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# AN EMPIRICAL EXAMINATION OF THE ROLE OF PROJECT MANAGEMENT PROCESS GROUPS IN IMPROVING SUSTAINABLE ENERGY POLICY IMPLEMENTATION IN NIGERIA

**Chinedu OKOYE[1], Nasiru IDRIS[2] and Ibrahim D. CHOJI[3]**
[1]Department of Project Management, Nasarawa State University, Nasarawa State
[2-3]Ibrahim Usman Jibril Institute of the Built Environment, Nasarawa State University, Nasarawa State
**Corresponding author email**: okoyeseeyou@gmail.com

***ABSTRACT***

***Purpose:*** *This study examines the role of Project Management Process Groups (initiating, planning, executing, monitoring, and closing) in improving sustainable energy policy implementation in Nigeria, addressing the persistent implementation deficit despite comprehensive frameworks.*

***Design/methodology/approach:*** *Utilizing a quantitative descriptive survey design, data were collected from 290 stratified stakeholders, including government officials, project managers, and community representatives via a validated questionnaire (reliability coefficient = 0.84). Analysis was conducted using descriptive statistics, chi-square tests, correlation, and regression analysis.*

***Findings:*** *The findings reveal that 56.5% of respondents perceive policy implementation as limited, driven by poor infrastructure (85.9%) and lack of coordination (82.9%). Project management processes are applied unevenly, particularly during monitoring and closure stages; however, correlation results demonstrate strong, positive, and significant relationships between systematic process application and implementation effectiveness ($r = 0.612 - 0.745$, $p < 0.05$).*

***Research limitations/implications:*** *A key limitation is the reliance on self-reported survey data within a single national context, which may introduce subjectivity. The implication is that linking structured lifecycles to public infrastructure execution proves Nigeria's energy crisis is fundamentally an execution architecture failure rather than a policy deficit.*

***Practical implications:*** *Nigerian energy institutions must transition from mere policy formulation to structured lifecycle governance. It is recommended that they institutionalise monitoring frameworks, strengthen inter-agency coordination, and build targeted technical capacity to improve policy performance.*

***Originality/value:*** *This study provides rare empirical evidence linking structured project management lifecycles directly to public infrastructure policy execution in a developing economy.*

**Keywords:** Sustainable Energy Policy; Project Management Process Groups; Policy Implementation; Renewable Energy Governance; Nigeria

[1] Email: kesj@kasu.edu.ng

## 1.0 INTRODUCTION

Nigeria's energy transition agenda continues to face significant implementation challenges despite the existence of several renewable energy policies and reform programmes. As of 2023, installed electricity generation capacity was estimated at about 13,000 MW, yet actual available generation fluctuated between 3,500 and 5,000 MW for a population of over 200 million people, while more than 85 million Nigerians lacked access to grid electricity (Energy Commission of Nigeria ECN, 2023). Although policies such as the Renewable Energy Master Plan and the National Renewable Energy and Energy Efficiency Policy established ambitious targets for solar, wind, biomass, and small hydro development, implementation outcomes remain far below expectations (Oyedepo, 2021). Scholars have argued that this gap is not solely a product of financing constraints but also reflects weaknesses in programme coordination, stakeholder alignment, and project governance structures across federal and state institutions (Akinyele and Rayudu, 2022). Consequently, the issue confronting Nigeria is not merely policy formulation but the effective translation of policy frameworks into operational and sustainable energy projects (Adenikinju et al., 2023).

Furthermore, sustainable energy policy implementation in Nigeria involves converting policy objectives into projects capable of improving electricity access, reducing emissions, and strengthening energy security (Adenikinju et al., 2023). Despite Nigeria's commitment to achieving net-zero emissions by 2060 and increasing renewable energy contribution to 30 per cent of electricity generation by 2030, renewable penetration in grid supply remains below 15 per cent when large hydro is excluded (IEA, 2022; ECN, 2023). Evidence of implementation challenges can be seen in delayed solar farm projects in Katsina and Bauchi State, stalled mini-grid initiatives under the Rural Electrification Agency, and inconsistent tariff structures that weaken investor confidence (REA, 2022). Studies suggest that these setbacks are linked to weak project scoping, poor risk planning, and fragmented stakeholder communication rather than technological incapacity alone (Akinyele and Rayudu, 2022).

Additionally, project management process groups provide an important framework for addressing these implementation weaknesses. These process groups, which include initiating, planning, executing, monitoring and controlling, and closing, structure projects from conception to completion and have become increasingly relevant in public infrastructure delivery (Joslin and Müller, 2022). In renewable energy projects, they help define project scope, coordinate stakeholders, manage procurement processes, and monitor performance outcomes (Zwikael et al., 2021). Research in Sub-Saharan Africa indicates that projects managed through structured lifecycle governance experience lower cost overruns and fewer schedule delays compared to projects managed through informal administrative approaches (Ofori-Kuragu et al., 2022). However, many Nigerian energy projects continue to bypass comprehensive planning and monitoring mechanisms, resulting in abandoned projects and underperforming infrastructure (Adenikinju et al., 2023).

The initiating and planning stages are particularly critical in Nigeria's sustainable energy sector. In many cases, projects are introduced without rigorous feasibility studies, stakeholder mapping, or proper demand assessments (Adenikinju et al., 2023). Findings from the Nigeria Electrification Project revealed that community engagement and demand assessment at the initiation stage significantly influence the long-term sustainability of solar mini-grid projects (REA, 2022). Weak initiation processes often lead to resistance, land disputes, and revenue shortfalls, while structured stakeholder identification improves project completion rates in decentralised renewable energy projects in Kaduna and Cross River State (Joslin and Müller, 2022). Furthermore, public sector audits continue to reveal procurement irregularities, unrealistic budgeting, and inadequate risk planning in infrastructure projects, including energy installations (Office of the Auditor-General of the Federation, 2022). Nigeria's economic conditions, particularly inflation and exchange rate

instability, have further worsened funding challenges where project plans failed to incorporate macroeconomic risk scenarios (World Bank, 2023).

