



## RESEARCH ARTICLE

### INNOVATIVE APPROACHES TO PUBLIC PROCUREMENT FOR SUSTAINABLE INFRASTRUCTURE PROJECTS IN NIGERIA

VIVIAN. O. ETOLUE<sup>1</sup>, A.B.C. AKUJUOBI<sup>2</sup>, E. C. UBANI<sup>2</sup> AND M.I. NMECHA<sup>1</sup>

<sup>1</sup>Federal Ministry of Education, Federal Secretariat, phase 2, Abuja, <sup>1-2</sup>Centre of Excellence in Sustainable Procurement, Environmental, and Social Standards, Federal University of Technology Owerri, Imo State.

#### ABSTRACT

This study investigates the adoption and efficacy of innovative procurement methods in promoting sustainability and efficiency within Nigeria's public infrastructure sector. Utilizing a mixed-methods approach, it combines survey data with interviews and document reviews across key Ministries, Departments, and Agencies (MDAs). Statistical analyses, including descriptive statistics and ANOVA, alongside thematic analysis, reveal that while Public Private Partnerships (PPPs) and e-procurement demonstrate potential, traditional procurement methods prevail due to institutional inertia, capacity gaps, and regulatory deficiencies. The findings indicate moderate engagement with sustainability, predominantly focused on environmental objectives, while economic and social dimensions are largely neglected. Barriers such as bureaucratic inefficiencies, inadequate training, financial constraints, and political interference persist across MDAs. The study concludes that a comprehensive reform agenda—emphasizing regulatory modernization, digital procurement infrastructure, and capacity building—is essential. Recommendations include targeted legal reforms, expanded training programs, promotion of inclusive sustainability metrics, and improved PPP frameworks. This research provides novel insights into procurement reform in developing economies, offering a data-driven framework to enhance transparency, innovation, and developmental impact in Nigeria's public sector.

**Keywords:** Sustainable procurement, e-procurement, public-private partnerships, regulatory reform, Nigeria, public infrastructure, institutional barriers

#### *Corresponding Author*

Vivian. O. Etolue

**Received:** 13/5/2025; **Revised:** 30/6/2025; **Accepted:** 18/7/2025; **Published:** 30/7/2025



## 1.0. INTRODUCTION

Public procurement in Nigeria is a pivotal instrument for delivering essential infrastructure and fostering national development. Globally accounting for 15–20% of GDP—and even higher in developing countries like Nigeria—it serves as a crucial tool for achieving socioeconomic goals (World Bank, 2021). Historically, Nigeria’s procurement mechanisms have been central to infrastructure delivery but have faced criticism due to inefficiencies, lack of transparency, and misalignment with sustainability objectives (Shai, Molefinyana & Quinot, 2019).

To address Nigeria’s infrastructure deficit, as highlighted by the World Economic Forum (2022), there is growing emphasis on sustainable procurement—an approach that integrates environmental, economic, and social factors. Sustainable infrastructure development ensures long-term benefits while minimizing environmental and social risks (Abubakar & Aina, 2019). Innovative procurement strategies such as e-procurement, Public-Private Partnerships (PPPs), and life-cycle costing are gaining traction. E-procurement enhances transparency and reduces corruption by digitizing procurement processes (Yamusa et al., 2023). PPPs help overcome public sector funding limitations by leveraging private investment (Babatunde et al., 2020), while lifecycle costing ensures long-term resource efficiency by considering the total cost of ownership.

However, the adoption of these innovations has been sluggish due to outdated legal frameworks, institutional resistance, and a lack of capacity among procurement personnel. The Public Procurement Act of 2007 introduced key reforms, yet enforcement remains weak, and technical gaps persist in applying sustainability standards (Ogunsanya et al., 2022).

International best practices offer valuable lessons. The UK’s Sustainable Procurement Strategy focuses on long-term value, social inclusion, and environmental responsibility (CIPS, 2020), while Singapore’s Green Procurement Guidelines encourage environmentally responsible construction and purchasing (Leffel, 2022). These examples provide scalable models for Nigeria’s procurement reform.

Moreover, sustainable procurement directly supports Nigeria’s commitment to the UN Sustainable Development Goals (SDGs)—notably SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production)—which advocate for resilient infrastructure and efficient use of natural resources (UNDP, 2022). A reformed procurement framework would also enhance investor confidence, improve infrastructure quality, and promote inclusive growth. Public procurement in Nigeria has long been recognized as a mechanism for infrastructure delivery and economic growth. However, implementation challenges persist, especially in achieving transparency, value-for-money, and sustainability. Nmecha et al. (2023) provide a critical evaluation of the Public Procurement Act (PPA) in their study titled “*An Appraisal of Effectiveness of Public Procurement Act and Procurement Process in the Cost of Contract Awards*”.



Their research highlights inefficiencies in cost control mechanisms and outlines how poor enforcement of procurement policies leads to inflated contract costs and delays, thereby undermining infrastructure development goals. Nmecha's work adds empirical weight to earlier criticisms of procurement inefficiencies by showing how bureaucratic inertia, weak monitoring frameworks, and limited stakeholder engagement hinder the full realization of procurement reforms. These insights support the broader call for reform by linking procurement inefficiency directly to financial waste and developmental stagnation.

Nigeria's procurement system is at a turning point. To bridge the infrastructure gap and foster resilience, a decisive shift toward innovative, transparent, and sustainable procurement practices is required. This transformation aligns with international benchmarks and is crucial for achieving long-term development goals.

