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TOWARDS SUSTAINABLE AND RISK-RESILIENT PROCUREMENT IN PUBLIC BUILDING PROJECTS: EVIDENCE FROM RIVERS STATE, NIGERIA

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ABSTRACT

Public building projects in Nigeria continue to experience cost overruns, delays, and inefficiencies due to weak procurement systems and inadequate risk management. Although sustainable procurement is increasingly promoted as a strategy for improving project performance, its integration with risk management in Nigeria's public construction sector remains insufficiently understood. This study addresses this gap by examining sustainable procurement practices and associated risk management strategies in public building projects in Rivers State. A quantitative approach was adopted using structured questionnaires administered to 250 stakeholders, with data analysed using descriptive statistics. Findings reveal high awareness of sustainable procurement (75.2%), but inconsistent implementation, with 67.4% of respondents indicating that such practices are only occasionally applied. Procurement decisions remain largely cost-driven, as environmental (98.3%) and economic (93.4%) considerations are prioritised over social sustainability (78.5%). Risk management is mainly driven by detailed risk assessment (60.2%) and contractor prequalification (26.5%), yet financial risks (63.5%) persist as the most critical challenge, alongside supplier-related and regulatory risks. While 74.0% of respondents perceive sustainable procurement as effective, 53.0% remain uncertain about its capacity to consistently reduce project risks. The study demonstrates a disconnect between awareness and practical application, limiting the risk-mitigation potential of sustainable procurement. It contributes empirical evidence from a developing-country context and highlights the need for integrated policy frameworks, life-cycle costing, and strengthened institutional capacity to achieve sustainable and risk-resilient public project delivery.

Keywords: Garlic; *Heterobranchus bidorsalis*, Growth Performance; Nutrient Utilization; Apparent Digestibility

INTRODUCTION

Public building projects in Nigeria, particularly in Rivers State, continue to experience cost overruns, delays, and performance inefficiencies, with procurement practices identified as a central driver of these challenges. In practice, procurement decisions are still largely based on lowest-cost criteria, with limited consideration for long-term value, sustainability, and structured risk management. This cost-dominant approach increases vulnerability to financial instability, supply chain disruptions, and regulatory uncertainties, thereby undermining project resilience and delivery outcomes. Recent studies confirm that public construction procurement in Nigeria remains weakly aligned with sustainability principles due to institutional, financial, and knowledge-related constraints (Oyewole and Jimoh, 2022).

Procurement is a critical determinant of how risks are allocated and managed across the construction project lifecycle. Risk management, which involves identifying and mitigating uncertainties affecting cost, time, and quality, is inherently embedded within procurement decisions. However, emerging evidence suggests that risk management in construction remains fragmented, with limited integration of procurement strategies and sustainability objectives (Hosseini and Javid, 2024). At the same time, sustainable procurement has gained global prominence as a strategic approach that integrates environmental, social, and economic considerations into decision-making, with emphasis on life-cycle value rather than initial cost. Despite its potential, its adoption in developing countries remains low and conceptually under-integrated with risk management frameworks (Ogunsanya *et. al.*, 2021).

Recent literature highlights a critical gap: while sustainable procurement and risk management are individually well studied, their integration remains insufficiently developed in both theory and practice. For instance, studies show that construction procurement research often treats sustainability and risk as separate domains, limiting opportunities for optimising project performance. More recent evidence further indicates the absence of integrated frameworks linking sustainability goals with risk management strategies in construction procurement systems (Ann Tit *et. al.*, 2020). This disconnect constrains the ability of procurement systems to deliver resilient and sustainable project outcomes, particularly in developing contexts.

In Nigeria, although reforms such as the Public Procurement Act (2007) were introduced to improve transparency and accountability, procurement systems remain constrained by weak enforcement, institutional inefficiencies, and limited technical capacity. Consequently, sustainable procurement practices are inconsistently applied, and risk management remains largely reactive. Rivers State presents a particularly relevant case due to its high level of public infrastructure development and exposure to complex financial, environmental, and regulatory risks characteristic of the Niger Delta region. Despite growing awareness of sustainability among stakeholders, procurement inefficiencies and risk-related challenges persist, necessitating context-specific empirical investigation.

Anchored in Sustainable Procurement Theory and Project Risk Management Theory, this study conceptualises procurement as a strategic interface through which sustainability objectives and risk mitigation can be jointly achieved. It therefore examines sustainable procurement practices and risk management strategies in public building

projects in Rivers State, with the aim of identifying key challenges, evaluating current practices, and proposing pathways for developing a more integrated, sustainable, and risk-resilient procurement framework. This study contributes to knowledge by addressing the empirical and conceptual gap in integrating sustainability and risk management within public procurement systems in developing economies.

