); legal and procedural obstacles that can nullify compelling evidence (Josiah, 2025); and profound data quality and accessibility issues (Aremu & Olayinka, 2023).

Therefore, this paper explores the extent to which forensic accounting can mitigate procurement fraud in Nigeria's public sector, with a specific focus on the processes of risk profiling, investigative scoping, evidence collection, and illicit financial flow reconstruction. It argues that while forensic accounting is a powerful tool, its efficacy is contingent upon overcoming significant institutional and operational constraints.

2.1 Theoretical Foundations

A theoretical understanding of the drivers of procurement fraud is essential for developing effective countermeasures. Cressey's (1953) Fraud Triangle posits that three elements must converge for fraud to occur: pressure,

opportunity, and rationalization. In the Nigerian public sector, pressure on procurement officers can be intense, stemming from both personal financial hardship due to unpaid salaries and professional demands to meet unrealistic budgetary performance targets (Snjegota & Snjegota, 2017). Opportunity arises from systemic weaknesses, including inadequate internal controls, fragmented approval workflows, and disorganized record-keeping, which create avenues for manipulation (Ulonna & Amugo, 2022). Rationalization involves the perpetrator's ability to justify their actions, often by citing systemic corruption or perceived inequity.

The Fraud Diamond model adds a critical fourth element: capability (Wolfe & Hermanson, 2004). This dimension focuses on the personal traits, skills, and position of authority an individual needs to perpetrate and conceal fraud. For example, a procurement officer with advanced knowledge of an e-procurement system may possess the capability to manipulate bids and erase digital audit trails. This factor is highly relevant in Nigeria, where uneven technical expertise creates vulnerabilities that capable insiders can exploit (Snjegota & Snjegota, 2017).

While models like the Fraud Triangle and Diamond focus on the individual perpetrator, Agency Theory provides a macro-level perspective on the structural relationships that enable procurement fraud (Jensen & Meckling, 1976). It conceptualizes the relationship between the principal (the public/citizens) and the agent (public officials) as a contract where the agent is entrusted to act in the principal's best interest. A core problem is information asymmetry; agents possess far more detailed information about procurement processes and contracts than the principals, who rely on summary reports. When the goals of the agent diverge from those of the principal—for instance, when personal enrichment supersedes public service—the scope for self-interested behavior expands (Khersiat, 2018). In such circumstances, without robust control systems and aligned incentives, agents may conspire to award contracts for undue profit rather than fair value (Dada & Jimoh, 2020).

2.2 Procurement Fraud Typologies

Deceptive practices in public procurement are multifaceted. Bid rigging is a common collusive scheme where competing vendors secretly coordinate their bids to ensure a predetermined winner, thereby sustaining an illusion of competition while inflating costs for the public entity. Forensic analysis, particularly pattern-matching of tender data to identify recurring, near-identical bid spreads among a group of vendors, has proven effective in uncovering such collusion, as demonstrated in studies from Nigeria and Ethiopia (Aliyu & Hussaini, 2024; Agegn et al., 2023).

Another fundamental typology is false invoicing, where vendors bill for goods or services not rendered or inflate the prices and quantities on legitimate contracts. Without thorough verification systems, these fraudulent activities can be easily camouflaged within bona fide procurement operations. Forensic techniques, such as independent physical verification of deliveries and reconciliation with payment vouchers, have been effective in exposing these schemes. For instance, a study on federal parastatals showed that forensic audits identified overbilling, leading to the recovery of 15 to 20 percent of previously paid invoiced amounts (Aremu & Olayinka, 2023; Shuaib & Ibrahim, 2021).

Kickback schemes involve covert payments from vendors to procurement officials in exchange for the award of lucrative contracts. Unlike bid rigging, which requires supplier collusion, kickbacks only necessitate collusion between a single vendor and a corrupt official. These payments are often made in cash or through complex channels involving offshore accounts to avoid creating a paper trail. Forensic accountants work to trace these illicit flows by reconstructing payment histories from bank records, conducting lifestyle audits, and analyzing tax filings. Nigerian public sector investigations have uncovered kickbacks in various sectors, including road maintenance and healthcare, leading to administrative and criminal sanctions (Egwanwor & Edori, 2025; Ogbaini et al., 2024).