Execution, monitoring, and closing processes also remain inconsistent across Nigeria's energy sector institutions. Although the Rural Electrification Agency reported the installation of over 125 solar mini-grids, evaluations showed major disparities in maintenance capacity and revenue recovery systems (REA, 2022). Effective project execution requires proper contractor supervision, quality assurance, and coordinated logistics, yet these capacities remain uneven across agencies. Monitoring and controlling processes are equally important because they provide mechanisms for tracking performance indicators such as capacity utilisation, cost variance, and beneficiary satisfaction (IEA, 2022; ECN, 2023). Without these controls, projects may deviate from objectives without timely detection. In addition, the closing stage is often neglected in public projects, limiting institutional learning and contributing to repeated design and maintenance failures in renewable energy installations across rural Nigeria (Adenikinju et al., 2023).

Nigeria's sustainable energy challenge therefore lies less in the absence of policies than in weak implementation structures and inconsistent application of project management process groups (Joslin and Müller, 2022). Although existing policies are comprehensive, implementation outcomes remain uneven because projects frequently proceed without structured lifecycle governance, effective monitoring systems, and coordinated stakeholder engagement. There is also limited empirical evidence examining how the application of initiating, planning, executing, monitoring and controlling, and closing processes influences sustainable energy policy implementation in Nigeria (Ofori-Kuragu et al., 2022). This gap in knowledge creates difficulties for policymakers and institutional leaders seeking effective governance mechanisms for improving renewable energy delivery (Adenikinju et al., 2023). Consequently, the insufficient empirical evidence on how Project Management Process Groups influence sustainable energy policy implementation in Nigeria therefore constitutes the central problem necessitating this study.

## 2.0 LITERATURE REVIEW

Studies have increasingly examined how project management process groups such as initiation, planning, execution, monitoring and control, and project closure contribute to the implementation of sustainable energy policies across different jurisdictions (Adenikinju et al., 2023). Contemporary scholarship increasingly maintains that renewable energy transition is not merely a technological undertaking, but also a project governance challenge requiring institutional coordination, stakeholder management, risk assessment, monitoring systems, and strategic implementation frameworks (Ofori-Kuragu et al., 2022). For instance, Maqbool, Deng and Rashid (2020), in their study titled "Stakeholders' Satisfaction as a Key Determinant of Critical Success Factors in Renewable Energy Projects," examined how project management success factors influence renewable energy project implementation in Pakistan. The aim of the study was to investigate the relationship between critical success factors, stakeholder satisfaction, and renewable energy project performance. The authors found that structured planning, stakeholder engagement, communication management, and monitoring mechanisms significantly improved project delivery outcomes in renewable energy initiatives. The study further revealed that project management processes enhanced implementation efficiency by reducing delays, improving cost control, and strengthening institutional trust among project actors. In particular, stakeholder satisfaction was found to partially mediate the relationship between project management practices and successful renewable energy project implementation. The methodology adopted quantitative survey techniques involving 272 renewable energy stakeholders and Structural Equation Modelling (SEM) for data analysis. However, the study was limited to small and medium-scale renewable energy projects within Pakistan and did not comparatively examine implementation across multiple countries. The authors therefore recommended stronger integration

of stakeholder management frameworks into national renewable energy policy implementation systems.

Similarly, Piwowar-Sulej, Sołtysik, Jarosz and Pukała (2023), in the study "The Linkage between Renewable Energy and Project Management: What Do We Already Know, and What Are the Future Directions of Research?" investigated the growing intersection between project management and renewable energy transitions globally. The objective of the study is to synthesise international evidence regarding how project management methodologies contribute to renewable energy development and sustainability transitions. Through a systematic literature review and bibliometric analysis of Scopus-indexed publications, the authors found that project planning, risk management, scheduling, and governance mechanisms substantially improved renewable energy implementation outcomes, particularly in solar, wind, biomass, and smart grid projects. Beyond this, the study established that effective monitoring and controlling processes reduced project uncertainty, enhanced institutional accountability, and minimised policy inconsistency in sustainable energy programmes. The methodology involved bibliometric mapping and systematic review procedures using peer-reviewed academic databases. Nevertheless, the study relied heavily on secondary literature and lacked field-based empirical validation. The authors consequently recommended more country-specific empirical investigations examining how project management process groups influence sustainable energy policy execution in developing economies.

In furtherance of this argument, Echeverri-Martínez, Alfonso-Morales and Caicedo-Bravo (2020), in their work titled "A Methodological Decision-Making Support for the Planning, Design and Operation of Smart Grid Projects," examined project management decision-support systems within smart energy infrastructure projects in Colombia. The study aimed to develop integrated planning and operational frameworks capable of improving renewable energy system implementation. The findings demonstrated that project planning and execution mechanisms significantly enhanced coordination among technical actors, reduced operational inefficiencies, and improved policy alignment within smart grid projects. The authors additionally observed that inadequate integration between planning and execution phases often resulted in delays, fragmented implementation, and rising project costs in sustainable energy programmes. Using integrated decision-making modelling and operational simulation techniques, the study showed that structured project governance frameworks improved energy project adaptability and institutional responsiveness. However, the study concentrated mainly on smart grid systems without broader examination of national sustainable energy policies. The researchers therefore recommended adoption of integrated project management tools for large-scale renewable energy policy implementation.

Relatedly, Khaldi and Sunikka-Blank (2020), in the study "Governing Renewable Energy Transition in Conflict Contexts: Investigating the Institutional Context in Palestine," examined how governance and institutional project coordination affect renewable energy transition processes in fragile political environments. The objective was to investigate the governance structures shaping renewable energy implementation in Palestine. The findings revealed that weak institutional coordination, inadequate project monitoring systems, and fragmented stakeholder engagement mechanisms constrained renewable energy policy implementation. Conversely, effective project governance structures improved policy continuity, donor coordination, and implementation efficiency despite political instability. The methodology combined institutional analysis, policy review, and qualitative stakeholder interviews. Nonetheless, the scope was limited to Palestine's conflict environment, thereby reducing generalisability to more stable governance contexts. The authors therefore recommended strengthening institutional project governance systems and monitoring frameworks to improve renewable energy transition outcomes.