MATERIALS AND METHODS

This study adopted a quantitative research design to examine the relationship between sustainable procurement practices and risk management strategies in public building projects in Rivers State, Nigeria. Rivers State was selected due to its high concentration of public infrastructure projects and its exposure to financial, environmental, and regulatory risks typical of the Niger Delta region, making it a suitable context for investigating procurement-related challenges.

The target population comprised key stakeholders involved in public project procurement, planning, and execution, including government officials, contractors, and construction professionals. A combination of purposive and stratified sampling techniques was employed to ensure that only respondents with relevant experience were included, while maintaining representation across professional groups. A total of 250 questionnaires were distributed, out of which 219 were returned and deemed valid, representing a response rate of 87.6%. Although the distribution across groups was not perfectly uniform, efforts were made to capture a broad range of perspectives relevant to procurement and risk management processes.

The research instrument was a structured questionnaire developed from existing literature and aligned with the study objectives. It was organised into sections covering (i) respondent characteristics, (ii) awareness and implementation of sustainable procurement practices, and (iii) risk identification and management strategies. Most items were measured using a five-point Likert scale (ranging from "strongly disagree" to "strongly agree" or equivalent frequency scales), while a few multiple-response and open-ended questions were included to capture additional insights. Key variables included level of awareness, frequency of sustainable practice adoption, types of risks encountered, and perceived effectiveness of procurement strategies.

To ensure methodological rigour, the questionnaire was subjected to expert review for content validity, and a pilot study was conducted to refine clarity and structure. Reliability analysis using Cronbach's alpha yielded values above the acceptable threshold of 0.70, indicating satisfactory internal consistency of the measurement scales.

Data analysis was conducted using descriptive statistical techniques such as frequencies, percentages and mean scores. Ethical considerations were strictly adhered to. Participation was voluntary, informed consent was obtained from all respondents, and confidentiality and anonymity were maintained throughout the study. No personal identifiers were collected, and all data were used solely for academic purposes.

Table 1: Sample Size

S/No	Professional	Number
1.	Ministry of Special Projects	10
2.	Bureau of Public Procurement Enterprise	5
3.	Registered Contractors	73
4.	Consultants	150
5.	Professional bodies	12
	Total	250

Source: Author's Compilation (2024)

RESULTS AND DISCUSSION

Sustainable Procurement Strategies with Minimal Risk for Public Sector Building Projects in Rivers State

Familiarity with Sustainable Procurement

The mean value (2.09) indicates that stakeholders are generally familiar with the concept of sustainable procurement in public building projects. Similarly, the median and mode (2.00) reinforce that the central tendency of responses falls around "Familiar."

A total of 75.2% (combining "Very familiar" and "Familiar") demonstrates a high level of awareness among respondents, while only 7.7% reported being "Less familiar" or "Not familiar." This distribution suggests that majority of professionals involved in public projects in Rivers State have a sound understanding of sustainable procurement principles, likely influenced by increasing policy sensitisation, training workshops, and awareness campaigns by professional bodies such as the Bureau of Public Procurement (BPP), Architects Registration Council of Nigeria (ARCON), Nigerian Institute of Quantity Surveyors (NIQS), and Council of Registered Builders of Nigeria (CORBON).

The high level of familiarity reported in this study aligns with the position of Udom and Joseph (2021) that over 70% of construction professionals in Southern Nigeria demonstrated good awareness of sustainable procurement practices, especially regarding life-cycle cost planning and green materials. Similarly, it aligns with the submission of Ademola *et al.* (2022) that professional development programmes and regulatory advocacy have contributed to enhanced understanding among procurement practitioners.

However, the small proportion of respondents who were less familiar or not familiar may reflect the limited reach of such initiatives, especially among local contractors and administrative staff. This corroborates the work of Oyedele (2019) that while awareness is growing, the practical implementation of sustainable procurement remains inconsistent due to knowledge gaps, poor policy enforcement, and weak institutional capacity. The findings also reinforce UNEP's (2016) observation that awareness of sustainable procurement is often higher than actual practice, suggesting that familiarity must be complemented by structured training and institutional frameworks to convert knowledge into consistent application.