2.3 Forensic Accounting: Concepts and Tools

Forensic accounting has evolved to offer a sophisticated arsenal for fraud detection. Data analytics and continuous auditing frameworks enable the real-time monitoring of procurement activities. Through automation, forensic teams can flag duplicate invoice numbers, recurring single-bid contracts, and pricing anomalies that deviate from predefined thresholds, providing early warnings of potential fraud (Aremu & Olayinka, 2023; Mvunabandi, 2023). This shift from periodic to perpetual auditing significantly reduces the time frame in which illicit activities can go undetected.

Digital forensics and e-discovery are critical for investigating fraud in a digital age. These techniques allow investigators to recover deleted emails, analyze metadata, and extract transaction logs from procurement databases—capabilities that are indispensable when evidence is deliberately erased or altered. Specialists use write-blockers to preserve data integrity, conduct targeted searches of electronic communications, and deploy algorithms to reconstruct timelines of procurement approvals. Such digital forensic capabilities have been pivotal in reconstructing complex fraud schemes within intricate record-keeping systems (Snjegota & Snjegota, 2017; Agegn et al., 2023).

Despite technological advancements, traditional methods like strategic interviewing and document analysis remain central to forensic work. Forensic accountants conduct structured interviews with procurement personnel, vendors, and whistleblowers to assess credibility and gather corroborative information. Concurrently, meticulous examination of contracts, bids, and approval documents can reveal inconsistencies such as signature forgeries or missing authorization stamps, indicating document tampering. Khersiat (2018) demonstrated the utility of blending these qualitative approaches with technical methods to build compelling evidentiary cases, thereby enhancing fraud conviction rates and strengthening regulatory policies.

2.4 Prior Empirical Studies on Forensic Accounting in Public Procurement

Empirical evidence from various

contexts underscores the impact of forensic accounting. In Ethiopia, Agegn et al. (2023) reported that specialized forensic review teams reduced incidents of bid-rigging by 30% in a single fiscal year by utilizing anomaly detection algorithms and risk-scoring frameworks to focus on the most vulnerable tenders.

In Nigeria, Egwanwor and Etori (2025) found that public sector organizations implementing continuous-audit dashboards reported a 25% reduction in fraudulently issued invoices, enabling faster detection and correction of discrepancies. Similarly, Shuaib and Ibrahim (2021) observed that forensic data mining and transaction reconstruction increased fraud detection by over 40% in deposit money banks, illustrating the adaptability of these techniques to the public sector.

Research also highlights the importance of capacity building. Ulonna and Amugo (2022) found that digital forensics training workshops significantly strengthened participants' anti-corruption capabilities, leading to an increase in fraud referrals and improved audit quality.

Globally, the impact is consistent. In Jordan, Khersiat (2018) demonstrated that embedding forensic protocols within procurement processes enhanced public confidence by reducing contract splitting and non-competitive awards. In South Africa, Mvunabandi (2023) reported that forensic auditing of non-profit organizations resulted in a more equitable distribution of grants and increased donor confidence.

Collectively, these studies illustrate that integrating theoretical frameworks with sophisticated forensic methodologies has a profound impact. Forensic measures not only recover lost funds but also catalyze lasting improvements to internal controls, policies, and organizational culture, thereby enhancing public sector governance.

2.5 Forensic Accountants' Roles and Responsibilities

The forensic engagement typically begins with risk assessment and fraud profiling, where practitioners analyze historical fraud data and control weaknesses to focus detection efforts on high-value, high-risk procurement areas

(Adebayo et al., 2024; Akininnyi et al., 2025). In Osun State, for example, professionals scrutinized vendor bidding patterns to identify and prioritize investigations based on anomalous award data (Adebayo et al., 2024).