In summary, the reviewed empirical literature demonstrates that effective application of project management process groups, particularly planning, stakeholder engagement, execution, monitoring, and governance coordination, significantly enhances the implementation, sustainability, and institutional effectiveness of renewable energy policies across different countries and project environments.

## 3.0 AREA OF THE STUDY

The study area is Nigeria, located in West Africa along the Gulf of Guinea. Nigeria lies between latitudes 4° and 14° North and longitudes 3° and 15° East. The country occupies a land area of about 923,768 square kilometres and shares boundaries with Niger to the north, Chad to the northeast, Cameroon to the east, and Benin to the west (Edomah, 2021). Nigeria is endowed with abundant renewable and non-renewable energy resources including solar, wind, hydro, biomass, and natural gas resources. Despite these enormous resources, the country continues to experience major challenges in sustainable energy policy implementation due to weak institutional coordination, inadequate funding, ineffective monitoring systems, and poor project execution mechanisms (Daudu and Idehen, 2021). Studies further revealed that ineffective planning, stakeholder management, and policy governance have negatively affected energy transition efforts and sustainable electricity development in Nigeria (Nwaiwu, 2021). Consequently, the growing need to strengthen sustainable energy policy implementation through effective project management process groups necessitated this study.

## 4.0 METHODOLOGY

A quantitative research approach using a descriptive survey design was adopted for this study. According to McCombes (2023), descriptive surveys systematically describe variables and perceptions within a defined population; this design therefore enabled an in-depth investigation and provided a clear understanding of the Role of Project Management Process Groups in Improving Sustainable Energy Policy Implementation in Nigeria. The study population consisted of key stakeholders directly involved in sustainable energy policy processes, including officials of the Federal Ministry of Power, officers of relevant regulatory agencies, project managers in renewable energy firms, and energy consultants across selected states in Nigeria. Using a stratified random sampling technique, which is a probability sampling method, respondents were grouped according to stakeholder category to ensure adequate representation. From this sampling frame, a total of 290 respondents were selected to participate in the study.

The instrument used for data collection was a researcher-designed questionnaire titled ‘An Empirical Examination of the Role of Project Management Process Groups in Improving Sustainable Energy Policy Implementation in Nigeria.’ The instrument was designed to elicit relevant information from respondents in line with the study variables. It consisted of two sections: Section A gathered socio-demographic information such as professional role, years of experience, and organisational affiliation; and Section B focused on Extent to which sustainable energy policies have been effectively implemented in Nigeria, Key Gaps Observed in Implementation and Frequency of Use of Project Management Process Groups in Your Organisation. A 4-point Likert scale was used, with response options of Very Frequently (4), Frequently (3), Occasionally or Rarely (2), Never (1).

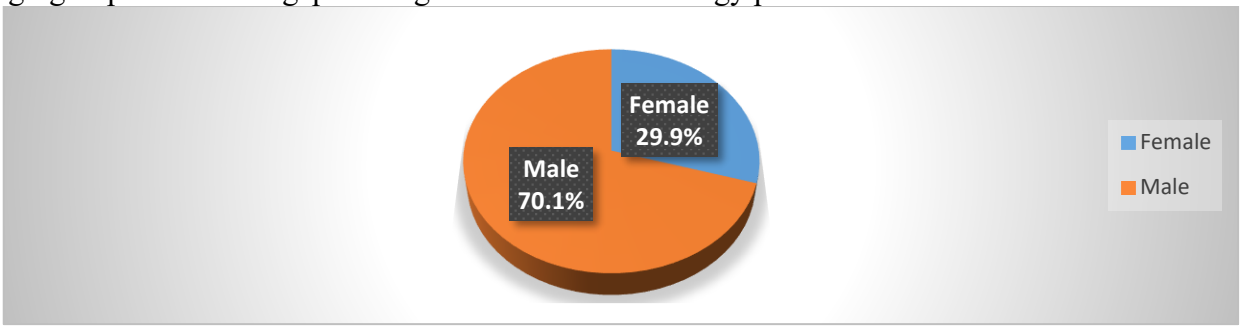
To ensure validity, the questionnaire was scrutinised by the researcher’s supervisor and two experts in project management and energy policy. Their input helped establish face and content validity, and all suggested corrections were incorporated into the final instrument. Reliability of the instrument was determined using the test–retest method to ensure consistency of responses over time. Using Pearson Product Moment Correlation, it yielded a reliability coefficient of 0.84.

Data collected were analysed using both descriptive and inferential statistical tools. Frequency counts, percentages, mean, and standard deviation were used to answer the research questions, while inferential statistics, specifically regression analysis and Analysis of Variance (ANOVA), were used as probability tests to test the research hypotheses and determine the level of significance at 0.05.