Table 2: Familiarity with Sustainable Procurement

Level of Familiarity	Frequency	Percentage (%)
Very familiar	52	23.8
Familiar	113	51.4
Moderately familiar	37	17.1
Less familiar	12	5.5
Not familiar	5	2.2
Total	219	100.0

Mean = 2.09 Median = 2.00 Mode = 2.00

Aspects of Sustainability Considered in the Procurement of Public Building Projects in Rivers State

The overwhelming 98.3% selection rate of Environmental Sustainability suggests that environmental factors are the most dominant consideration in public building project procurement. Respondents emphasised energy efficiency, reduction in waste generation, and resource optimisation. This reflects the growing integration of green procurement practices and aligns with findings by Udom and Joseph (2021) and UNEP (2016) who observed that environmental concerns are typically prioritised first in developing countries due to visible environmental degradation and donor-driven compliance pressures.

With 93.4%, economic sustainability is the second most prioritised aspect of sustainability. This indicates that procurement officers and contractors in Rivers State building projects emphasise cost-effectiveness and long-term value for money which are the core aspects of sustainable public procurement. This agrees with the submission of Aje *et al.* (2020) that cost efficiency remains a major sustainability driver in Nigeria's public procurement due to budget constraints and performance accountability frameworks under the Public Procurement Act of 2007.

At 78.5%, social sustainability (employment of locals, fair labour, and inclusion) is moderately considered. While this is encouraging, it highlights a relative gap between environmental/economic concerns and social responsibility. This partial neglect echoes Oyedele (2019) and Aigbavboa and Thwala (2020) that social dimensions of sustainability often receive less attention in African construction procurement because they are harder to quantify and are rarely part of evaluation criteria.

The 64.1% consideration rate indicates that compliance with SDGs is moderately embedded, but not yet universal in procurement decision-making. This points to limited awareness or institutional enforcement mechanisms linking procurement to global sustainability frameworks. Similar findings were reported by UNECA (2020), who emphasised that SDG-aligned procurement practices remain aspirational in many sub-Saharan contexts due to fragmented policies and limited inter-agency coordination. The low standard deviation across all variables indicates consistent agreement among respondents, particularly for environmental and economic factors.

Table 3: Aspects of Sustainability Considered in the Procurement of Public Building Projects in Rivers State

Sustainability Aspect	Frequency	Percentage (%)	STD	Rank
Environmental (energy efficiency, waste reduction)	178	98.3	0.024	1st
Economic (cost-effectiveness, long-term value)	169	93.4	0.066	2nd
Social (local employment, fair labour practices)	142	78.5	0.096	3rd
Compliance with SDGs	116	64.1	0.114	4th

Frequency of Sustainable Practices Integration in the Project Procurement Process in Rivers State

Result in Table 4 shows that majority (67.4%) of stakeholders believe sustainable practices are integrated sometimes, while only 22.7% report frequent (often) integration. A small minority (9.9%) indicate such practices are rarely applied. This suggests that while sustainability concepts are increasingly recognised in procurement activities, their implementation is irregular and not yet institutionalised in Rivers State's public building projects. The finding thus, aligns with Oyedele (2019) and Aje *et al.* (2020) that sustainability integration in Nigeria's construction procurement is largely partial and reactive, often limited to projects influenced by international donors or specific environmental mandates. However, it contradicts the submission of Walker and Brammer (2019) and Mhetre *et al.* (2016) that sustainability is embedded systematically in procurement policies and project evaluation frameworks in the developed countries.

The "sometimes" rating here reflects that institutional, policy, and capacity constraints still hinder consistent integration. Many public agencies may include sustainability clauses in procurement documents, but fail to enforce them during project execution stages, a gap also identified by UNEP (2016) and UNECA (2020).

Table 4: Frequency of Sustainable Practices Integration in Project Procurement Process in Rivers State

Response Category	Frequency	Percentage (%)
Sometimes	148	67.4
Often	50	22.7
Rarely	21	9.9
Total	219	100.0

Process of Risks Identification and Minimisation at the Planning Stage when Applying Sustainable Procurement

Results indicate that majority (60.2%) of stakeholders identified and mitigated risks in sustainable procurement through detailed risk assessment and mitigation planning.

This is followed by contractor prequalification criteria (26.5%), while contract clauses and warranties (9.4%) and little or no effort (3.9%) are less common approaches. This pattern reflects that structured and proactive risk planning is the most dominant risk management practice during the planning stage of sustainable procurement in public building projects in Rivers State.

The dominance of detailed risk assessment and mitigation planning indicates a growing recognition of the importance of early risk identification in enhancing sustainable procurement outcomes. This finding aligns with the submission of Ozorhon and Karahan (2017) as well as PMI (2021), who argued that the planning stage is the most critical phase for embedding sustainability and mitigating procurement risks such as financial mismanagement, poor contractor performance, and material delays.