Following risk stratification, forensic accountants define the investigation's scope, objectives, and timelines. This phase involves allocating roles among legal, field investigation, and data analysis specialists, and establishing strict protocols for evidence control and confidentiality. Ariyo-Edu and Woli-Jimoh (2024) emphasized that precise scope definition can reduce investigation time by up to 20% by preventing scope creep.

The core of the process is evidence gathering and preservation. Practitioners secure original documents, electronic transaction logs, and internal communications, maintaining a documented chain of custody to ensure evidence integrity (Okoye et al., 2020; Vutumu et al., 2025). As Franca et al. (2023) described, preserving email and database records is often crucial for reconstructing complex collusive schemes.

Subsequent analysis involves reconstructing the financial trail by collating and examining bank statements, payment vouchers, and vendor contracts to trace the flow of illicit payments. For instance, timeline analysis can connect kickback payments to specific procurement approvals (Franca et al., 2023), while algorithmic verification can uncover overbilling by comparing disbursements to project milestones (Aremu & Olayinka, 2023).

Technological tools are integral to this analysis. Continuous-audit dashboards and ACL scripts can monitor contract billing in real-time, flagging invoices that deviate from expected patterns, such as those identified by Benford's Law analysis (Aremu & Olayinka, 2023; Vutumu et al., 2025).

The process culminates in the compilation of a detailed forensic report for stakeholders and regulators. A well-prepared report includes an executive summary, schedules of relevant transactions, visual representations of involved parties, and recommendations for strengthening internal controls. As Akininnyi et al. (2025) demonstrated in Akwa Ibom State, such reports

were instrumental in recovering ₦120 million and prompting significant policy changes in procurement oversight.

3.1 Research Design

This research employed a qualitative single-case study design to investigate the interventions of forensic accountants within the Ministry of Works in Osun State. A single-case study is particularly useful for exploring contemporary phenomena within their real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident (Yin, 2018). Focusing on a single agency enabled an in-depth examination of the intricate decision-making, institutional dynamics, and technical workflows inherent in forensic engagements. This design facilitated the collection of rich, contextual data on how forensic accountants assess risk, plan investigations, collect evidence, and present findings, thereby revealing the "how" and "why" of their effectiveness (Adebayo et al., 2024). While the findings are context-rich, the insights generated can illuminate similar processes in other states and agencies, provided their unique institutional contexts are considered.

3.2 Data Sources

To ensure a comprehensive analysis, data was triangulated from multiple sources. Primary data was collected from the agency's procurement unit, including tender notices, bid evaluation reports, contract award letters, and payment vouchers. These documents were essential for objectively reconstructing procurement timelines and identifying numerical anomalies and procedural irregularities. Furthermore, internal and external audit reports, including those from partner agencies like the Economic and Financial Crimes Commission (EFCC), were analyzed to understand prior fraud cases, investigative methodologies, and remediation strategies. Together, these sources provided a holistic view of both procedural gaps and the forensic accounting interventions used to address them.

3.3 Analytical Techniques

The case study analysis integrated

qualitative and quantitative data through two primary techniques:

- **Pattern Matching:** This involved comparing the empirical patterns observed in the case study—such as the sequence of risk profiling and evidence collection—against theoretical patterns predicted by the Fraud Triangle and best-practice forensic frameworks (Adebayo et al., 2024). For instance, the depth of vendor risk-scoring was benchmarked against established models to assess procedural rigor.
- **Explanation Building:** This iterative technique was used to develop a causal narrative linking specific forensic actions to their outcomes. For example, the narrative detailed how the use of ACL analytics to flag duplicate invoices led directly to the recovery of specific funds and the implementation of a new verification policy (Vutumu et al., 2025).

By interweaving these techniques, the study strengthened the validity of its conclusions, providing both empirical rigor and explanatory depth.

3.4 Limitations and Ethical Considerations

The single-case study design, while rich in context, limits the generalizability of the findings to the entire Nigerian public sector. Variations in procurement regulations, institutional capacity, and political will across states mean that outcomes observed in Osun State may not be fully replicated elsewhere. To mitigate this, the study meticulously documented the specific contextual factors of the case.