## 5.0 PRESENTATION AND DISCUSSION OF RESULTS

### 5.1 Demographic Characteristics of Respondents

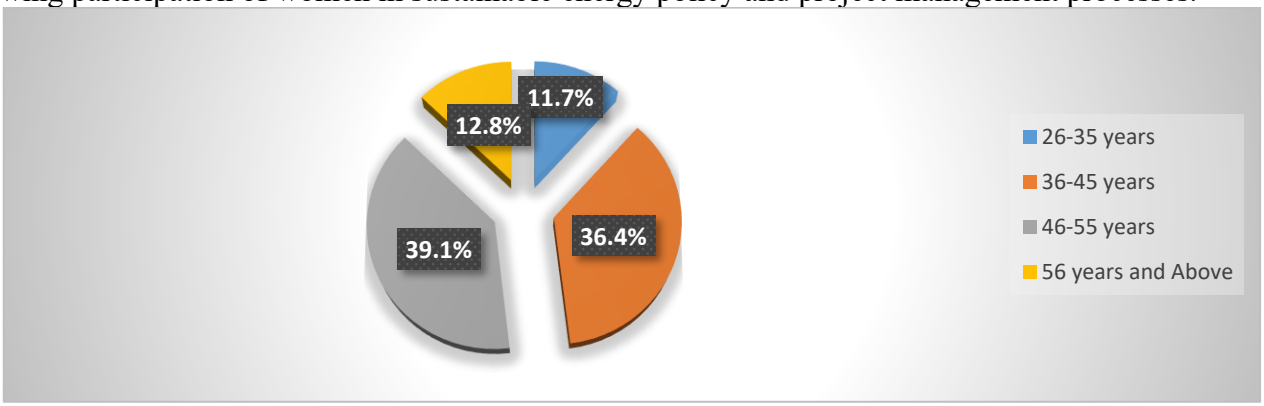
This section presents an overview of the demographic characteristics of the respondents, including their gender, age, occupational category, and years of experience in the Nigerian energy and policy management sector. These variables provide contextual insight into the stakeholders involved in bridging implementation gaps in Nigeria's sustainable energy policies.




*Source: Field Survey, 2025*

**Figure 1.0: Gender Distribution of Respondents**

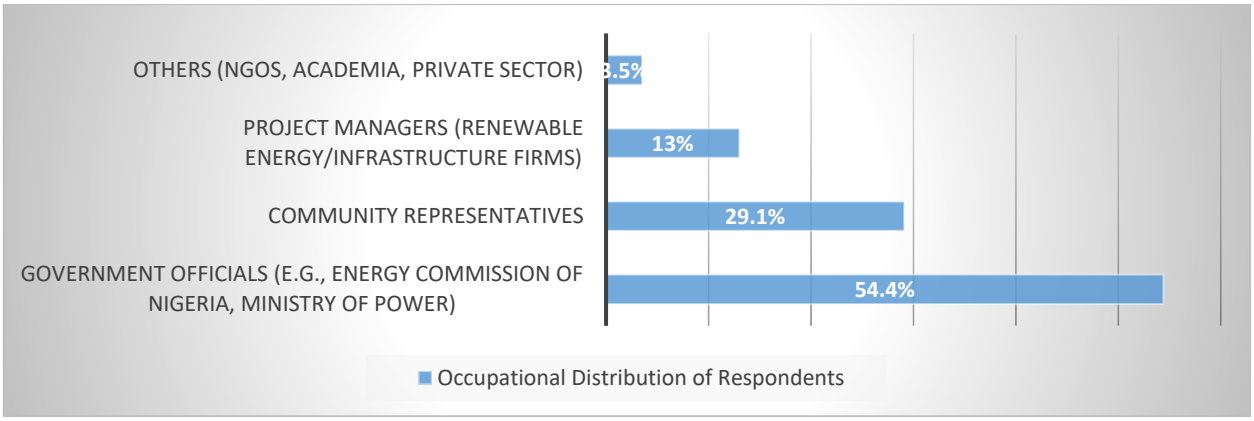
Figure 1.0 reveals the gender distribution of respondents. Out of 290 participants, 70.1 per cent were male, while 29.9 per cent were female. This indicates a male-dominated energy and policy environment, reflecting existing structural patterns within Nigeria's power and renewable energy sector. Nevertheless, the substantial female representation suggests increasing inclusivity and growing participation of women in sustainable energy policy and project management processes.




*Source: Field Survey, 2025*

**Figure 4.2: Age Distribution of Respondents**

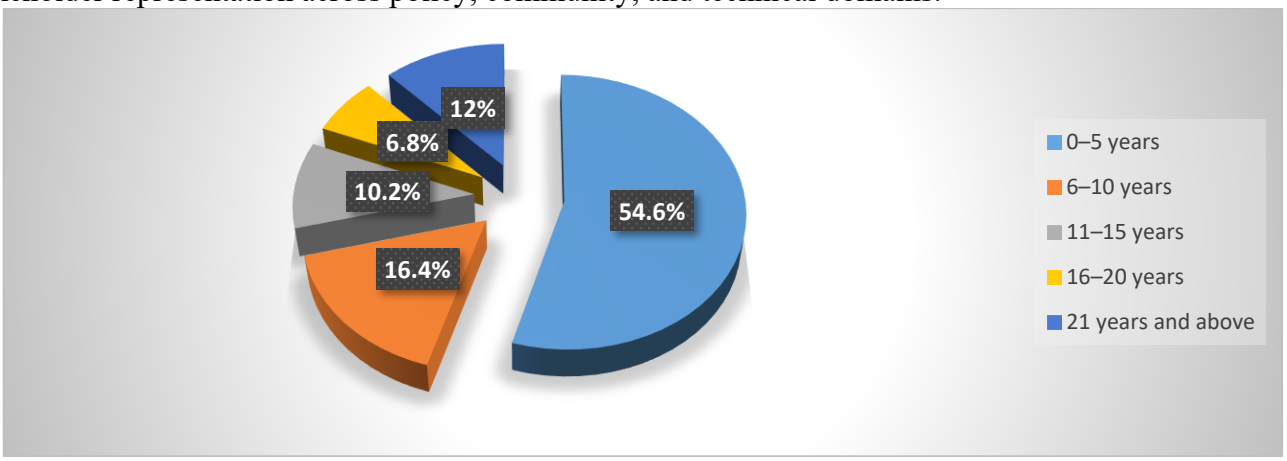
Figure 2.0 shows the age distribution of respondents. A majority of 39.1 per cent were between 46–55 years, followed closely by 36.4 per cent within the 36–45-year range. Respondents aged 56 years and above accounted for 12.8 per cent, while 11.7 per cent were between 26–35 years. This distribution demonstrates that most participants are mature professionals with considerable experience, thereby strengthening the reliability of their perspectives on sustainable energy policy implementation and Project Management Process Groups.