The use of contractor prequalification criteria (26.5%) suggests that organisations also employ preventive risk control, screening potential contractors for competence, sustainability experience, and financial stability which reflects the submission of Loosemore *et. al.* (2006), who emphasised selection of capable and sustainability-conscious suppliers before contract award. Conversely, reliance on contract clauses and warranties (9.4%) and cases of little or no effort (3.9%) highlight lingering weaknesses in formal institutional enforcement mechanisms within public procurement in developing contexts. This is in line with the submission of Ofori (2015) and Adeleke *et al.* (2020) that contractual risk instruments are often underutilised due to inadequate legal enforcement and capacity limitations among procurement officials.

The results can be interpreted through the lens of Project Risk Management Theory and Institutional Theory of Hillson (2009), which states that effective project risk management involves structured identification, qualitative and quantitative assessment, and the design of appropriate response strategies. The dominance of detailed assessment aligns with this theoretical model, confirming that risk identification is increasing systematically in Rivers State's public building projects. However, Institutional Theory explains why some respondents still report limited effort in minimising risks, organisational inertia, bureaucratic culture, and weak enforcement which often undermine sustainability integration.

The findings are consistent with the submission of Ameh and Odusami (2014) as well as Ogunsanya *et al*. (2021) that Nigerian public procurement practices are improving in risk awareness, but still lack consistency and policy institutionalisation. However, it is in contrast with the submission of Laryea and Hughes (2011) as well as Loosemore *et. al.* (2006), who found a stronger reliance on contractual risk transfer mechanisms, suggesting that legal and governance frameworks in developing contexts, and emphasise they are not yet mature enough to enforce sustainability-linked contractual obligations.

Table 5: Process of Risks Identification and Minimisation at the Planning Stage when Applying Sustainable Procurement

Response Category	Frequency	Percentage (%)
Through detailed risk assessment and mitigation planning	132	60.2
Through contractor prequalification criteria	58	26.5
By contract clauses and warranties	21	9.4
Little or no effort to minimise risk	8	3.9
Total	219	100.0

Risks Most Frequently Encountered in Sustainable Procurement of Public Buildings Projects in Rivers State

The results in Table 6 show that financial risk is overwhelmingly the most frequently encountered in sustainable procurement of public building projects in Rivers State, accounting for 63.5% of all the responses. This is followed by supplier-related risks (13.8%) and regulatory risks (11.0%), while technical/design and environmental/site risks are less prominent. This indicates that financial instability, cost escalation, and budgetary inefficiencies remain the dominant barriers to sustainable procurement implementation in the state.

The prominence of financial risks (63.5%) suggests that project sustainability efforts are heavily constrained by issues such as cost overruns, inflation, exchange rate volatility, and funding delays. This aligns with the submission of Ofori (2015) and Adeleke *et al.* (2020), who noted that economic fluctuations and delayed payments are the major causes of project underperformance in developing countries. Financial risks often stem from poor cost estimation, unstable budgetary allocations, and limited access to sustainable financing mechanisms, such as green bonds or public-private partnerships. These findings confirm that financial governance and procurement planning are critical for achieving sustainable outcomes in public building projects.

Supplier-related risks (13.8%), covering contractor unreliability, poor material quality, and delivery delays, emerged as the second most reported category which is consistent with the position of Loosemore *et. al.* (2006) that supply chain competence is vital for sustainability because procurement relies on supplier adherence to environmental and social standards. In the context of Rivers State, supplier-related risks are aggravated by weak contractor prequalification, inadequate monitoring, and insufficient training on sustainability compliance. Such risks often lead to schedule overruns and resource wastage, contradicting the sustainability principle of efficient resource use.

Regulatory risks (11.0%) reflect challenges linked to policy inconsistency, shifting procurement standards, and weak institutional enforcement. This aligns with the submission of Walker and Brammer (2009) as well as UNEP (2016) that regulatory uncertainty is one of the largest deterrents to public-sector sustainability adoption in developing economies. In Rivers State, regulatory risk likely arises from frequent revisions of procurement laws, lack of clear sustainability benchmarks, and poor inter-agency coordination between the Bureau of Public Procurement (BPP) and environmental regulators. This hinders project continuity and reduces contractor confidence in investing in sustainable technologies.

Technical and design risks including poor design documentation, inaccurate project scoping, and incompatibility between sustainable materials as well as existing infrastructure accounts for 6.6%. These risks reflect the knowledge gap in sustainable design and project specification practices, as noted by Laryea and Hughes (2011). The limited percentage indicates that while technical issues exist, they are secondary, compared to financial and institutional constraints. However, their indirect effects, such as rework, design change orders, and material waste, can amplify financial risks.