## **1.2. Problem Statement**

Public procurement plays a crucial role in the development of Nigeria's infrastructure; however, it is significantly impeded by corruption, bureaucratic delays, inadequate planning, and a lack of transparency and accountability. These inefficiencies result in project delays, inflated costs, and substandard or abandoned projects, thereby exacerbating the country's infrastructure deficit and undermining public trust and economic growth. From a financial perspective, procurement inefficiencies lead to substantial losses, primarily due to corruption and mismanagement, which divert funds from essential development projects. The rigidity of Nigeria's procurement framework—particularly the inadequate enforcement of the Public Procurement Act (2007) and the scarcity of skilled personnel—further diminishes efficiency and innovation.

Moreover, Nigeria's procurement system largely neglects sustainability, prioritizing the lowest cost bids without considering long-term value, maintenance, or environmental impact. Insufficient stakeholder engagement also contributes to project risks, community opposition, and delays. To address these challenges, the study recommends the adoption of innovative solutions such as e-procurement to enhance transparency, public-private partnerships (PPPs) for financing and expertise, and life-cycle costing for sustainability. These reforms are essential for improving procurement outcomes and achieving Nigeria's infrastructure and development objectives.

## **1.3 Aim and Objectives of Study**

The primary aim of this study is to investigate and compare innovative procurement strategies for sustainable infrastructure projects in Nigeria. To achieve this aim, the study will pursue the following specific objectives:

1. Identify and evaluate innovative procurement methods employed in public infrastructure projects in Nigeria.
2. Assess the effectiveness of these innovative procurement methods in achieving sustainability goals, encompassing environmental, social, and economic dimensions.



3. Analyze the impact of policy and legal frameworks on the adoption of innovative procurement practices in Nigeria.
4. Examine the role of technological tools in enhancing transparency and efficiency within Nigeria's procurement processes.
5. Investigate the influence of public-private partnerships (PPPs) on infrastructure financing and delivery in Nigeria.
6. Identify the barriers to the adoption of innovative procurement practices in Nigeria.

#### **1.4. Research Questions**

The following research questions are formulated to align with the objectives of this study.

1. What innovative procurement methods are currently employed for public infrastructure projects in Nigeria?
2. How effective are these innovative procurement methods in achieving sustainability goals, encompassing environmental, social, and economic dimensions?
3. What influence do Nigeria's policy and legal frameworks exert on the adoption of innovative procurement practices?
4. How do technological tools, such as e-procurement platforms, enhance transparency and efficiency in Nigeria's procurement processes?
5. What role do public-private partnerships (PPPs) play in financing and delivering sustainable infrastructure projects in Nigeria?
6. What are the barriers to the adoption of innovative procurement practices in Nigeria?

#### **1.5. Hypotheses**

In alignment with the study's objectives and research questions, the following hypotheses have been established to direct this investigation:

1. HO<sub>1</sub>: The adoption of various innovative procurement methods is not significantly prevalent in public infrastructure projects in Nigeria.
2. HO<sub>2</sub>: The implementation of innovative procurement methods has not significantly influenced the attainment of sustainability goals, encompassing environmental, social, and economic dimensions, in public infrastructure projects in Nigeria.
3. HO<sub>3</sub>: Policy and legal frameworks in public procurement do not significantly affect the adoption of innovative procurement methods in public infrastructure projects.
4. HO<sub>4</sub>: The utilization of technological tools, such as e-procurement platforms, does not significantly enhance transparency and efficiency in public infrastructure projects.



5. HO<sub>5</sub>: The adoption of public-private partnerships (PPPs) has not significantly impacted the financing and delivery of sustainable infrastructure projects in Nigeria.
6. HO<sub>6</sub>: There are no significant barriers to the adoption of innovative procurement practices for public infrastructure projects in Nigeria.

## **2.0. LITERATURE REVIEW**

Public procurement serves as a fundamental component of infrastructure development in Nigeria; however, it is beset by systemic inefficiencies that undermine its efficacy. Issues such as corruption, bureaucratic inertia, inadequate planning, and insufficient institutional capacity have resulted in project delays, cost overruns, and abandoned initiatives. These shortcomings not only impair service delivery but also exacerbate Nigeria's infrastructure deficit and impede its developmental objectives (World Bank, 2023; Ambe & Maleka, 2022).

### **Financial and Operational Inefficiencies**

The financial ramifications of procurement inefficiencies are significant. Corruption and inflated contracts divert public resources away from critical infrastructure investments. Transparency International (2022) identifies procurement-related fraud as a primary contributor to the mismanagement of public funds in Nigeria. Furthermore, inadequate procurement planning leads to the implementation of substandard infrastructure, thereby increasing lifecycle costs and diminishing public value (Nmecha et al., 2023; OECD, 2021).

### **Rigid and Outdated Procurement Frameworks**

The Public Procurement Act (2007), initially established to promote transparency and competition, suffers from inadequate enforcement and is often ill-suited for complex infrastructure projects. Procedural bottlenecks and the absence of adaptive mechanisms hinder efficiency. Furthermore, procurement officers frequently lack the technical expertise required to manage large-scale infrastructure projects, leading to suboptimal outcomes (PPDC, 2022).

### **Absence of Sustainable Procurement Practices**

The majority of procurement processes in Nigeria prioritize the selection of the lowest-cost bids, frequently neglecting the long-term economic, social, and environmental impacts. This short-term focus results in fragile infrastructure, environmental degradation, and inequitable access to services. Sustainable procurement—an approach increasingly adopted on a global scale—remains underutilized within Nigeria's public sector (UNEP, 2023; Yusuf & Musa, 2021).