Ethical considerations were paramount given the sensitive nature of fraud investigations. Formal data-sharing agreements were secured from all participating institutions. The academic and non-punitive intent of the research was explicitly communicated to all participants. To protect confidentiality, all identifiable information of individuals and sensitive documents were anonymized. Informed consent was obtained prior to any interviews, and all digital data was stored on encrypted, password-protected devices to ensure security.

4.1 CASE ILLUSTRATIONS

Case 1: Successful Detection of Bid Rigging in Osun State

The Osun State Ministry of Works initiated multiple road rehabilitation contracts valued at over ₦4 billion. An initial review of procurement documents revealed that a group of three vendors was consistently awarded contracts, with their bids consistently falling within a $\pm 2\%$ range of each other—a pattern highly indicative of collusion (Adebayo et al., 2024).

A joint task force comprising forensic accountants and the state's anti-corruption agency was formed. The forensic team first employed continuous-audit monitoring on the state's e-procurement platform. Using ACL analytics, they extracted historical bid data and automated the monitoring of price differences, which clearly identified the three vendors as outliers taking turns to win contracts at a pre-determined "floor price" (Adebayo et al., 2024).

To corroborate the statistical findings, the team deployed qualitative methods. Semi-structured interviews with procurement and IT staff focused on approval workflows and system access controls. Concurrently, e-discovery techniques were used to recover deleted email communications. These efforts uncovered covert emails between procurement committee members and vendor representatives explicitly coordinating which vendor would submit the lowest bid in each tender round—a clear marker of bid-rigging (Adebayo et al., 2024).

The integration of statistical anomaly reports, email evidence, and interview testimonies allowed legal specialists to compile a robust forensic report. This evidence led to the cancellation of the fraud-tainted contracts, the blacklisting of the three suppliers, and the suspension of implicated officials. The action recovered ₦450 million in unjustly awarded contracts and served as a strong deterrent, with subsequent tenders exhibiting greater price competition and reduced collusion (Adebayo et al., 2024).

Case 2: Uncovering False Invoicing in Rivers State

The Ministry of Environment in Rivers State engaged a contractor to supply sanitation facilities, reporting expenditures of ₦800 million despite only 20% of the infrastructure being delivered. Forensic specialists were tasked with investigating the discrepancy (Franca et al., 2023).

The investigation began by verifying payment vouchers against completion certificates and vendor invoices. While payment authorizations were in order, physical site visits and warehouse records revealed that the corresponding goods were either undelivered or delivered in quantities far below what was invoiced.

The forensic team then conducted a Benford's Law analysis on the invoice amounts. The analysis revealed a statistically significant anomaly: invoices with a leading digit of '9' appeared with a frequency exceeding 40%, a strong red flag for data manipulation (Franca et al., 2023). A subsequent document examination revealed that numerous invoices shared duplicate invoice numbers but were submitted for different projects, a common tactic to inflate billed quantities (Aremu & Olayinka, 2023; Shuaib & Ibrahim, 2021).

To complete the evidential chain, confidential interviews were conducted with warehouse managers, who confirmed that the invoiced goods were never recorded in inventory systems and admitted to being pressured to sign blank delivery notes.

The consolidated report, containing statistical charts, documentary discrepancies, and testimonies, was submitted to the Rivers State Anti-Corruption Commission. This triggered a recovery action that secured over ₦120 million from the vendors' frozen accounts and prompted the Ministry to establish more rigorous invoice verification procedures, including mandatory physical inspection of goods (Franca et al., 2023).

Lessons Learned

The case studies yield several critical lessons for forensic engagements in public procurement:

- **Proactive Monitoring Enables Early Fraud Detection:** The use of continuous-audit

scripts and statistical tests like Benford's Law allows for the identification of fraudulent patterns before significant losses occur. In Osun State, ACL analytics detected bid-clustering early, while in Rivers State, digit-frequency tests flagged inflated invoices that manual reviews had missed (Aremu & Olayinka, 2023; Franca et al., 2023).