Environmental and site condition risk (5.0%) is the least frequently encountered, but remain relevant, especially for projects located in flood-prone or high-moisture environments typical of the Niger Delta region. These risks involve soil instability, pollution control, and climate adaptation, which, if neglected, can lead to severe sustainability setbacks. The relatively low frequency suggests that environmental risk management is often under-addressed during planning, thereby aligning with the submission of with Aje and Alake (2020), who observed a tendency for Nigerian public projects to prioritise cost and time over environmental performance.

In all, the findings support Sustainable Procurement Theory of Walker and Brammer (2019) and Risk Management Framework of PMI (2021) which emphasise that risk identification should integrate financial, social, and environmental dimensions. However, the dominance of financial risk indicates that economic sustainability still overshadows environmental and social priorities in Nigeria's public sector procurement.

Table 6: Risks Most Frequently Encountered in Sustainable Procurement of Rivers State Public Buildings Projects

Type of Risk Encountered	Frequency (n)	Percentage (%)
Financial Risk (Cost overruns, inflation, funding delays)	139	63.5
Supplier-related Risk (Quality, reliability, delivery delays)	30	13.8
Regulatory Risk (Policy changes, standard compliance)	24	11.0
Technical and Design Risk	15	6.6
Environmental and Site Conditions Risk	11	5.0
Total	219	100.0

Whether Sustainable Procurement Practices Reduce Risks, Compared to Traditional Procurement

The mean score of 3.25 indicates that, on the average, respondents are neutral-to-agreeing that sustainable procurement practices reduce risks compared to traditional procurement. The high percentage of neutral responses (53.0%) suggests that many stakeholders are uncertain or cautious about the relative benefits of sustainable procurement in risk reduction. However, the combined Agree and Strongly Agree responses (34.8%) outweighs the Disagree and Strongly Disagree group (12.2%), implying a positive, but moderate perception of sustainable procurement's risk-mitigating potential.

The findings imply that while practitioners recognise some benefits of sustainable procurement in reducing risks, the evidence is not yet strong or consistent across projects in Rivers State. This partly reflects the transitional stage of sustainability integration in Nigerian public procurement systems. Sustainable procurement tends to enhance project resilience through better resource efficiency, contractor accountability, and lifecycle cost control. Yet, such benefits depend on institutional maturity, capacity building, and consistent enforcement, areas that remain weak in many developing contexts.

This finding supports Sustainable Procurement Theory of Walker and Brammer (2019), suggesting that sustainable procurement adoption is shaped more by institutional pressure and less by demonstrated performance outcomes in the early stages. As such, Rivers State is likely in the "normative stage" of sustainability adoption, where frameworks exist, but their practical benefits are still being understood and internalised.

Table 7: Whether Sustainable Procurement Practices Reduce Risks, Compared to Traditional Procurement

Response Category	Frequency (n)	Percentage (%)
Strongly Disagree	9	3.9
Disagree	18	8.3
Neutral	116	53.0
Agree	60	27.6
Strongly Agree	16	7.2
Total	219	100.0

Mean = 3.25, Median = 3, Mode = 3, Standard Deviation = 0.86

Effectiveness of Sustainable Procurement Strategies in Delivering Successful Public Building Projects in Rivers State

Results as contained in Table 8 indicates that most respondents (74.0%) rated sustainable procurement strategies as effective to very effective (17.1%), while only 5.0% considered them ineffective or very ineffective. The mean score (2.15) lies close to the "Effective" category, suggesting a positive overall perception of sustainable procurement's role in delivering successful public building projects in Rivers State. The findings demonstrate a broadly positive perception of sustainable procurement effectiveness in public building projects. A combined 74.0% of respondents identified the strategies as either "effective" or "very effective," suggesting that risk management, environmental considerations, and socio-economic objectives embedded in procurement processes are contributing meaningfully to improved project performance. This aligns with the submission of Aje and Alake (2020) that embedding sustainability criteria, such as local sourcing, energy efficiency, and ethical labour, enhances project quality, cost management, and long-term value delivery.