### **Inadequate Stakeholder Engagement**

Infrastructure development often requires collaboration among diverse stakeholders. In Nigeria, however, limited consultation with communities and affected groups frequently results in resistance, land disputes, and environmental opposition. Effective stakeholder engagement is essential for reducing project risks, aligning priorities, and ensuring community buy-in (AfDB, 2022; Epting, 2020).

### **Recommendations: Innovative Solutions for Reform**

To address these challenges, the following measures are proposed: E-Procurement Platforms:

The digitization of procurement processes can enhance transparency, mitigate corruption, and facilitate real-time tracking of project milestones (World Bank, 2023; Belokrylova et al., 2021). Public-Private Partnerships (PPPs): Utilizing PPPs enables Nigeria to access private financing and expertise, thereby improving project delivery and cost management (ADB, 2022; Changelima et al., 2021). Life-Cycle Costing: Transitioning from lowest-bid procurement to value-based assessments can foster sustainability and reduce long-term costs (Menifield, 2020; UNEP, 2023). Capacity building, particularly the enhancement of procurement personnel's competencies in contract management, cost analysis, and sustainability assessment, is imperative (Nmecha et al.2023). Inefficiencies within Nigeria's public procurement system significantly hinder its infrastructure development goals. Addressing these challenges through the adoption of transparency-enhancing technologies, sustainable procurement models, and strategic stakeholder inclusion is essential. Recent studies emphasize that reforming public procurement is not merely a financial imperative; it is fundamental to achieving sustainable and inclusive national growth (Nmecha et al., 2023; World Bank, 2023).

## **3.0. METHODOLOGY**

### **3.1. Research Design**

This study adopts a comparative mixed-methods research design, combining both descriptive quantitative analysis and qualitative thematic analysis. This approach ensures a comprehensive examination of procurement practices within Nigeria's public infrastructure sector. Quantitative data is used to identify trends and statistical relationships, while qualitative data offers contextual insights into policy, institutional frameworks, and stakeholder behavior.

### **3.2. Study Area**

The research examines the principal Ministries, Departments, and Agencies (MDAs) engaged in infrastructure procurement, specifically: the Federal Ministry of Works and Housing, the



Federal Ministry of Power, the Federal Ministry of Transportation, the Federal Ministry of Water Resources, and the Niger Delta Development Commission (NDDC). These entities were selected due to their pivotal roles in the planning and delivery of public infrastructure throughout Nigeria.

### 3.3. Data Collection Methods

**Primary Data:** Data were gathered using a structured questionnaire with a 5-point Likert scale, targeting procurement officers, project managers, Public-Private Partnership (PPP) unit staff, and policymakers within selected Ministries, Departments, and Agencies (MDAs). **Secondary Data:** A comprehensive review of procurement documents, tender records, policy frameworks, and project reports was conducted to gain insights into institutional practices and to monitor the implementation of innovative procurement strategies.

### 3.4. Sampling Techniques

A purposive sampling method was employed to select relevant MDAs and infrastructure projects that involve innovative procurement or PPP models. Additionally, a proportional sampling technique was utilized to ensure an equitable distribution of respondents across the MDAs. Utilizing the formula  $n = N / (1 + N(e)^2)$  Where:

$n$  = required sample size  $N$  = total population size;

$e$  = margin of error (assumed at 5%, or 0.05).

Assuming an estimated population size of 500 relevant stakeholders across the selected MDAs, the sample size calculation is as follows:

$$n = 500 / (1 + 500) (0.05)^2$$

, resulting in  $500 / (1 + 1.25) = 222$ . Therefore, a sample size of approximately 222 participants is deemed sufficient for this study.

### 3.5. Data Analysis Techniques Quantitative Analysis:

- Conducted using **SPSS** and **Excel**.
- **Descriptive statistics** (mean, median, standard deviation) summarize stakeholder perceptions.
- **ANOVA (Analysis of Variance)** tested for differences in opinions across MDAs and respondent categories.

#### Mean Square Between Groups

$$F = \frac{\text{Mean Square Between Groups}}{\text{Mean Square Within Groups}}$$

The F-statistic (F) is employed to assess whether there are significant differences among group means (Handfield, Jeong, and Choi, 2019). The integration of these methods establishes a comprehensive framework for data analysis, ensuring that the insights derived



are both statistically valid and contextually pertinent. The results from both analyses are triangulated to formulate conclusions and provide practical recommendations.

### Qualitative Analysis:

- Applied **thematic coding** to secondary documents and reports.
- Followed Braun & Clarke's six-step approach: data familiarization, coding, theme identification, theme review, definition, and reporting.
- Themes were linked to constructs such as sustainability, innovation, transparency, and stakeholder involvement.

### Triangulation and Interpretation

The findings from both data streams were triangulated to validate the results and enhance the depth of insights. Quantitative data offered measurable evidence of trends, while qualitative data provided context to these findings and uncovered underlying institutional and procedural barriers. This methodological approach ensures a rigorous, multidimensional analysis, yielding reliable conclusions regarding the effectiveness of innovative procurement practices in Nigeria's public infrastructure delivery.

## 4.0. PRESENTATION OF RESULTS AND DISCUSSION

### 4.0. Presentation of Results

**Objective 1:** To identify and evaluate innovative procurement methods utilized in public infrastructure projects in Nigeria

**Research Question 1:** What innovative procurement methods are currently employed in public infrastructure projects in Nigeria?

**Hypothesis (HO<sub>1</sub>):** The adoption of various innovative procurement methods is not significantly prevalent in public infrastructure projects in Nigeria.

