



Effects of Stakeholder Involvement in Sustainable Road Infrastructural Projects in Minna, Niger State, Nigeria

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Abstract

Over the years, it has been observed that persistent issues, such as poor maintenance, weak project delivery, and limited community participation in infrastructure management, have been prevalent. This study assessed the effects of stakeholder involvement on sustainable road infrastructure development in Minna, Niger State, Nigeria. Using a descriptive survey design, data were collected from 365 respondents, comprising government agencies, contractors, engineers, community members, and civil society organisations. Data were analysed using mean scores and the Relative Importance Index (RII). The results revealed that stakeholder engagement significantly improves the durability and quality of roads (mean = 3.11; RII = 0.622), enhances design quality through user feedback (mean = 3.10; RII = 0.620), and increases social acceptability of projects (mean = 3.09; RII = 0.618). Conversely, aspects related to environmental sustainability ranked lower, with eco-friendly construction practices (mean = 2.95; RII = 0.590) and compliance with environmental laws (mean = 3.03; RII = 0.606) receiving less emphasis. The study concludes that while stakeholder participation strengthens the technical and social dimensions of sustainability, environmental inclusion remains inadequate. Consequently, three key recommendations were made: Institutionalise inclusive stakeholder engagement frameworks to improve transparency and reduce conflicts; Strengthen environmental stakeholder participation to enhance compliance and promote green construction practices; and Enhance capacity-building and feedback mechanisms to ensure accountability and continuous stakeholder collaboration. Overall, the findings underscore that balanced stakeholder engagement across technical, social, and environmental dimensions is critical for achieving long-term sustainable road infrastructure in Niger State and similar developing contexts.

Keywords: Stakeholder Involvement, Sustainable Infrastructure, Road Projects, Project Management, Minna, Nigeria.

1.0 Introduction

Road infrastructure is a critical enabler of economic growth and social development, facilitating the movement of goods and people, connecting communities, and providing access to essential services (World Bank, 2021). In Nigeria, road transport remains the dominant mode of transportation, accounting for over 90% of inland freight and passenger movement. Consequently, developing and maintaining a robust and sustainable road network is paramount to the nation's progress. However, road infrastructure developers must balance their pursuit of development with sustainability principles, ensuring economic viability, social equity, and environmental protection (Ugbenna, 2022). Sustainable road infrastructure is designed, constructed, and maintained in a manner that is both economically efficient and environmentally resilient, while also being socially inclusive.

Despite its importance, the Nigerian construction industry, particularly the road sub-sector, faces significant challenges that undermine project success and sustainability. These include

inadequate funding, corruption, political influence, and poor project management practices (Adejoh and Shaibu, 2020). A critical, yet often overlooked, aspect of these challenges is the management of project stakeholders. Stakeholders are individuals, groups, or organisations that can affect or be affected by a project's activities and outcomes. They include government agencies, contractors, consultants, community members, road users, and civil society organisations.

Effective stakeholder involvement is globally recognised as a key driver of project performance, ensuring alignment of objectives, effective communication, and conflict resolution (Ogunlana and Agyekum, 2023). When stakeholders are actively and appropriately engaged, it can lead to improved project design, increased ownership and acceptance, reduced risks, and enhanced long-term sustainability. On the contrary, poor stakeholder engagement often results in conflicts, project delays, cost escalations, and infrastructure that fails to meet the community's actual needs (Akwei and Damoah, 2017).

This study examines the impact of stakeholder involvement on sustainable road infrastructure projects in Minna, Niger State, Nigeria. Minna, the capital of Niger State, is a growing urban centre that grapples with significant road infrastructure deficits. Studies have highlighted the deplorable condition of many roads in Minna, citing challenges such as inadequate funding, poor maintenance culture, and the absence of robust project management strategies (Bolanle and Olorunfemi, 2019). Furthermore, the deterioration of many roads in Minna, marked by potholes, cracks, and ineffective drainage, reflects deep-rooted issues in project execution and management. While funding is a major issue, the extent to which stakeholder dynamics influence the sustainability of road projects in this specific context remains largely unexplored. Most existing studies on stakeholder management in Nigeria focus on national-level or metropolitan contexts, such as Lagos and Abuja, leaving medium-sized cities like Minna underexplored. Given Minna's distinct social, political, and cultural characteristics, a localised study is necessary to understand how stakeholder engagement shapes project outcomes.

Although inadequate funding is often blamed for the poor performance of NIGROMA, evidence shows that project failures also stem from conflicts, weak community participation, and misalignment between project goals and stakeholder interests (Adams, 2024). Current literature also tends to evaluate stakeholder participation through traditional measures of project success, such as cost and time efficiency, without emphasising sustainability (Abwolo et al., 2023; Bello & Tijani, 2022; Mwangi et al., 2021). A lack of empirical work remains in linking stakeholder involvement to the environmental, social, and economic durability of road infrastructure (Johnson & Lee, 2018). This gap underscores the need to examine how inclusive stakeholder processes contribute to the long-term sustainability of projects. Consequently, this study provides an in-depth, evidence-based analysis of stakeholder involvement and its influence on sustainable road infrastructure development in Minna, Niger State. This research, therefore, seeks to bridge this gap by examining the effects of stakeholder involvement on sustainable road infrastructure projects in Minna.