*Source: Field Survey, 2025*

**Figure 3.0: Occupational Distribution of Respondents**

Figure 3.0 indicates that government officials constituted 54.4 per cent of respondents, highlighting their central role in policy formulation and implementation. Community representatives accounted for 29.1 per cent, project managers 13.0 per cent, and others 3.5 per cent. This spread reflects broad stakeholder representation across policy, community, and technical domains.

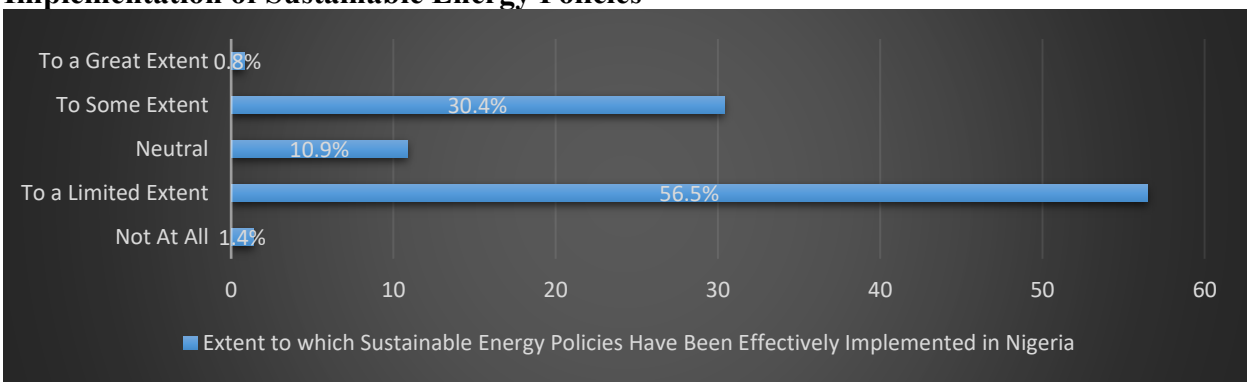



*Source: Field Survey, 2025*

**Figure 4.0: Years of Experience in the Energy Sector**

Figure 4.0 reveals that 54.6 per cent of respondents had 0–5 years of experience, 16.4 per cent had 6–10 years, and 12 per cent had over 21 years. This mix of emerging professionals and seasoned experts provides balanced insights into Nigeria's sustainable energy implementation challenges.

**Implementation of Sustainable Energy Policies**




*Source: Field Survey, 2025*

**Figure 5.0: Extent to which sustainable energy policies have been effectively implemented in Nigeria**

Figure 5.0 shows the respondents' perception of the extent to which sustainable energy policies have been effectively implemented in Nigeria. A majority of the respondents - 164 (56.5%), believe that sustainable energy policies are implemented only to a limited extent, while 88 respondents (30.4%) stated that such policies are implemented to some extent. A smaller proportion - 32 respondents (10.9%), remained neutral on the issue. In contrast, only 2 respondents (0.8%) indicated that policies have been implemented to a great extent and a further 4 respondents (1.4%) stated that policies not been implemented at all.

These findings suggest that although there is a framework for sustainable energy policy in Nigeria, its implementation remains weak and inconsistent. Respondents emphasised that policy initiatives often do not translate into practical outcomes, particularly at the community level.

**Table 1.0: Chi-Square Test for the Extent of Implementation of Sustainable Energy Policies in Nigeria**

| Response Category | Observed (O) | Expected (E) | $(O-E)^2/E$ |
|---|---|---|---|
| Not at all | 4 | 58.0 | 51.6 |
| To a great extent | 2 | 58.0 | 55.2 |
| Neutral | 32 | 58.0 | 11.6 |
| To some extent | 88 | 58.0 | 15.5 |
| To a limited extent | 164 | 58.0 | 207.7 |
| **Total** | **290** | **290.0** | **341.6** |

*Source: Field Survey, 2025*

**Key: Computed $\chi^2$ value: 341.6; Degrees of freedom (df): 4; Critical value ($\chi^2_{0.05,4}$): 9.488; Significance level ($p < 0.05$)**

The calculated Chi-square value ($\chi^2 = 341.6$) is far greater than the critical value ($\chi^2_{0.05,4} = 9.488$) at the 0.05 significance level. This indicates a statistically significant difference in the responses regarding the extent to which sustainable energy policies have been effectively implemented in Nigeria. Therefore, respondents' views are not evenly distributed, the majority's opinion that sustainable energy policies are implemented only to a limited extent is statistically valid and not due to random chance. This statistical finding reinforces the descriptive analysis above; confirming that implementation of sustainable energy policies in Nigeria remains weak and inconsistent.

**Table 2.0: Key Gaps Observed in Implementation**

| Key Gaps Observed | Mean | Std. Deviation | No (%) | Yes (%) |
|---|---|---|---|---|
| Weak regulatory frameworks | 0.89 | 0.32 | 26.4 | 73.6 |
| Inadequate funding | 0.86 | 0.34 | 28.0 | 72.0 |
| Poor infrastructure | 0.91 | 0.29 | 14.1 | 85.9 |
| Lack of coordination among stakeholders | 0.83 | 0.37 | 17.1 | 82.9 |
| Insufficient technical expertise | 0.64 | 0.48 | 35.9 | 64.1 |

*Source: Field Survey, 2025*

Table 2.0 outlines the major gaps observed in the implementation of sustainable energy policies in Nigeria. The most prominent gap identified by respondents is poor infrastructure, acknowledged by 85.9% of respondents, followed closely by lack of coordination among stakeholders at 82.9%, and weak regulatory frameworks at 73.6%. Similarly, 72% of respondents highlighted inadequate funding as a significant constraint, while 64.1% pointed to insufficient technical expertise as another crucial barrier.