**Findings:** Mixed Adoption: While Public-Private Partnerships (PPPs) and hybrid procurement methods, such as the Federal Ministry of Power's (FMP) Zungeru Project, demonstrate potential, the Design-Bid-Build method remains predominant, as evidenced by the Federal Ministry of Works and Housing (FMW&H) and the Federal Ministry of Transport (FMOT). EProcurement: Adoption is limited and inconsistent, with the Niger Delta Development Commission (NDDC) and the Federal Ministry of Water Resources (FMWR) encountering technical and capacity-related challenges.

**Training Gaps:** Although many procurement officers have received training, there is a lack of formal, recurring training focused on innovation (Mean score: 2.69).





**Quantitative Mean:** 3.043 (moderate); indicating cautious uptake and variability across Ministries, Departments, and Agencies (MDAs). The hypothesis  $HO_1$  is rejected. Although not widespread, innovative procurement methods are present in selected projects. Institutional inertia and capacity gaps impede broader adoption.

**Objective 2:** Evaluate the efficacy of these innovative procurement methods in achieving sustainability objectives, encompassing environmental, social, and economic dimensions.

**Research Question 2:** To what extent are these innovative procurement methods effective in achieving sustainability goals?

**Hypothesis ( $HO_2$ ):** The implementation of innovative procurement methods has not significantly impacted the attainment of sustainability goals.

**Findings:** Environmental Focus: Projects frequently prioritize environmental sustainability (e.g., FMOT's use of EIA, FMP's emphasis on renewable energy).

Neglected Social/Economic Aspects:

The inclusion of local contractors, community benefits, and lifespan value are often disregarded. Quantitative Mean: 3.198; indicating moderate effectiveness, with social and economic dimensions being weakly integrated.

**Resistance:** Stakeholders exhibit resistance to sustainability requirements (Mean = 3.50), particularly concerning inclusive procurement.

Hypothesis  $HO_2$  is rejected. Innovative methods contribute to sustainability to some extent—primarily environmental—but are insufficiently comprehensive across all dimensions.

**Objective 3:** To examine the influence of policy and legal frameworks on the adoption of innovative procurement practices in Nigeria.

**Research Question 3:** What impact do Nigeria's policy and legal frameworks have on the adoption of innovative procurement practices?

**Hypothesis ( $HO_3$ ):** Policy and legal frameworks do not significantly influence the adoption of innovative procurement methods.

**Findings:** Weak Legal Support: The majority of Ministries, Departments, and Agencies (MDAs) operate under outdated procurement acts, which restrict flexibility for Public-Private Partnerships (PPPs) and electronic procurement. Regulatory Gaps: Inconsistent legislation and slow reforms impede innovation, as evidenced by delays in the Federal Ministry of Power's (FMP) PPP initiatives. Quantitative Mean: 3.144 (moderate); legal frameworks are perceived as important yet insufficient. Need for Reforms: There is a high level of agreement on the necessity for regulatory reform (Mean = 3.59).



Hypothesis HO<sub>3</sub> is rejected. Policy and legal frameworks exert a significant impact; their current inadequacy constrains innovation.

**Objective 4:** Investigate the impact of technological tools on enhancing transparency and efficiency within procurement processes.

**Research Question 4:** In what ways do technological tools, such as e-procurement platforms, contribute to increased transparency and efficiency in Nigeria's procurement processes?

**Hypothesis (HO<sub>4</sub>):** The implementation of technological tools does not significantly enhance transparency and efficiency.

**Findings:** Low Adoption: E-procurement is not extensively implemented, with only partial efforts observed by the NDDC and FMP.

Positive Perceptions: A majority of respondents concur that technology enhances transparency and efficiency, with a mean score of 3.64 for transparency.

Technical Expertise: Staff exhibit moderate levels of technical proficiency, with a mean score of 2.99, indicating a need for capacity building.

Training Deficit: Training on technological tools is infrequent, with a mean score of 2.68. The hypothesis HO<sub>4</sub> is rejected. While technology is perceived as having a positive impact, its underutilization and the limited capacity of staff hinder the realization of its full benefits.

**Objective 5:** Examine the impact of public-private partnerships (PPPs) on the financing and delivery of infrastructure in Nigeria.

**Research Question 5:** What is the role of PPPs in the financing and delivery of sustainable infrastructure projects?

**Hypothesis (HO<sub>5</sub>):** PPPs have not significantly influenced the financing and delivery of infrastructure.

**Findings:** The analysis indicates a positive impact, with PPPs being perceived as effective in enhancing project timelines and risk-sharing (Mean = 3.67). However, implementation is constrained by regulatory ambiguities, low confidence from the private sector, and bureaucratic delays. The outcomes of PPP projects vary, with some, such as the FMP, achieving success, while others are hindered by fragmented oversight. The hypothesis HO<sub>5</sub> is rejected. PPPs exert a significant and positive influence, yet they necessitate stronger policy support and coordination.

**Objective 6:** To identify the barriers to the adoption of innovative procurement practices.

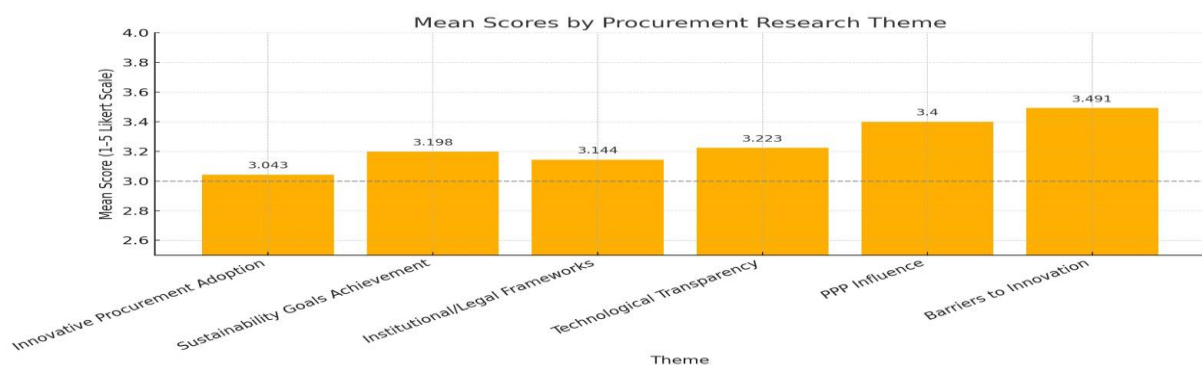
**Research Question 6:** What are the barriers to the adoption of innovative procurement practices?