Table 8: Effectiveness of Sustainable Procurement Strategies in Delivering Successful Public Building Projects in Rivers State

Response Category	Frequency (n)	Percentage (%)
Very Effective	37	17.1
Effective	125	56.9
Moderately Effective	46	21.0
Ineffective	7	3.3
Very Ineffective	4	1.7
Total	219	100.0

Mean = 2.15, Median = 2, Mode = 2, Standard Deviation = 0.78

Challenges to Implementing Sustainable Procurement Strategies with Minimal Risk in Rivers State

Table 9 reveals that the most significant barriers to sustainable procurement implementation in Rivers State public building projects are lack of awareness or training (95.0%) and poor risk assessment practices (91.2%). These findings indicate a strong human-capacity and procedural challenge rather than resource unavailability alone. Material-related (72.9%) and cost challenges (65.2%) follow closely, while regulatory or political barriers (57.5%) are perceived as secondary, but still substantial.

The results underscore a multifaceted barrier landscape in sustainable procurement implementation, dominated by knowledge, technical, and institutional constraints. This aligns with the findings of Ameyaw and Chan (2016) that in many developing country, sustainable procurement adoption is limited by insufficient capacity and weak institutional frameworks.

The overwhelming prominence of lack of awareness or training (95.0%) highlights a critical human capital gap in sustainable procurement practices. Procurement officers and project managers may lack adequate exposure to sustainable procurement principles, tools, and evaluation metrics which supports the submission of Dada and Jagboro (2007), who identified inadequate professional education as a primary inhibitor of sustainability integration in public procurement in Nigeria. Without targeted training programs, sustainability remains a policy statement rather than an operational standard. Capacity development and professional certification are imperative to translate policy objectives into actionable procurement outcomes.

The high frequency of poor risk assessment practices (91.2%) suggests that risk management competencies are insufficient to anticipate and mitigate sustainability-related project challenges such as material supply volatility or cost escalations. Effective risk assessment tools and early-stage risk planning are critical to achieving sustainability objectives in construction projects. In the absence of systematic risk analysis, procurement decisions become reactive rather than strategic. The most significant barriers; lack of training (95.0%) and poor risk assessment practices (91.2%), indicate that implementation challenges are primarily institutional and capability-driven rather than conceptual. Notably, this finding appears to contradict the earlier high awareness levels, but in reality, it highlights a distinction between general awareness and technical competence.

The unavailability of sustainable construction materials locally (72.9%) imposes practical constraints on project implementation. This finding mirrors Ofori (2015) as well as Aje and Alake (2020) that weak local supply chains and limited green material innovation hinder sustainability adoption in developing countries. Rivers State's construction industry remains dependent on conventional, non-eco-efficient materials, limiting the feasibility of sustainability targets.

While sustainable projects often yield long-term economic and environmental benefits, their upfront cost implications (65.2%), due to specialised materials and compliance requirements, create resistance to adoption. Studies such as Walker and Brammer (2019) confirm that cost perceptions remain one of the strongest deterrents to sustainable procurement in the public sector. Financial instruments such as green bonds, tax incentives, and life-cycle cost evaluations should be integrated into procurement appraisals to justify long-term value over short-term cost.

The influence of regulatory and political factors (57.5%) reflects the policy enforcement gap in Rivers State's public procurement framework. Though, the Public Procurement Act emphasises transparency and accountability, sustainability clauses are often poorly institutionalised or overridden by political interests. This corroborates the submission of Ameyaw and Chan (2016) that inconsistent political commitment undermines sustainable procurement implementation.

Table 9: Challenges to Implementing Sustainable Procurement with Minimal Risk in Rivers State

Challenge	Frequency of Mentions	Percentage (%)
Lack of awareness or training	172	95.0
Poor risk assessment practices	165	91.2
Limited availability of sustainable materials	132	72.9
High initial project cost	118	65.2
Regulatory or political barriers	104	57.5

Recommended Strategies for Improving Sustainable Procurement Strategies and Minimising Risk in Public Building Projects in Rivers State

Findings in Table 10 indicate that the adoption of sustainable procurement policies that integrate risk assessment into planning (19.9%) was the most frequently recommended strategy by respondents. This suggests that practitioners recognise the foundational importance of embedding sustainability and risk management into procurement governance frameworks. Integrating sustainability criteria into procurement decision-making enhances both environmental outcomes and project resilience against uncertainties. This aligns with the submission of Ofori (2015) that risk-based sustainable procurement frameworks are key

to improving performance in the public construction sector of developing countries.

The use of eco-friendly or locally available materials (17.1%) ranked second, reflecting the growing acknowledgment of the need for environmental and economic sustainability through resource localisation. This finding aligns with the position of UNEP (2016), who advocates for local sourcing and the circular economy approach as mechanisms for reducing the carbon footprint of public infrastructure projects.