These results suggest that structural and institutional weaknesses are the major obstacles hindering effective policy implementation in Nigeria's energy sector. Respondents overwhelmingly agreed that poor infrastructure, particularly in electricity distribution, renewable energy transmission, and maintenance continues to impede sustainable policy outcomes.

**Table 3.0: Chi-Square Test for Significant Differences among Key Gaps in Implementation of Sustainable Energy Policies**

| Key Gap Observed | Yes (%) | No (%) | Observed (O) Yes | Expected (E) Yes | $(O-E)^2/E$ |
|---|---|---|---|---|---|
| Weak regulatory frameworks | 73.6 | 26.4 | 214 | 145 | 32.2 |
| Inadequate funding | 72.0 | 28.0 | 209 | 145 | 28.3 |
| Poor infrastructure | 85.9 | 14.1 | 249 | 145 | 74.4 |
| Lack of coordination among stakeholders | 82.9 | 17.1 | 240 | 145 | 62.3 |
| Insufficient technical expertise | 64.1 | 35.9 | 186 | 145 | 11.6 |
| **Total** | — | — | **1,098** | **725** | **208.8** |

*Source: Field Survey, 2025*

Computed $\chi^2 = 208.8$; Degrees of freedom (df) = 4; Critical value ($\chi^2_{0.05,4}$) = 9.488; Significance level = $p < 0.05$

The computed Chi-square value ($\chi^2 = 208.8$) is far greater than the critical value ($\chi^2_{0.05,4} = 9.488$) at the 0.05 significance level, indicating a statistically significant difference among the identified gaps in the implementation of sustainable energy policies.

This means that respondents' opinions on the prevalence of the various gaps are not uniform. Certain challenges are clearly more dominant than others. Specifically, poor infrastructure (85.9%) and lack of coordination among stakeholders (82.9%) stand out as the most critical and statistically significant barriers compared to others such as inadequate funding (72.0%) and weak regulatory frameworks (73.6%).

**Table 4.0: Frequency of Use of Project Management Process Groups in Your Organisation**

| Process Groups | VF (%) | F (%) | O/R (%) | N (%) |
|---|---|---|---|---|
| Group Process Initiation | 28.5 | 44.0 | 21.5 | 6.0 |
| Group Process Planning | 33.4 | 42.9 | 15.5 | 8.2 |
| Group Process Execution | 33.4 | 42.9 | 19.0 | 4.6 |
| Group Process Monitoring | 33.2 | 42.9 | 19.0 | 4.9 |
| Group Process Closure | 26.4 | 45.1 | 20.7 | 7.9 |

*Source: Field Survey, 2025*

*(Keys: VF = Very Frequently; F = Frequently; O/R = Occasionally or Rarely; N = Never)*

Table 4.0 provides an overview of how frequently project management process groups are applied in organisations involved in energy policy implementation in Nigeria. The table shows that group process initiation is practiced very frequently by 28.5% of respondents and frequently by 44.0%, while 21.5% indicated it occurs occasionally or rarely, and 6.0% reported that it is never applied. Similarly, group process planning is used very frequently by 33.4%, frequently by 42.9%, occasionally by 15.5%, and never by 8.2%. For group process execution, 33.4% of respondents noted

very frequent use, 42.9% indicated frequent use, 19.0% reported occasional or rare use, and 4.6% stated that it is never applied.

In the case of group process monitoring, 33.2% of respondents observed very frequent use, 42.9% said frequent, 19.0% indicated occasional or rare, and 4.9% stated never. Finally, group process closure is applied very frequently by 26.4%, frequently by 45.1%, occasionally by 20.7%, and never by 7.9%.

These results suggest that while project management processes are fairly common in energy-related organisations, their consistent application remains uneven across the different stages. The higher frequency of initiation, planning, and execution compared to closure implies that many projects lack proper completion and evaluation mechanisms.

**Table 5.0: Correlation between Frequency of Project Management Process Group Use and Effective Implementation of Sustainable Energy Policies**

| Variables | Pearson Correlation (r) | Sig. (p-value) | |
|---|---|---|---|
| Extent of policy implementation and Group process initiation | 0.612 | 0.000 | 90 |
| Extent of policy implementation and Group process planning | 0.658 | 0.000 | 90 |
| Extent of policy implementation and Group process execution | 0.701 | 0.000 | 90 |
| Extent of policy implementation and Group process monitoring | 0.745 | 0.000 | 90 |
| Extent of policy implementation and Group process closure | 0.694 | 0.000 | 90 |

*Source: Field Survey, 2025*

The correlation analysis above revealed a strong and statistically significant positive relationship between the extent of sustainable energy policy implementation and the frequency of application of project management process groups ($p < 0.05$ across all variables). Among the process groups, monitoring ($r = 0.745$) shows the strongest positive correlation with policy implementation effectiveness, followed closely by execution ($r = 0.701$) and closure ($r = 0.694$). This implies that when project management activities, especially monitoring and closure, are consistently practiced, the implementation of sustainable energy policies tends to improve significantly.

Conversely, where these process groups are infrequently applied, implementation outcomes remain weak, fragmented, and unsustainable. This quantitative finding validates the earlier descriptive and qualitative evidence from respondents who emphasized that poor monitoring, weak closure mechanisms, and inadequate follow-up frameworks are major factors limiting policy success.

**Table 6.0: ANOVA Test on Differences in Perception of Policy Implementation among Respondent Categories**

| Source of Variation | Sum of Squares | If | Mean Square | F-Statistic | Sig. (p-value) |
|---|---|---|---|---|---|
| Between Groups | 14.762 | 3 | 4.921 | 9.386 | 0.000 |
| Within Groups | 149.018 | 2 | 0.521 | | |

| Source of Variation | Sum of Squares | If | Mean Square | F-Statistic | Sig. (p-value) |
|---|---|---|---|---|---|
| | | 86 | | | |
| **Total** | **163.780** | **289** | | | |

*Source: Field Survey, 2025*

The one-way ANOVA test in Table 6.0 examines whether significant differences exist among the four respondent categories - Government Officials, Project Managers, Energy Consultants, and Community Representatives - regarding their perception of the effectiveness of sustainable energy policy implementation in Nigeria.