2.0 Literature Review

2.1 Conceptual Review

2.1.1 Concept of Stakeholder Involvement

Stakeholder involvement refers to the deliberate and organised engagement of individuals, groups, or institutions that influence or are impacted by a project throughout its various stages. Drawing from Freeman's (1984) stakeholder theory, these actors must have their interests acknowledged and incorporated into project decisions to achieve successful outcomes. In road

development, stakeholders range from government ministries and project managers to engineers, contractors, community residents, civil society organisations, and end users. Their engagement extends beyond basic consultation to include sharing information, giving feedback, participating in decision-making, and collaborating on project planning, implementation, monitoring, and maintenance. In contexts with weaker governance systems, such as many developing regions, meaningful involvement is critical for reducing conflict, promoting accountability, and ensuring projects align with community needs.

2.1.2 Concept of Sustainable Road Infrastructure

Sustainable road infrastructure refers to road projects that are conceived, built, and managed in a way that balances economic practicality, social benefits, and environmental preservation. This concept reflects the global sustainability model that emphasises efficient use of resources, long-term cost savings, equitable access, user safety, and environmental responsibility. Sustainable roads are designed to withstand climate variability, reduce emissions, encourage the use of environmentally friendly materials, and comply with environmental regulations (Ugbenna, 2022). However, in Nigeria, environmental considerations often receive inadequate attention due to weak enforcement mechanisms, limited environmental awareness, and budget-driven decision-making. Achieving sustainability in road projects, therefore, requires stronger policy support, inter-agency collaboration, and active engagement of all relevant stakeholders.

2.1.3 Stakeholder Involvement and Sustainable Road Infrastructure: Conceptual Linkages

The relationship between stakeholder participation and sustainability in road projects is multifaceted. Stakeholders contribute to technical sustainability by providing local knowledge, improving the accuracy of design decisions, and reducing rework through collaborative planning. Their involvement also enhances social sustainability by addressing community mobility needs, minimising disputes, and fostering a sense of ownership that encourages proper use and maintenance of road facilities. Environmental sustainability is further supported when environmental experts and advocacy groups participate, promoting compliance with regulations and the adoption of eco-friendly practices, although this dimension remains comparatively weak in many Nigerian road projects. Stakeholder engagement also improves governance by boosting transparency and helps prevent conflict by addressing concerns early in the project cycle.

2.1.4 Dimensions of Stakeholder Involvement in Road Infrastructure Projects

Stakeholder involvement manifests through several key dimensions: information dissemination, consultation, participation in decision-making, collaboration, and empowerment. Information sharing fosters trust and prepares communities for the impacts of projects, while consultation enables stakeholders to express their concerns during project scoping, design, environmental assessment, and monitoring. Involvement in decision-making gives stakeholders the opportunity to influence project choices, such as materials, design options, and implementation methods, thereby improving long-term sustainability. Collaboration strengthens partnerships between government agencies, communities, and NGOs, while empowerment through training, capacity-building, and access to project data enables stakeholders to contribute effectively, particularly in maintenance and monitoring. These dimensions collectively influence economic, social, and environmental sustainability; however, challenges such as political interference, low awareness, weak institutional support, and bureaucratic delays continue to limit effective engagement in Nigeria.