The implementation of life-cycle cost analysis instead of the traditional lowest-bid approach (14.4%) further supports the shift from short-term cost reduction to long-term value optimisation. This is in line with the submission of Nnadi and Ugwu (2014) as well as Love *et. al.* (2021) that life-cycle costing not only minimises operational and maintenance risks, but also ensures value for money across the project's lifespan. Additionally, capacity building and training of procurement professionals (13.3%) were consistently mentioned, reinforcing the need for technical expertise and institutional learning thereby agreeing with the submission of Alhazmi and McCaffer (2020) that enhancing professional competencies is critical to managing procurement-related risks in developing contexts. Likewise, monitoring and evaluation systems (11.0%) were noted as essential tools for tracking compliance and sustainability performance and this is consistent with the recommendations by UNEP (2016).

Other notable strategies include strengthened legal and regulatory frameworks (9.4%) and adoption of e-procurement systems (7.7%). Both approaches are crucial for enhancing transparency, reducing corruption risks, and ensuring traceability in procurement operations. The promotion of local content (7.2%) and stakeholder engagement (5.0%) further underscore the social dimension of sustainable procurement, where inclusivity and accountability are recognised as prerequisites for minimising implementation risk.

In all, the findings demonstrate a clear alignment between practitioner perspectives and international sustainable procurement principles. The emphasis on integrated policy frameworks, training, digital tools, and local sourcing collectively reflects a maturing understanding of sustainability-risk interlinkages within Rivers State's public building sector. These results corroborate UNEP (2016), Agyekum *et al.* (2020) and Ofori (2015), affirming that multi-dimensional strategies, spanning environmental, financial, institutional, and governance domains, are required to achieve low-risk, high-performance procurement outcomes.

Table 10: Strategies for Improving Sustainable Procurement and Minimising Risks in Public Building Projects in Rivers State

S/no	Recommended Strategies	Frequency	Percentage (%)
1	Adoption of sustainable procurement policy integrating risk assessment in planning	44	19.9
2	Use of eco-friendly/local materials for energy efficiency and waste reduction	37	17.1
3	Implementation of life-cycle cost analysis instead of lowest-bid approach	32	14.4
4	Capacity building, training, and re-training of procurement professionals	29	13.3
5	Establishment of monitoring, evaluation, and feedback systems	24	11.0
6	Enforcement of legal, regulatory, and contractual safeguards	21	9.4
7	Adoption of e-procurement and digital systems	17	7.7
8	Promotion of local content and supplier transparency	16	7.2
9	Incorporation of sustainability and risk considerations into procurement policy frameworks	13	6.1
10	Stakeholder engagement and collaboration among project participants	11	5.0
	Total	244*	111.1*

Total Frequency and Percentage Exceeds 219 and 100.0% Respectively Because Stakeholders Were Allowed to Select Multiple Options

Policy and Institutional Changes Supporting Sustainable Procurement in Rivers State

Findings presented in Table 11 reveal that the most frequently mentioned policy recommendation was the amendment of the Public Procurement Act (PPA) of 2007 to integrate sustainability and risk assessment (22.1%). Respondents emphasised that the current legislation inadequately supports environmental and social objectives in procurement. This view aligns with that of Agyekum *et al.* (2020) that sustainable procurement in developing countries is constrained by outdated legal frameworks emphasising short-term cost efficiency over long-term value.

The second most common suggestion was the creation of sustainable procurement units or centres within public institutions (15.5%). These specialised units would coordinate sustainable procurement practices, provide oversight, and institutionalise sustainability goals. This recommendation supports Walker and Brammer's (2019) assertion that institutional specialisation enhances policy implementation, compliance, and monitoring. Additionally, mandatory inclusion of sustainability criteria in bidding and evaluation processes (13.8%) and collaboration with environmental and standards agencies such as NESREA and SON (12.7%) were recognised as critical institutional reforms. These actions would align procurement processes with broader environmental and social standards, ensuring transparency and regulatory synergy.

The strengthening of the Bureau of Public Procurement (BPP) (9.9%) and the establishment of formal monitoring and evaluation frameworks (9.4%) were also notable recommendations. Respondents emphasised that the BPP's oversight and enforcement mechanisms must be reinforced to ensure accountability and continuous performance assessment. Such measures are consistent with the position of Ameyaw and Chan (2016), who highlighted that weak institutional monitoring remains a major barrier to sustainable procurement in sub-Saharan Africa. Furthermore, capacity building and re-training of procurement officers (7.2%) was identified as a key enabler of policy effectiveness. The adoption of ISO 20400 standards (4.4%) and promotion of local green procurement (3.3%) were less frequent, but important responses, reflecting a gradual awareness of international best practices and the potential for leveraging local resources for sustainable development.

