

Original Research Article

Advancing Compliance in Nigeria's Public Procurement through Technology, Data Analytics and Regulatory Frameworks

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Abstract: Public procurement in Nigeria is plagued by inefficiency, corruption, and weak enforcement despite the Public Procurement Act of 2007. This study assesses the integration of technology, the impact of data analytics on risk detection, and the role of regulatory agencies in advancing procurement compliance. Adopting a qualitative-descriptive research design, the study utilized a systematic review of literature and institutional reports alongside structured interviews with 50 procurement officers, employing statistical tests such as Pearson Correlation, Simple Linear Regression, and ANOVA for hypothesis testing. Findings reveal that while e-procurement tools exist, their integration is fragmented and often superficial, appearing as "half-built portals" lacking real-time integration. Statistical results confirm that bribery, bid rigging, and ghost contracting significantly undermine service delivery and budget efficiency. The study concludes that advancing compliance requires scaling digital systems, institutionalizing analytics-driven oversight, and strengthening the independence of regulatory bodies.

Keywords: Accountability, Compliance monitoring, Data-driven oversight, Digital procurement, Regulatory frameworks

1. INTRODUCTION

Public procurement is widely acknowledged as a major driver of national development and service delivery, accounting for a large share of public expenditure in Nigeria. According to Adedokun (2025), public procurement is now seen as a key driver of government priorities aligned with the UN 2030 Sustainable Development Goals (SDGs), and also supports a green economy, innovation, SMEs, and ethical business practices. Its importance in the Nigerian state is underscored by the 2024 budget of ₦28.77 trillion (\$34 billion), with 32% for capital projects. Yet, persistent challenges in the system have spurred

studies and reforms to enhance transparency, efficiency, and sustainability (Aliu, Olatubosun, & Ajayi, 2020). However, procurement processes in the country remain highly susceptible to irregularities, inefficiencies, and corruption, despite the establishment of the Public Procurement Act (PPA) 2007 and oversight by the Bureau of Public Procurement (BPP) and the Independent Corrupt Practices Commission (ICPC). Before 2007, Nigeria's public procurement system was plagued by several challenges, most notably a lack of transparency in contract awards and execution, as well as widespread corruption and related unethical practices (Ifejika, 2024). Previous reforms have emphasized institutional frameworks but often neglected the role of technology and data-driven systems in strengthening compliance (Ukwandu & Ijere, 2020). Oluoha (2025), Ukwandu and Ijere (2020), opined that since gaining independence in 1960, successive Nigerian governments have introduced a series of administrative reforms intended to enhance the public sector's capacity to implement development programs and advance national goals. However, the effectiveness of these reforms in truly strengthening the public sector as a reliable driver of national development remains questionable. The gap observed in this study lies in the limited integration of these modern compliance mechanisms into procurement planning and execution. The purpose of this paper is to evaluate how technology, regulatory frameworks, and data-driven tools can be harnessed to advance compliance in Nigeria's procurement system. The contribution of this paper lies in linking theory and practice to emphasize actionable strategies that can transform compliance monitoring into a sustainable model for accountability and efficiency.

Despite an enabling legal framework, procurement in Nigeria still suffers from persistent non-compliance with established rules, manipulation of bidding processes, and weak enforcement of regulatory guidelines. According to Ama et al. (2023), the challenges that hinder transparency and efficiency in procurement standards range from inadequate or outdated procurement laws, lack of coherence between different regulations, bribery and kickbacks, limited access to information, insufficient skills of procurement personnel, to institutional deficiencies. The current compliance monitoring framework is underutilized due to limited digital adoption, inadequate technical expertise, and political interference (Oguejiofor et al., 2023). Moreover, risk-based data analytics and automated compliance systems are rarely deployed to detect and mitigate irregularities. Amid these challenges, leveraging data-driven strategies and technology has become crucial for strengthening compliance. Zhao et al. (2021) focused on institutional reforms but paid little attention to the integration of advanced technologies and data science into compliance monitoring. This paper addresses this gap by examining the role of e-procurement platforms, compliance automation, and analytics-driven oversight in strengthening Nigeria's procurement processes. The key objectives are: (i) to assess the integration of technology in compliance mechanisms, (ii) to analyze the impact of data analytics on risk detection and decision-making, and (iii) to evaluate the role of regulatory agencies in promoting compliance within Nigeria's procurement framework.