**Hypothesis (HO<sub>6</sub>):** There are no significant barriers to the adoption of innovative practices.

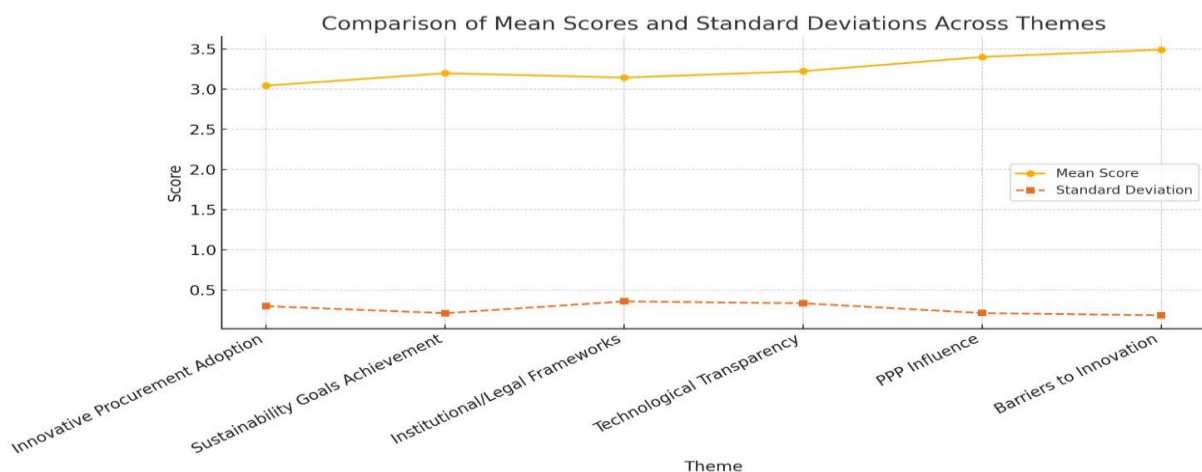
**Findings:** The primary barriers identified include political interference (Mean = 3.81), bureaucratic delays (Mean = 3.63), resistance to change (Mean = 3.67), financial constraints (Mean = 3.51), and lack of expertise (Mean = 3.40). There is a strong consensus, as indicated by the highest mean across themes (3.491), demonstrating widespread recognition of these barriers. Hypothesis HO<sub>6</sub> is strongly rejected. There are evident, significant, and systemic barriers that necessitate policy, financial, and organizational reforms.

**Bar Chart with Error Bars:** This chart presents the mean scores alongside their standard deviations for each research theme, thereby providing insights into both the central tendency and the variability of responses, as depicted in Figure 1.

**Line Chart Comparison:** This chart illustrates the variation in mean scores and standard deviations across the six themes, effectively highlighting the discrepancies between perceived performance and the consistency of responses, as shown in Figure 2.