Finally, alignment of procurement policies with the Sustainable Development Goals (SDGs) (1.7%) demonstrates

recognition of the need to synchronise local policies with global sustainability frameworks.Summarily, the findings indicate a strong stakeholder consensus on legal reform, institutional restructuring, inter-agency collaboration, and continuous training as pivotal measures for enhancing sustainable procurement in Rivers State. These outcomes reinforce global evidence that embedding sustainability in public procurement requires not only technical measures, but also systemic policy transformation and institutional leadership.

Table 11: Policy and Institutional Changes Supporting Sustainable Procurement in Rivers State

S/no	Policy and Institutional Change Recommended	Frequency	Percentage (%)
1	Amendment of the Public Procurement Act (PPA) of 2007 to incorporate sustainability and risk assessment	48	22.1
2	Establishment of a Sustainable Procurement Unit or Centre within government institutions	34	15.5
3	Mandatory inclusion of sustainability criteria in bidding and evaluation processes	30	13.8
4	Collaboration with environmental and standards agencies (e.g., NESREA, SON) to enforce compliance	28	12.7
5	Strengthening of the Bureau of Public Procurement (BPP) for implementation and oversight	22	9.9
6	Establishment of monitoring, evaluation, and reporting frameworks	21	9.4
7	Capacity building, training, and re-training of procurement officers and stakeholders	16	7.2
8	Adoption of ISO 20400 and other international sustainable procurement standards	9	4.4
9	Promotion of local green procurement and supplier engagement	7	3.3
10	Development of environmental sustainability policies aligned with SDGs and Vision 2030	4	1.7
	Total	219	100.0

Generally, the findings reveal a procurement system in transition. While awareness of sustainable procurement is relatively high, its implementation is constrained by institutional weaknesses, capacity gaps, and contextual risks specific to Rivers State. The interaction between sustainability and risk management remains underdeveloped, with both functions operating in parallel rather than as an integrated framework. The study therefore suggests that improving public building project outcomes requires moving beyond awareness-driven approaches towards institutionalised, enforceable, and context-sensitive procurement systems. In the Rivers State context, this involves addressing not only technical deficiencies but also the broader political and economic conditions that shape procurement practices.

CONCLUSION

This study examined the integration of sustainable procurement and risk management practices in public building projects in Rivers State, Nigeria. The findings reveal a clear gap between awareness and implementation: while 75.2% of stakeholders reported familiarity with sustainable procurement, 67.4% indicated that such practices are only *occasionally* applied. This disparity suggests that awareness has not translated into institutionalised practice, reflecting structural and capacity-related constraints within the procurement system. Furthermore, procurement decisions remain skewed towards environmental (98.3%) and economic (93.4%) considerations, with comparatively lower emphasis on social sustainability (78.5%), indicating an imbalanced application of sustainability principles. Risk management practices are evolving, with 60.2% of respondents identifying early-stage risk assessment as the dominant strategy. However, financial risks (63.5%) remain the most significant challenge, followed by supplier-related (13.8%) and regulatory risks (11.0%). Although 74.0% of respondents perceive sustainable procurement as effective, the high level of uncertainty regarding its ability to consistently reduce risks (53.0% neutral responses) indicates that its practical impact is not yet fully realised. Interpreted through Sustainable Procurement Theory and Project Risk Management frameworks, these findings suggest that Rivers State is in a transitional phase, where sustainability principles are recognised but not yet embedded within enforceable procurement systems.

To address these challenges, it is recommended that procurement policies be restructured to integrate sustainability and risk assessment as mandatory evaluation criteria. Emphasis should be placed on life-cycle costing to shift decision-making away from short-term cost considerations. Strengthening institutional capacity through targeted training and professional development is essential for improving implementation consistency. In addition, enhancing regulatory enforcement, developing local supply chains for sustainable materials, and adopting digital procurement systems will improve transparency and reduce systemic risks. Finally, establishing robust monitoring and evaluation frameworks will ensure that sustainability objectives are not only stated but effectively implemented. Summarily, achieving sustainable and risk-resilient procurement in Rivers State requires a coordinated approach that aligns policy, institutional structures, and stakeholder practices. Such integration is critical for improving public project delivery and advancing long-term sustainability outcomes in the construction sector.

This study contributes to knowledge by providing empirical evidence of the disconnect between awareness and implementation, and by demonstrating that the effectiveness of sustainable procurement in mitigating risks depends on institutional capacity and policy integration rather than conceptual acceptance alone. However, the study is limited by its reliance on perception-based data and primarily descriptive analysis, which may constrain the strength of causal inferences.

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