2. RELATED LITERATURE

2.1 Conceptual Review

Digital procurement systems enhance efficiency and transparency while introducing cybersecurity risks such as data breaches and ransomware (Balogun, 2025; Okafor, 2024; Sobulo, 2024). Information-based oversight represents a shift toward systematic data analysis, utilizing predictive analytics and machine learning to identify anomalies (Adegbite, 2022; Amadi & Alapiki, 2022; Apulu et al., 2021). Analytical tools for risk identification further transform procurement into a data-driven function, allowing for real-time reporting on spending patterns and supplier performance (Udeh et al., 2024).

2.2 Theoretical Framework

This study is underpinned by Procurement Capacity Progression Models, such as the Contract Management Maturity Model (CMMM) (Garrett & Rendon, 2025; Rendon, 2018). These frameworks assess institutional growth from basic, reactive compliance to optimized, strategic processes. Higher maturity levels involve structured, centralized systems and strategic sourcing, which are essential for aligning procurement activities with business priorities like risk mitigation (Team Procure, 2025).

2.3 Empirical Review and Research Gaps

Empirical evidence from the National Information Technology Development Agency (NITDA) demonstrates the effectiveness of data-driven enforcement through compliance notices and fines for data breaches (Okeowo, 2020; Olalekan, 2021). However, the development of Nigeria's digital identity ecosystem (NIMC) highlights persistent oversight challenges and infrastructure delays (Ogala, 2013). A critical research gap identified is that previous reforms emphasized institutional frameworks while neglecting the integration of advanced technologies and data science into real-time compliance monitoring (Ukwandu & Ijere, 2020; Zhao et al., 2021).

3. METHODOLOGY

This study adopts a qualitative-descriptive research design to evaluate procurement compliance. The methodology involved a systematic review of academic literature and institutional reports, supplemented by structured interviews with 50 procurement officers to gauge field-level implementation.

To achieve the study objectives, the following step-by-step procedure was employed:

1. **Indicator Identification:** Drawing compliance indicators from literature on e-procurement adoption and maturity models.
2. **Primary Data Collection:** Conducting interviews to identify thematic gaps and perceptions of current digital tools.
3. **Statistical Analysis:** Quantitative hypotheses were tested using **Pearson Correlation** (for service delivery and ghost contracting), **Simple Linear**

Regression (for bid rigging and budget utilization), and **ANOVA** (for document falsification and conflicts of interest).

4. **Synthesis:** Integrating qualitative themes with statistical findings to identify compliance gaps.

4. FINDINGS AND DISCUSSION

4.1 Integration of Technology in Compliance Mechanisms

The study indicates that the integration of technology within Nigeria's procurement system is characterized by inconsistency and fragmentation, with notable disparities in implementation levels across public institutions. While previous research, such as that by Okoro et al. (2023), identified the widespread use of internet-based ICT tools as a catalyst for e-procurement adoption, field interviews revealed that implementation remains superficial in numerous parastatals. Among the 50 officers interviewed, only 15 confirmed that their organizations had fully adopted digital procurement tools. Musa et al. (2023) highlighted that perceived usefulness, trust, and security were pivotal factors driving e-procurement adoption, whereas perceived ease of use unexpectedly served as a deterrent. This finding is consistent with our interviews, where respondents expressed skepticism towards complex digital interfaces, inadequate training, and insufficient user support. Aliu et al. (2021) observed that organizations with functional e-procurement platforms experienced enhanced compliance, increased supplier participation, and reduced administrative bottlenecks. This observation aligns with respondent recommendations advocating for comprehensive e-procurement implementation to mitigate human manipulation and enhance monitoring. The interview results further corroborate this: over 48 out of 50 respondents contended that fully implemented automated procurement systems would significantly curtail manipulation, ghost contracting, and political interference in contract allocation. Nevertheless, current digital systems were predominantly described as "half-built portals" lacking real-time integration or contractor verification.