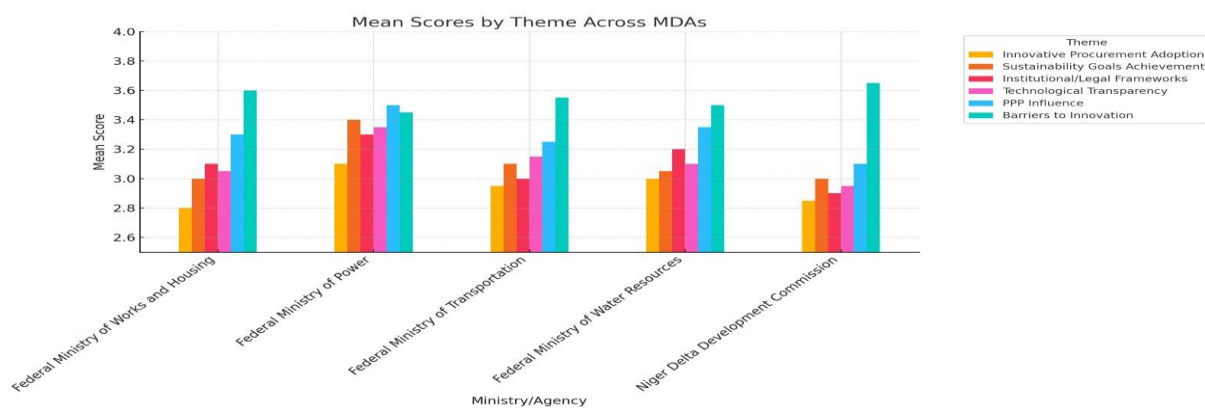


**Figure 1: Mean Scores**



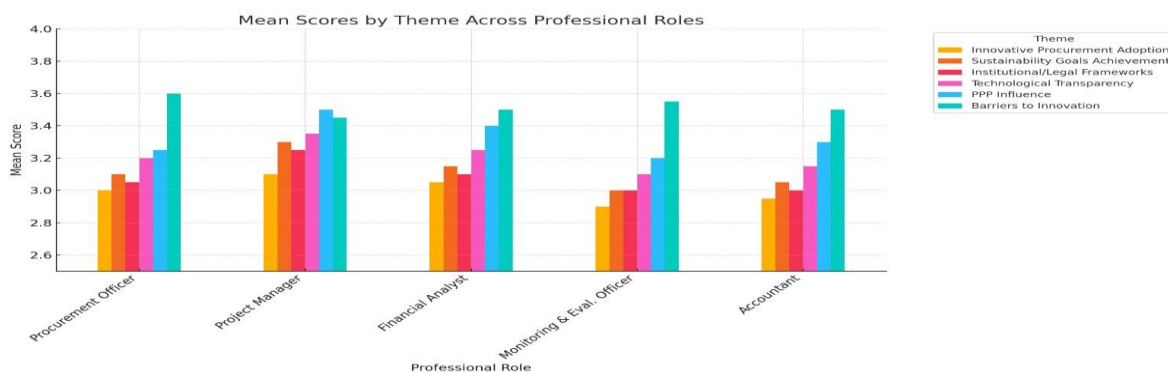
**Figure 2: Comparison of Mean Scores**

Figure 3 presents the average scores for each procurement theme across the five principal MDAs. The Federal Ministry of Power consistently achieves the highest scores in most themes, particularly in sustainability, the influence of public-private partnerships (PPP), and the utilization of technological tools. In contrast, the Federal Ministry of Works and Housing and the Niger Delta Development Commission (NDDC) exhibit lower scores in the adoption of innovation and legal frameworks, indicating a reliance on traditional practices and potential regulatory deficiencies. Notably, barriers to innovation are universally high across all MDAs, with the NDDC demonstrating the greatest concern in this area.



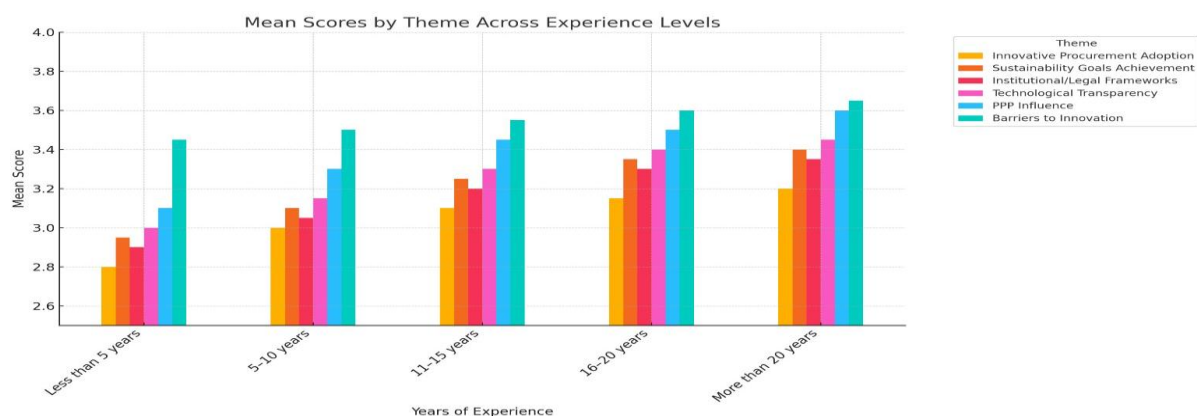
**Figure 3: Mean Scores by Themes across MDAs**

Figure 4 presents the mean scores across key procurement themes categorized by professional role. Project Managers consistently demonstrated the highest confidence in innovative procurement, the impact of public-private partnerships (PPP), and the utilization of technological tools. Procurement Officers and Financial Analysts also achieved high scores, particularly in identifying barriers and recognizing the potential for sustainability. Monitoring and Evaluation Officers exhibited more critical perspectives across the themes, likely attributable to their oversight responsibilities and exposure to implementation gaps. Accountants showed moderate alignment, especially concerning issues related to financial transparency and procurement barriers.



**Figure 4: Mean Score by Themes across Professional Roles**

Figure 5 illustrates the mean scores for each procurement theme categorized by years of professional experience. Respondents with over 20 years of experience exhibited the highest confidence across all themes, particularly in recognizing the impact of public-private partnerships (PPPs), technology, and legal frameworks. Mid-career professionals, with 11 to 20 years of experience, closely followed, indicating a substantial familiarity with procurement reforms and practical challenges. In contrast, early-career professionals, with less than 5 years of experience, reported the lowest scores, which may reflect their limited exposure or involvement in strategic decision-making roles. This trend highlights the critical importance of mentoring, training, and knowledge transfer to younger professionals to facilitate effective innovation adoption.



**Figure 5:** Experience Levels

## 4.2. Discussions

This study uncovers a heterogeneous landscape within Nigeria's public procurement system, characterized by notable disparities in innovation, sustainability, legal support, and implementation effectiveness.

1. **Adoption of Innovative Procurement Methods:** While innovative methods such as Public-Private Partnerships (PPPs) and e-procurement are acknowledged, their implementation remains limited. Main Cause: Institutional inertia, limited capacity, and regulatory conservatism. Evidence: Quantitative Mean = 3.043; qualitative findings corroborate a preference for traditional models.
2. **Effectiveness in Achieving Sustainability Goals:** The primary emphasis remains on environmental objectives, while social and economic dimensions are insufficiently addressed. Main Cause: The absence of comprehensive sustainability frameworks in procurement design. Evidence: Quantitative Mean = 3.198; there is limited consideration of social benefits or community impact.
3. **Institutional and Legal Frameworks:** Outdated and inconsistent regulations impede innovative practices.