The results indicate a statistically significant difference across the groups ($F = 9.386$, $p < 0.05$), suggesting that perceptions of policy implementation effectiveness are not uniform. This means that respondents' professional roles and institutional experiences influence how they evaluate the extent to which sustainable energy policies have been implemented.

This pattern highlights the lack of consistency in applying project management process groups across energy agencies and firms. While initiation and planning are frequently used, monitoring and closure, critical to evaluating and ensuring success, are often neglected.

### 5.2 Test of Hypothesis

To examine the relationship between the application of Project Management Process Groups (PMPGs) and the effectiveness of sustainable energy policy implementation in Nigeria, the Pearson Product-Moment Correlation and One-Way ANOVA statistical techniques were employed. The correlation analysis was considered appropriate because both variables were measured on ordinal scales converted to interval-level indices, while ANOVA was used to determine differences in perception among respondent categories. The analysis was conducted at a 0.05 level of significance.

**a. Correlation Test of Association**

Table 7.0 presents the Pearson correlation results examining the relationship between the extent of sustainable energy policy implementation and the frequency of application of PMPGs.

**Table 7.0: Correlation between Application of PMPGs and Policy Implementation Effectiveness**

| Variables | Pearson Correlation (r) | Sig. (p-value) | N |
|---|---|---|---|
| Policy Implementation × Initiation | 0.612 | 0.000** | 290 |
| Policy Implementation × Planning | 0.658 | 0.000** | 290 |
| Policy Implementation × Execution | 0.701 | 0.000** | 290 |
| Policy Implementation × Monitoring | 0.745 | 0.000** | 290 |
| Policy Implementation × Closure | 0.694 | 0.000** | 290 |

*Source: Field Survey, 2025*
(Significance level: $p < 0.05$)

The correlation coefficients indicate strong and statistically significant positive relationships between the application of PMPGs and the effectiveness of sustainable energy policy implementation ($p = 0.000 < 0.05$). Monitoring ($r = 0.745$) shows the strongest association, followed by execution ($r = 0.701$) and closure ($r = 0.694$). Since all p-values are less than 0.05, the null hypothesis of no significant relationship is rejected. This implies that increased application of structured project management processes significantly enhances policy implementation outcomes in Nigeria.

**b. Hypothesis Testing**

| Hypothesis | Statistical Result | Decision | Interpretation |
|---|---|---|---|
| **$H_0$:** There is no significant relationship between the application of PMPGs and the effectiveness of sustainable energy policy implementation in Nigeria. | r values range from 0.612–0.745, p = 0.000 | Rejected | Application of PMPGs significantly influences implementation effectiveness. |

*Source: Field Survey, 2025*

The statistically significant correlation results confirm that organisations that frequently apply initiation, planning, execution, monitoring, and closure processes experience stronger implementation performance. In particular, the high correlation for monitoring underscores the critical importance of performance tracking, evaluation, and feedback mechanisms in ensuring sustainable policy outcomes.

Furthermore, the ANOVA results ($F = 9.386$, $p = 0.000 < 0.05$) indicate significant differences in perception among respondent categories, suggesting that professional roles influence evaluation of implementation effectiveness.

Overall, the empirical evidence demonstrates that the structured and consistent application of Project Management Process Groups is significantly associated with improved sustainable energy policy implementation in Nigeria. The null hypothesis is therefore rejected, affirming that project management methodologies play a critical role in strengthening policy execution and delivery.

### 5.3 Discussion of Findings

The central finding of this investigation reveals that sustainable energy policies in Nigeria are widely perceived as existing more robustly on paper than in practice. Respondents consistently indicated that implementation remains weak, uneven, and often detached from community-level realities. This perception aligns with the empirical observations of Adeshina et al. (2024), whose sectoral review of Nigeria's post-reform electricity market concluded that policy articulation has outpaced execution due to institutional discontinuities and infrastructural decay. Similarly, Okhirebhu et al. (2025), examining renewable transition pathways, found that although frameworks such as the National Renewable Energy and Energy Efficiency Policy (NREEEP) articulate ambitious targets, translation into measurable outcomes has been inconsistent. The convergence between the present findings and these studies suggests that implementation failure is not episodic but systemic, rooted in governance fragmentation and limited absorptive capacity within energy institutions. Ajia's (2025) scoping review further reinforces this interpretation, demonstrating that policy effectiveness in Nigeria is significantly moderated by regulatory coherence and enforcement capacity.

Beyond the general weakness of implementation, the study identifies structural and institutional barriers as the dominant constraints. Poor infrastructure and lack of coordination among stakeholders emerged as particularly salient obstacles. This observation corroborates the work of Chukwuemeka

et al. (2024), whose bibliometric mapping of sustainable energy development literature highlights infrastructure deficits and inter-agency fragmentation as persistent bottlenecks across Sub-Saharan Africa. In the Nigerian context, Iledare and Suberu (2023) argue that transmission constraints and distribution inefficiencies continue to undermine renewable integration despite favourable policy rhetoric. The emphasis on coordination gaps also resonates with the findings of Olanrewaju et al. (2022), who demonstrate that Nigeria's energy governance landscape is characterized by overlapping mandates between federal ministries, regulatory bodies, and state-level actors. Such institutional complexity often generates implementation inertia rather than synergy. The present findings therefore situate policy weakness not merely within funding inadequacies, but within deeper systemic coordination failures.