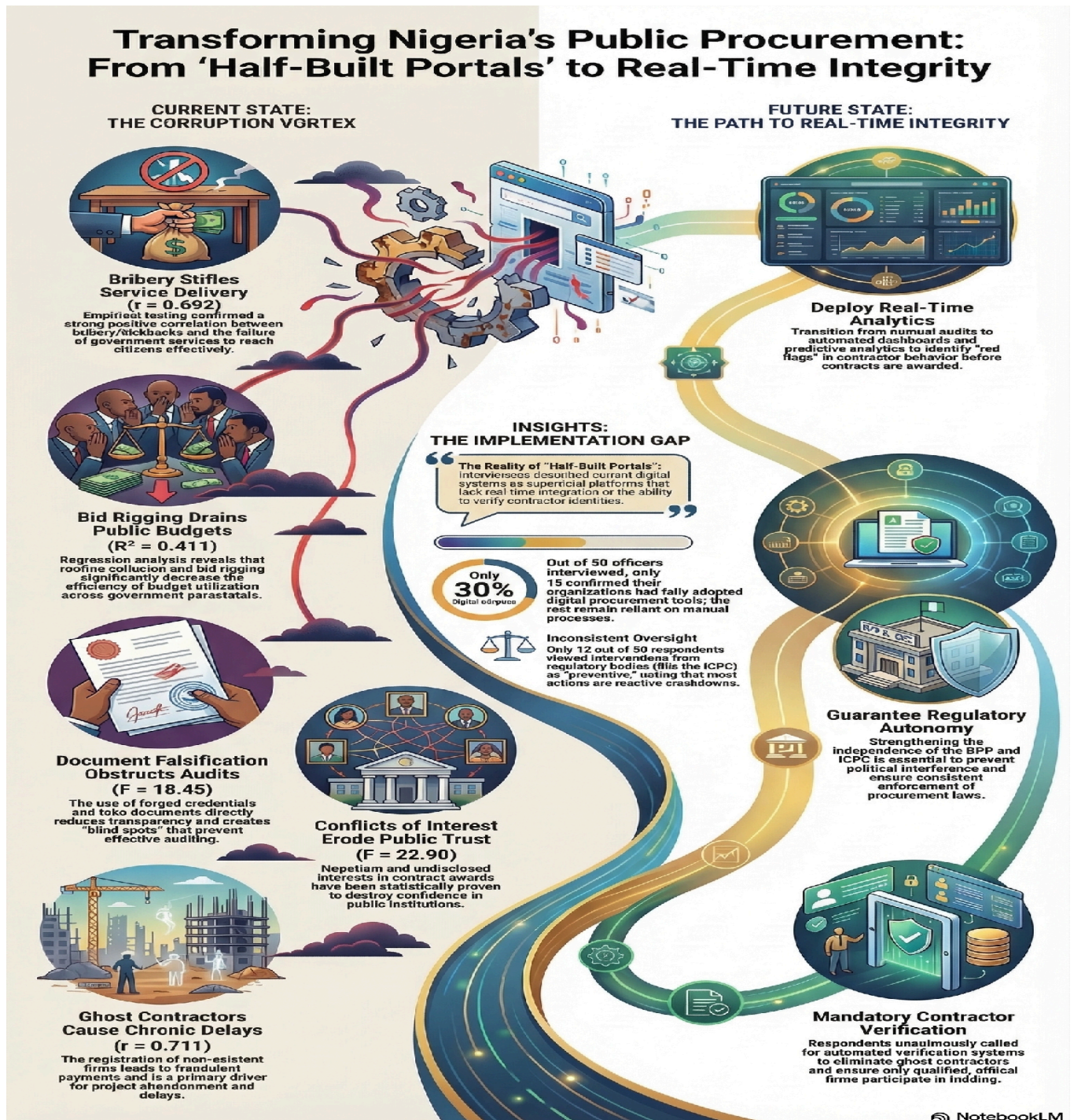
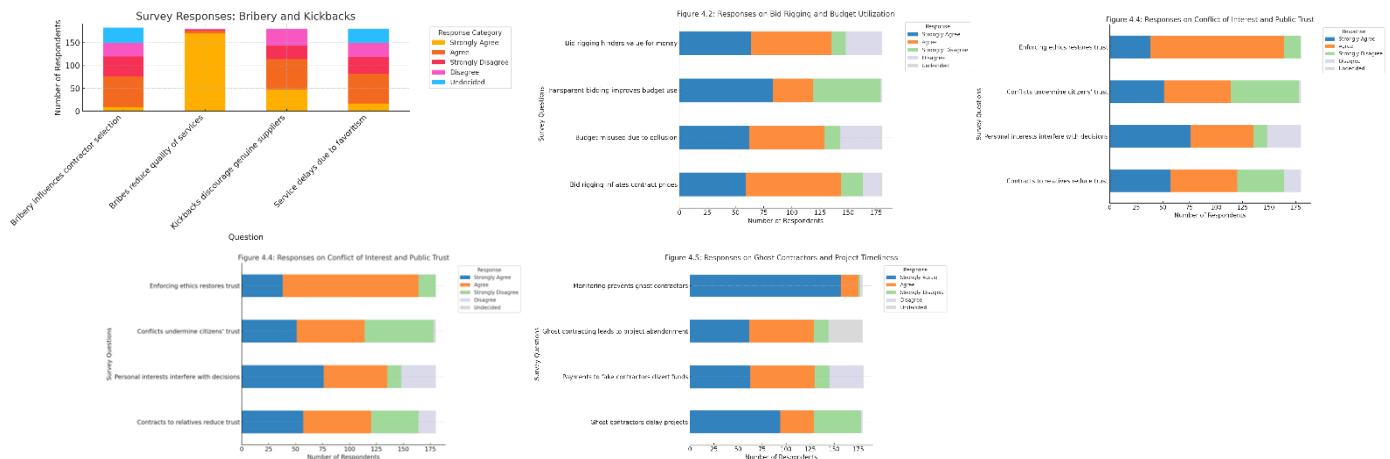