Main Cause: Weak enforcement, fragmented mandates, and low institutional synergy.

Evidence: Mean = 3.144; delays and ambiguity in procurement processes are frequently cited.

4. Technological Tools and Transparency: E-procurement is underutilized, despite its recognized benefits.

Main Cause: Inadequate ICT infrastructure, lack of training, and resistance to digitalization.

Evidence: Mean = 3.223; implementation is characterized by fragmentation and sluggish progress.

5. Public-Private Partnerships (PPPs): While there is substantial support for Public-Private Partnerships, their implementation remains inconsistent. The primary reasons for this inconsistency are the absence of legal instruments specific to PPPs and a lack of institutional readiness.

Evidence: The highest mean score recorded is 3.400, indicating that stakeholders recognize the potential of PPPs but also identify significant barriers.

6. Barriers to Innovation: Barriers to innovation are widespread and systemic across all thematic areas. The main obstacles include political interference, funding challenges, and bureaucratic delays.

Evidence: The highest overall mean score is 3.491, which is consistent across various Ministries, Departments, and Agencies (MDAs) and roles.

Cross-Cutting Statistical Finding

ANOVA Result:  $p = 0.007 < 0.05$

Interpretation: The analysis of variance indicates statistically significant differences across themes, underscoring the necessity for tailored, theme-specific policy responses.

Innovative Procurement	Cautiously adopted	Limited, inconsistent
Sustainability Goals	Environmental focus only	Social/economic neglected
Legal Frameworks	Outdated, fragmented	Needs reform
Technological Tools	Underutilized	Infrastructure gaps
PPPs	Strong support	Weak implementation
Barriers to Innovation	Strongly present	Cross-cutting issue

## **5.0. POLICY RECOMMENDATIONS AND CONCLUSION**

### **5.1. Policy Recommendations and Conclusion**

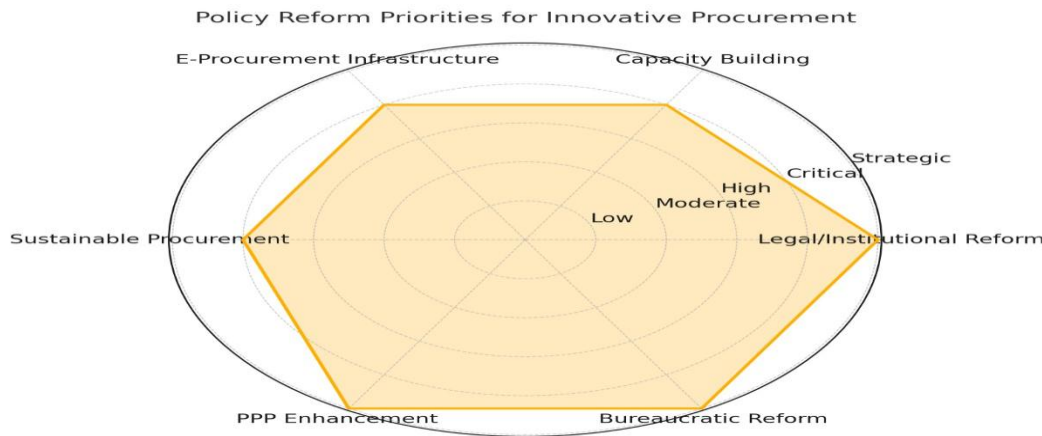
Based on an analysis of both qualitative and quantitative data, the following policy recommendations are proposed to address the identified challenges and deficiencies in Nigeria's public procurement system for infrastructure development:



1. Strengthen Legal and Institutional Frameworks: Revise Public Procurement Laws to explicitly support Public-Private Partnerships (PPPs), e-procurement, and sustainable procurement standards. Harmonize regulatory provisions across Ministries, Departments, and Agencies (MDAs) to reduce fragmentation and enhance inter-agency collaboration. Establish specialized PPP units within key MDAs to streamline procurement processes and project oversight.
2. Enhance Capacity Building and Training: Mandate ongoing professional development in innovative procurement methodologies, sustainability practices, and digital procurement platforms. Offer specialized technical training to procurement and financial officers on lifecycle costing, risk sharing in public-private partnerships (PPPs), and the integration of environmental and social impacts. Introduce certification-based programs in collaboration with procurement institutes and universities.
3. Invest in E-Procurement Infrastructure: Broaden access to reliable and scalable digital procurement platforms across all Ministries, Departments, and Agencies (MDAs). Establish a centralized procurement data repository to ensure transparency and facilitate real-time monitoring and audit trails. Allocate specific funding for information and communication technology (ICT) upgrades and maintenance to ensure system sustainability.
4. Promote Inclusive and Sustainable Procurement: Develop mandatory guidelines for incorporating environmental, social, and economic sustainability objectives into project tenders and evaluations. Implement social procurement policies that require the participation of small and medium-sized enterprises (SMEs), local contractors, and women-owned businesses. Institutionalize sustainability scorecards to evaluate and monitor public infrastructure projects.
5. Enhance Public-Private Partnership (PPP) Frameworks and Private Sector Participation Conduct a comprehensive review and reform of the PPP policy to ensure legal clarity, effective risk-sharing models, and robust dispute resolution mechanisms. Implement incentives, such as tax benefits and guarantees, to stimulate private sector investment in public infrastructure projects. Establish PPP knowledge hubs to disseminate best practices and facilitate cross-sectoral and interstate learning.
6. Mitigate Political and Bureaucratic Obstacles. Create an independent oversight body dedicated to procurement innovation to reduce political interference. Streamline approval processes and eliminate redundant bureaucratic procedures through process re-engineering. Introduce performance-based accountability mechanisms for procurement officers and project managers to enhance efficiency and effectiveness.