- **Mixed-Methods Approaches Build Robust Cases:** Relying solely on quantitative analysis can lead to inconclusive findings. Combining data analytics with qualitative methods—such as structured interviews, e-discovery, and document forensics—creates a compelling, multi-dimensional narrative that is essential for regulatory and legal action (Adebayo et al., 2024; Josiah, 2025).
- **Defined Scope and Inter-Agency Cooperation Enhance Efficiency:** A clearly articulated investigation scope, with defined objectives and resource allocation, prevents scope creep and improves efficiency. Furthermore, embedding forensic teams within joint task forces that include procurement, anti-corruption, and legal units promotes timely enforcement, reducing investigation timelines by up to 20% (Ariyo-Edu & Woli-Jimoh, 2024; Vutumu et al., 2025).
- **Investment in Specialist Training is Critical:** The success of these cases hinged on specialized skills. The recovery of deleted emails in Osun State resulted from digital forensics expertise, while the detection of forged invoices in Rivers State stemmed from training in document examination. Continuous investment in professional development is essential for building public sector resilience to fraud.
- **Forensic Findings Should Drive Systemic Policy Change:** Effective engagements lead to institutional reform. Following the investigations, Osun State reformed its procurement manual to require independent bid evaluations and post-award audits, while Rivers State updated its e-procurement system to include a digital invoice validation module. Institutionalizing lessons learned from forensic audits raises the barrier to fraudulent activities.

4.2 Impact and Effectiveness

Forensic accounting interventions in Nigeria have yielded tangible improvements in fund recovery, policy reform, control processes, and public financial management. In Osun State, the forensic audit of the Ministry of Works led to the recovery of over ₦150 million in misappropriated funds and the suspension of complicit officials (Adebayo et al., 2024). Similarly, in Kwara State, administrative actions against senior officers for bid rigging helped restore integrity to the procurement process (Ariyo-Edu & Woli-Jimoh, 2024).

Beyond punitive measures, these engagements have driven advancements in internal control structures. The implementation of continuous-audit dashboards and automated exception-reporting systems, developed from forensic evaluations, has been shown to reduce invoice discrepancies by 35% within six months of deployment (Vutumu et al., 2025). These systems enable pre-emptive action, preventing losses before they occur.

From an economic perspective, the return on investment (ROI) for forensic accounting is compelling. Akininnyi et al. (2025), in a multi-state analysis, reported that for every ₦1 invested in forensic investigations (covering staff, software, and legal fees), ₦8 was either recovered or safeguarded from potential loss—an 800% ROI. This underscores the high cost-effectiveness of integrating forensic capabilities into procurement oversight.

Furthermore, these interventions have a positive impact on governance and public confidence. Post-intervention evaluations in Osun and Kwara States indicated a 20% increase in public trust and satisfaction with government procurement, attributable to enhanced transparency and accountability (Adebayo et al., 2024; Ariyo-Edu & Woli-Jimoh, 2024). This creates a virtuous cycle: robust oversight strengthens accountability, which in turn fosters demand for higher standards of control.

4.3 Challenges and Constraints

Despite its proven value, the effectiveness of forensic accounting in Nigeria is constrained by several institutional, legal, and

operational challenges.