Figure 4.1: Summary of Major Empirical Findings and Thematic Results



Figures 4.2–4.5 emphasize that corruption risks—ranging from bid rigging to ghost contracting—are not only widely recognized but also perceived to have a **direct negative impact** on project quality, budget efficiency, transparency, and public trust. These findings underscore the urgent need for **reform through automation, stronger ethics enforcement, and data-driven monitoring systems** in public procurement.

4.2 Impact of Data Analytics on Risk Detection and Decision-Making

Quantitative and qualitative findings underscore the emerging application of data analytics for compliance monitoring in Nigeria. Oguejiefor et al. (2023) identified a deficiency in capacity, funding, and institutional support for data-driven risk detection—an observation corroborated by interviews, where over 40 respondents acknowledged that data is collected but seldom analyzed beyond superficial summaries. Ezeoke (2023) proposed a comprehensive framework for employing analytics in compliance oversight, encompassing key practices such as defining compliance indicators, automating data collection, and real-time visualization. However, none of the interviewees reported the utilization of real-time dashboards, predictive analytics, or visualization tools in their current systems. Instead, compliance predominantly relies on manual audits, external probes, or reactive investigations. Chika and Tochukwu (2020) emphasize a significant gap in Nigeria's data protection and privacy laws, a concern also reflected in the field interviews. Respondents expressed apprehensions regarding inadequate enforcement, lack of data governance, and the absence of certified data professionals, resulting in breaches and unreliability in procurement information systems. Despite these deficiencies, there is a growing recognition of data as a strategic asset for mitigating procurement fraud. Both interview and survey data indicate widespread support for enhanced analytics, particularly for identifying red flags in contractor behavior, repeated bid rigging, or ghost contractor registrations.

4.3 Role of Regulatory Agencies in Promoting Compliance

The Bureau of Public Procurement (BPP) and the Independent Corrupt Practices Commission (ICPC) serve as the principal oversight bodies; however, their effectiveness is compromised by inconsistent enforcement, political interference, and limited technological capacity, as previously documented by Saliu and Ifejika (2019). This sentiment is

corroborated by interview responses, wherein officers expressed dissatisfaction with the ICPC's reactive and punitive approach. Only 12 out of 50 respondents perceived ICPC interventions as preventive. Instead, the majority regarded these interventions as sporadic crackdowns lacking sustainability or follow-up. Survey results (Tables 4.2 to 4.6) provide robust empirical evidence that institutional controls are insufficient in mitigating corruption. Findings from the interviews advocate for the implementation of real-time digital monitoring systems, independent audit frameworks, and enhanced autonomy for regulatory agencies to operate without political interference. Furthermore, despite the BPP's online procurement portal, numerous respondents observed frequent manual overrides and non-compliance with online posting requirements, which undermine its efficacy.