Inadequate funding and insufficient technical expertise were also identified as significant impediments, though less dominant than infrastructure and coordination deficits. This hierarchy of constraints mirrors the conclusions of Adenikinju and Olatunji (2021), who contend that while financing gaps are critical, the more enduring limitation lies in weak project structuring and limited technical capacity to design bankable renewable projects. Ebhota and Jen (2020), writing on renewable deployment in emerging economies, similarly maintain that technical skill shortages often delay feasibility assessments and grid integration studies, thereby stalling otherwise viable projects. The implication here is that financial injections alone are unlikely to produce transformative outcomes without parallel investments in institutional competence and knowledge systems.

The analysis further reveals that project management process groups are relatively common within organisations engaged in energy policy implementation, yet their application remains uneven across stages. Initiation, planning, and execution are reportedly applied more consistently than monitoring and closure. This asymmetry aligns with the implementation gap described by Too and Weaver (2020), who argue that many public-sector projects globally demonstrate "front-end strength" but "back-end fragility," particularly in evaluation and institutional learning. In Nigeria's public administration context, Akinwale and George (2023) observe that monitoring frameworks are frequently underdeveloped, resulting in limited feedback loops and weak accountability mechanisms. The present findings suggest that sustainable energy initiatives may be experiencing a similar procedural imbalance, where projects are launched with enthusiasm but conclude without rigorous performance auditing or lessons learned documentation.

The correlation analysis indicated a strong positive relationship between the consistent use of project management process groups and effective policy implementation further deepens the explanatory narrative. Particularly, monitoring and closure exhibited the strongest association with improved implementation outcomes. This finding substantiates the argument advanced by Müller and Lecoeuvre (2022), who posit that governance intensity within monitoring structures significantly predicts project sustainability in complex policy environments. Their comparative European study demonstrates that projects subjected to systematic monitoring regimes exhibit higher resilience and adaptive capacity. In African infrastructure contexts, Ofori and Chan (2021) similarly conclude that post-implementation review mechanisms are decisive in determining whether policy projects generate enduring public value. The present investigation therefore reinforces a growing scholarly consensus that structured project governance – especially in monitoring and closure phases – functions as a stabilising mechanism within volatile policy landscapes.

The ANOVA findings indicating variation in perception among professional categories further illuminate the institutional dimension of implementation. Differences in perspective among government officials, project managers, consultants, and community representatives suggest that role-based exposure shapes evaluative judgment. This resonates with the stakeholder perception

framework articulated by Klakegg et al. (2021), who argue that institutional position influences how success and failure are interpreted in public projects. In Nigeria, Adebayo (2024) notes that technocrats embedded within regulatory agencies often perceive incremental policy progress, whereas community actors experience stagnation due to limited visible impact. The divergence captured in this study therefore reflects not mere opinion differences, but structural positioning within the energy governance ecosystem.

Taken together, the findings reveal a coherent narrative: sustainable energy policy implementation in Nigeria is constrained less by policy absence and more by institutional execution deficits, infrastructural decay, coordination failures, and incomplete project governance cycles. The positive relationship between structured project management processes and improved implementation outcomes suggests that procedural discipline, rather than rhetorical ambition, may be the missing link in Nigeria's energy transition architecture.

## 6.0 CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion

This study concludes that sustainable energy policy implementation in Nigeria remains structurally fragile despite the existence of comprehensive policy frameworks. This weakness does not derive primarily from conceptual inadequacy but from systemic execution challenges embedded within infrastructure deficits, fragmented governance, and uneven application of project management processes. While project initiation and planning are relatively common, monitoring and closure mechanisms – which ensure continuity, accountability, and institutional learning – remain insufficiently institutionalised. The study further establishes that consistent application of project management process groups correlates strongly with improved implementation outcomes, underscoring the importance of procedural rigour in public-sector energy governance. Ultimately, Nigeria's sustainable energy transition requires not additional policy declarations but strengthened implementation architectures anchored in disciplined project governance and inter-agency coordination.

### 6.2 Recommendations

First, there is a need to institutionalise comprehensive monitoring and evaluation frameworks within all sustainable energy programmes. The Federal Ministry of Power, in collaboration with state energy agencies, should develop mandatory post-implementation review protocols aligned with internationally recognised project governance standards. Such institutionalisation would address the current imbalance between execution and closure phases and foster systematic learning across projects.

Second, inter-agency coordination mechanisms must be formalised beyond ad hoc committees. A centralised Sustainable Energy Implementation Coordination Council, comprising representatives from regulatory bodies, transmission agencies, renewable developers, and community stakeholders, should be established to harmonise mandates and reduce policy overlap. This recommendation responds directly to the coordination deficits identified in both the empirical findings and recent Nigerian energy governance literature.

Third, targeted capacity-building programmes should be implemented for project managers and technical officers within energy institutions. Partnerships with Nigerian universities and professional bodies can facilitate advanced training in renewable project design, risk management, and monitoring analytics. Strengthening technical expertise would mitigate the institutional competence gaps that currently undermine implementation consistency.

Fourth, infrastructure rehabilitation and grid modernisation must be prioritised as foundational enablers of sustainable energy deployment. Without functional transmission and distribution systems, renewable policy ambitions will continue to outstrip operational realities. Strategic public–private partnerships may offer viable pathways for accelerating infrastructure renewal.

Collectively, these recommendations seek to reposition project management process groups not as peripheral administrative tools, but as core governance instruments capable of transforming Nigeria's sustainable energy policy landscape from aspirational rhetoric into measurable developmental impact.

## 7.0 LIMITATIONS OF THE STUDY

During the course of conducting this research, the researcher encountered several limitations; however, efforts were made to minimize their effects on the validity and reliability of the study. A major limitation was restricted access to some government institutions and relevant policy documents due to bureaucratic procedures and confidentiality concerns. Inconsistent and inadequate data across energy agencies also affected data collection and analysis. Financial and logistical constraints further limited broader field coverage across Nigeria. These limitations were mitigated through the use of key informant interviews, data triangulation, online survey tools, and secondary data from credible organisations such as IRENA, World Bank, and AfDB.

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