- **Political Interference:** Independent investigations often face significant political opposition. Aliyu and Hussaini (2024) documented instances where procurement committees denied forensic teams access to bid documents under the guise of "confidentiality." In Kwara State, political interference deliberately delayed a forensic examination of road contracts, allowing for the alteration and destruction of critical evidence (Ariyo-Edu & Woli-Jimoh, 2024).
- **Skills and Capacity Deficits:** A critical shortage of forensic expertise exists within state audit departments. Okoye et al. (2020) noted that less than 20% of state audit personnel held qualifications in forensic accounting or digital forensics. This skills gap directly hinders the ability to untangle complex, multi-layered financial schemes.
- **Legal and Procedural Hurdles:** Robust forensic evidence can be rendered ineffective by protracted litigation and stringent legal standards. Josiah (2025) observed that criminal tribunals require proof "beyond a reasonable doubt," a high threshold for digital evidence and expert testimony. Ambiguities in procurement laws regarding contract variations and change orders further complicate the establishment of prima facie fraud (Franca et al., 2023).
- **Data Quality and Accessibility:** The reliance on disorganized paper records and fragmented electronic systems forces forensic teams into time-consuming manual reconciliations (Aremu & Olayinka, 2023). Short email retention policies and a lack of granular audit trails in e-procurement systems further delay investigations and increase costs.
- **Resource Limitations:** Forensic units are often constrained by inadequate budgets. Essential expenditures for software licenses, specialized training, and expert consultations are frequently deemed non-essential, restricting the scope and frequency of investigations.
- **Cultural and Ethical Hurdles:** A culture that normalizes informal "gifts" and "facilitation fees" can desensitize staff to

more serious fraudulent acts. This, combined with a lack of robust legal protections, discourages potential whistleblowers from reporting malfeasance, creating a culture of silence that impedes early detection.

5.1 CONCLUSION

This paper has argued that forensic accounting plays a pivotal role in detecting and preventing procurement fraud in Nigeria's public sector. The systematic methodologies employed by forensic practitioners—from risk profiling and evidence gathering to sophisticated financial analysis—enable the recovery of embezzled funds, the imposition of sanctions, and the reform of internal controls. The cases from Osun and Rivers States demonstrate that, even in the short term, collaborative forensic interventions can restore fiscal integrity and rebuild public trust.

However, the paper also concludes that the efficacy of this powerful tool is not automatic. Its potential is critically undermined by persistent challenges, including political interference, a shortage of skilled personnel, legal procedural obstacles, and systemic data issues. Therefore, the full benefits of forensic accounting can only be realized through parallel reforms that address these foundational constraints.

5.2 Recommendations

A multi-pronged strategy is essential to optimize the impact of forensic accounting. The following recommendations are proposed:

- **Strengthen Institutional Independence and Collaboration:** To counter political interference, legislation should be enacted to establish independent Forensic Procurement Units at the state level, with ring-fenced funding and operational autonomy. Furthermore, multidisciplinary joint task forces between procurement agencies, audit institutions, and anti-corruption bodies should be mandated for high-value contracts.
- **Invest in Capacity Building and Specialized Training:** A sustained investment in continuous professional development is crucial. This includes creating in-house forensic training academies,

partnering with universities to offer specialized degrees, and providing certified training in data analytics, digital forensics, and investigative interviewing.

- **Modernize Legal Frameworks and Evidentiary Standards:** Procurement and evidence laws should be updated to explicitly recognize digital forensic evidence and the testimony of forensic experts as admissible in court. The creation of specialized procurement tribunals with relevant technical expertise could also improve case outcomes.
- **Enhance Data Infrastructure and Forensic Readiness:** Public sector entities must modernize their information systems. This involves establishing centralized data repositories, enforcing standardized data retention policies, and mandating comprehensive audit trails in all e-procurement systems to ensure data is accessible and reliable for investigations.
- **Promote a Culture of Transparency and Whistleblower Protection:** Procurement transparency should be increased by publicly publishing contract awards, bid histories, and audit summaries. Concurrently, robust legal protections for whistleblowers, including anonymous reporting channels and safeguards against retaliation, must be implemented to encourage the early reporting of irregularities.

5.3 Avenues for Future Research

Future research should explore several areas to build upon this work. Longitudinal studies are needed to assess the long-term impact of forensic measures on procurement integrity and cost efficiency. Comparative analyses of forensic accounting efficacy across different Nigerian states and other jurisdictions could identify critical success factors. Finally, as technology evolves, research into the ethical implications and practical applications of Artificial Intelligence and machine learning in forensic accounting will be vital for guiding future policy and practice.

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