4.4 Summary of Empirical Hypotheses Testing and Discussions

Table 1: *Summary of Empirical Hypothesis Testing Results*

Hypothesis	Statistical Method	Key Result/Statistic	P-Value	Decision
H1: Bribery and kickbacks do not affect service delivery effectiveness.	Pearson Correlation	$r = 0.692$	$p < 0.05$	Rejected
H2: Investigations do not positively influence bid rigging and budget utilization.	Simple Linear Regression	$R^2 = 0.411$ ($F=52.98$)	$p < 0.05$	Rejected
H3: Document falsification does not affect transparency.	ANOVA	$F = 18.45$	$p < 0.05$	Rejected
H4: Conflicts of interest do not affect public trust.	ANOVA	$F = 22.90$	$p < 0.05$	Rejected
H5: Ghost contractors do not affect timely delivery.	Pearson Correlation	$r = 0.711$	$p < 0.05$	Rejected

Each hypothesis was tested statistically: Hypothesis One: Bribery and kickbacks do not affect service delivery effectiveness. Result: Rejected (Pearson Correlation: $r = 0.692$, $p < 0.05$). Strong link found between bribery and reduced service effectiveness. Survey showed bribery compromised quality, with favoritism in procurement, aligning with Akosile (2021) and Rose-Ackerman (2013). Hypothesis Two: Investigations do not positively influence bid rigging and budget utilization. Result: Rejected (Simple Linear Regression: $R^2 = 0.411$, $F = 52.98$, $p < 0.05$). Bid rigging decreased budget efficiency. Interviewees reported routine collusion, supporting OECD (2016) and Ojo (2021). Hypothesis Three: Document falsification does not affect transparency. Result: Rejected (ANOVA: $F = 18.45$, $p < 0.05$). Falsified documents reduce trust and hinder audits, aligning with Agbiji (2022) and Olatunji (2021). Hypothesis Four: Conflicts of interest do not affect public trust. Result: Rejected (ANOVA: $F = 22.90$, $p < 0.05$). Conflicts and nepotism erode confidence, echoing UNECA (2018) and Ogunyemi (2021). Hypothesis Five: Ghost contractors do not affect timely delivery. Result: Rejected (Pearson Correlation: $r = 0.711$, $p < 0.05$). Ghost contractors cause delays and fraudulent payments, consistent with Okechukwu (2021) and World Bank (2017).

4.5 Thematic Synthesis of Qualitative Data from Interviews

Table 2: *Thematic Synthesis of Qualitative Data from Interviews (N=50)*

Identified Theme	Findings from Field Interviews	Supporting Literature
Technology Integration	48/50 respondents noted that current systems are "half-built portals" lacking real-time contractor verification.	Aliu et al. (2021); Musa et al. (2023)
Data Utilization	Over 40 respondents admitted data is collected but rarely analyzed beyond superficial summaries.	Oguejiofor et al. (2023)
Regulatory Oversight	Only 12/50 viewed ICPC interventions as preventive; 38/50 viewed them as reactive "crackdowns."	Saliu & Ifejika (2019)
Compliance Barriers	Significant manual overrides of online requirements and political manipulation persist.	Ama et al. (2023)

An analysis of responses from 50 structured interviews reveals consistent themes: There is a high level of awareness regarding procurement laws and cycles; however, corruption persists due to inadequate enforcement, cultural acceptance of bribery, and political manipulation. Respondents unanimously agree that key reforms should include the implementation of an e-procurement system, protection for whistleblowers, real-time monitoring and analytics, mandatory ethical training, and contractor verification systems.

The mixed-method findings conclusively indicate that corruption in procurement—manifested through bribery, bid rigging, document falsification, conflicts of interest, and ghost contractors—has significantly undermined service delivery, fiscal responsibility, and public trust in Nigerian government parastatals. Although technological integration remains underutilized, there is a strong institutional demand for reform, as evidenced by calls for digital transparency tools, enhanced enforcement, and ethical procurement practices.

5. CONCLUSIONS AND RECOMMENDATIONS

Conclusions on Objectives:

1. **Objective (i) - Technology:** Realized by identifying that technological integration is inconsistent and lacks real-time contractor verification.
2. **Objective (ii) - Data Analytics:** Realized by finding that while data is collected, it is seldom analyzed beyond superficial summaries, resulting in a lack of evidence-based risk detection.
3. **Objective (iii) - Regulatory Role:** Realized by documenting that oversight agencies like the BPP and ICPC are hindered by manual overrides and a reactive approach.

Recommendations:

- **Institutionalize Digital Systems:** The government should transition from "half-built portals" to fully automated e-procurement systems to curtail human manipulation.
- **Adopt Real-time Analytics:** Implement real-time dashboards and predictive tools to move from reactive audits to proactive risk mitigation.

- **Strengthen Regulatory Autonomy:** Enhance the independence of the BPP and ICPC to minimize political interference and eliminate manual overrides of online requirements.

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