Figure 6 illustrates the strategic policy focus areas identified in the study: Legal and Institutional Reform, Public-Private Partnership (PPP) Enhancement, and Bureaucratic Reform are prioritized as essential pillars for immediate policy intervention. Additionally,

capacity building, e-procurement, and sustainability integration are recognized as crucial, necessitating ongoing investment and structural support.



**Figure 6:** Radar Chart

## 5.2. Conclusion

This study investigated the adoption and efficacy of innovative procurement strategies for sustainable infrastructure development in Nigeria. Employing a mixed-method approach, it critically examined procurement practices across key MDAs, with a focus on innovative methods, legal frameworks, technology, sustainability goals, PPPs, and barriers.

The findings indicate that although there is an increasing awareness of innovative procurement methods such as PPPs and e-procurement, their adoption remains limited and inconsistent due to regulatory gaps, weak institutional capacity, financial constraints, and resistance to change. While environmental sustainability is gaining attention, the social and economic dimensions are frequently neglected. Similarly, although PPPs are generally regarded as effective in financing and delivering infrastructure, their potential is compromised by weak regulatory support and political interference.

Significant barriers, including bureaucratic inertia, limited digital infrastructure, and a lack of technical training, continue to impede progress. Nonetheless, there are evident opportunities for reform, particularly in legal modernization, digital transformation, professional training, and stakeholder engagement.

Innovative procurement has not yet been fully integrated into Nigeria's infrastructure development strategy. A comprehensive reform agenda that incorporates legal, institutional, technological, and human capital dimensions is essential for establishing a transparent, sustainable, and innovation driven procurement ecosystem.



### **5.3. Contribution to Knowledge**

This research makes significant contributions to the literature and practice of public procurement in the following ways:

1. **Context-Specific Analysis of Innovation in Procurement:** It provides a unique, empirical insight into the state of procurement innovation in Nigeria, utilizing a triangulated data approach. The study addresses a critical gap in African procurement literature by analyzing the interaction between innovation, sustainability, and institutional capacity.
2. **Development of an MDA-Specific Comparative Framework:** Through detailed comparisons across ministries (FMW&H, FMP, FMOT, FMWR, and NDDC), the study reveals how institutional differences influence procurement outcomes. This offers a diagnostic tool for policymakers to design tailored interventions at both federal and state levels.
3. **Integration of Thematic and Statistical Methods:** By combining thematic analysis with descriptive and inferential statistics (ANOVA), the research develops a robust model for evaluating public procurement systems. This methodological integration establishes a standard for future research designs in developing economies.
4. **Policy-Relevant Insights on PPPs and E-Procurement:** The study highlights practical challenges and enablers of PPP and digital procurement adoption in Nigeria. It provides a foundation for evidence-based policymaking that can lead to legislative reforms and operational improvements.
5. **Strategic Emphasis on Sustainability:** By emphasizing the three dimensions of sustainability (environmental, social, economic), the research encourages a more holistic understanding of sustainable procurement, aligning with global best practices and SDG principles.

### **Competing Interest**

The authors have declared that no conflicting interest exist in this study

### **REFERENCES**

- Abubakar, A., & Aina, O. (2019). *Sustainable infrastructure development in Nigeria*.
- African Development Bank (AfDB). (2022). *Stakeholder engagement for infrastructure delivery in Africa*.
- Ambe, I. M., & Maleka, M. E. (2022). *Challenges of public procurement in developing economies*.
- Asian Development Bank (ADB). (2022). *PPPs for infrastructure in emerging markets*.



- Babatunde, S. O., Perera, S., Zhou, L., & Udejaja, C. (2020). *Public-private partnerships in Nigeria: Challenges and opportunities*.
- Belokrylova, E., et al. (2021). *Digital governance and procurement reforms*.
- Chartered Institute of Procurement & Supply (CIPS). (2020). *UK sustainable procurement strategy*.
- Changalima, I. A., et al. (2021). *Public procurement reforms in Sub-Saharan Africa*.
- Epting, S. (2020). *Public participation in infrastructure governance*.
- Ezeabasili, A. C., & Nmecha, M. I. (2023). *Institutional procurement practices in Nigeria*.
- Handfield, R., Jeong, H., & Choi, T. Y. (2019). *Measuring procurement effectiveness using ANOVA*.
- Leffel, J. (2022). *Singapore's green procurement guidelines*.
- Menifield, C. E. (2020). *Life-cycle costing in public procurement*.
- Nmecha, E. M. I., Stanley, O. C., & Akujuobi, A. B. C. (2023). *An appraisal of effectiveness of Public Procurement Act and procurement process in the cost of contract awards*. Retrieved from <https://www.researchgate.net/publication/370897173>
- Organisation for Economic Co-operation and Development (OECD). (2021). *Strengthening public procurement systems*.
- Ogunsanya, K., et al. (2022). *Enforcement challenges of Nigeria's Public Procurement Act*.
- Public and Private Development Centre (PPDC). (2022). *Monitoring procurement transparency in Nigeria*.
- Shai, L., Molefinyana, C., & Quinot, G. (2019). *Public procurement and development goals*.
- Transparency International. (2022). *Corruption and public funds in Nigeria*.
- United Nations Environment Programme (UNEP). (2023). *Global sustainable public procurement review*.
- United Nations Development Programme (UNDP). (2022). *SDGs and public procurement in Africa*.
- World Bank. (2021, 2023). *Public procurement and infrastructure financing*.
- Yamusa, M., et al. (2023). *E-procurement and transparency in Nigeria*.