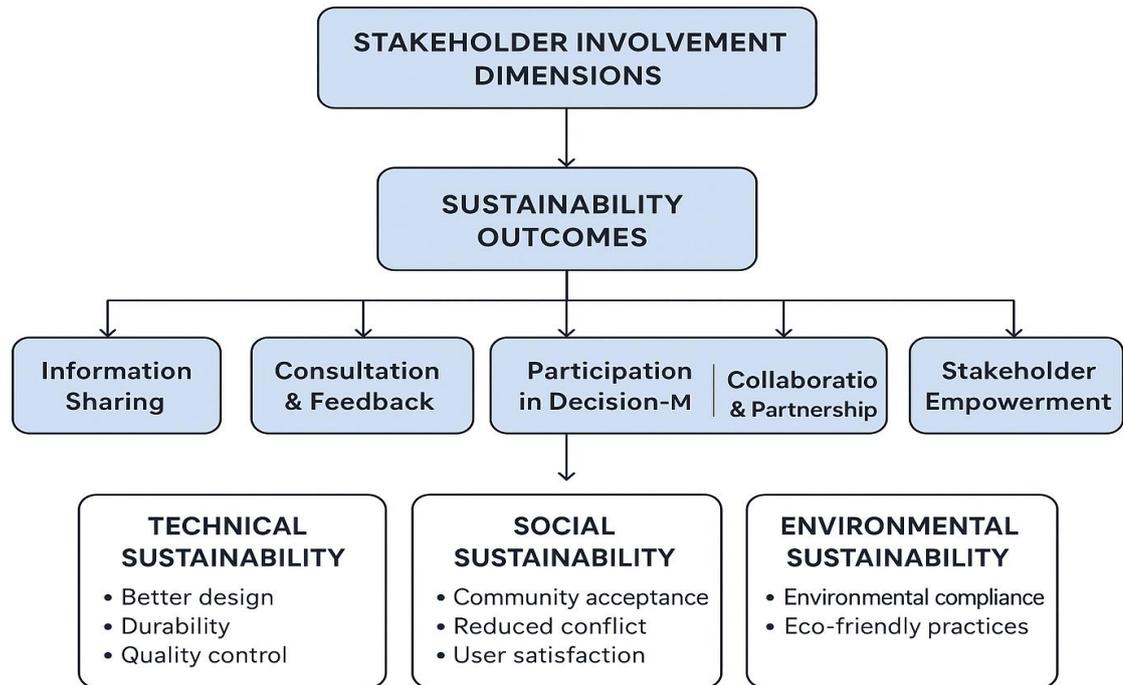


Figure 1: Stakeholder Involvement and Sustainability Outcomes Framework
 Source: Authors' Conception (2025)

Figure 1 illustrates how various aspects of stakeholder engagement collectively contribute to achieving sustainable outcomes in road infrastructure development. At the top of the framework is the concept of Stakeholder Involvement Dimensions, which captures the various ways stakeholder groups, including local residents, engineers, contractors, NGOs, and government agencies, participate in planning and executing road projects. Their level and quality of engagement directly influence the Sustainability Outcomes, emphasising that long-term project success depends heavily on the extent of stakeholder participation.

The framework identifies five key elements of stakeholder involvement: Information Sharing, Consultation and Feedback, Participation in Decision-Making, Collaboration and Partnership, and Stakeholder Empowerment. Each plays a distinct role in supporting the delivery of the project. Information Sharing promotes openness and builds confidence among stakeholders, while Consultation and Feedback help uncover community priorities and emerging issues. Participation in Decision-Making encourages local ownership and reduces opposition to project activities. Collaboration and Partnership improve coordination between project actors and affected communities, and Stakeholder Empowerment enables individuals and groups to engage more effectively throughout the project lifecycle.

Together, these dimensions contribute to three main forms of sustainability. Technical sustainability stems from improved project design, enhanced durability, and strengthened quality assurance, made possible through shared expertise and collaborative planning. Social sustainability is achieved when communities support the project, disputes are minimised, and users report higher satisfaction benefits linked to active participation and regular feedback. Environmental sustainability is strengthened when stakeholder engagement promotes adherence to environmental regulations and encourages the use of environmentally responsible practices.

In essence, the diagram underscores that sustainable road infrastructure depends not only on technical proficiency but also on robust, inclusive, and transparent stakeholder engagement. It highlights that when stakeholders are well-informed, involved, empowered, and included in decision-making, road projects stand a greater chance of being effective, widely accepted, and sustainable in the long run.

2.2 Theoretical Review

2.2.1 Stakeholder Theory

Developed by Freeman (1984), Stakeholder Theory posits that organisations, including project-based ones, should be managed to benefit all their stakeholders, not just shareholders or project sponsors. The theory posits that balancing the diverse and often conflicting interests of all stakeholders is essential for achieving long-term success and creating value. In the context of public infrastructure projects, this theory presents a moral and strategic imperative for project managers and government agencies to proactively identify, engage with, and address the concerns of various stakeholders, including local communities, suppliers, and government bodies. Applying this theory helps understand that project success is not merely technical but deeply embedded in the social and political relationships surrounding it.

2.2.2 Arnstein's Ladder of Citizen Participation

Arnstein's (1969) "Ladder of Citizen Participation" provides a robust framework for analysing the level of stakeholder involvement in projects. The ladder features eight rungs, categorised into three levels:

- i. Non-participation (Manipulation, Therapy): Where the real objective is to "educate" or "cure" participants, not to enable their participation.
- ii. Degrees of Tokenism (Informing, Consultation, Placation): Where stakeholders are heard, but there is no guarantee that their views will be considered, and power holders retain the right to decide.
- ii. Degrees of Citizen Power (Partnership, Delegated Power, Citizen Control): Where stakeholders have genuine influence and share decision-making responsibilities.

This framework is particularly relevant for this study as it critically assesses the *quality* and *depth* of stakeholder involvement in Minna's road projects, moving beyond a simple "involved vs. not involved" dichotomy. It will help in evaluating whether current engagement practices are merely tokenistic or genuinely empowering.

2.3 Empirical Review

Eskerod and Huemann (2023) study focused on how early identification of stakeholders and the use of participatory decision-making practices affect the efficiency and timely delivery of construction projects in North-Central Nigeria. The study adopted a mixed-method strategy that combined structured questionnaires targeted at project managers and consultants with interviews and reviews of project documentation. Results indicated that projects that properly identified their stakeholders and incorporated them into decision-making processes experienced fewer delays, reduced conflict, and smoother coordination. In the study it was suggested that project agencies should adopt formal participatory planning systems and to provide training on stakeholder mapping to strengthen performance and long-term project sustainability.

Oloku and Sule (2019) study explored the contribution of stakeholder engagement to addressing socio-economic challenges and improving governance and service delivery across Nigeria. A descriptive survey approach was employed, utilising questionnaires administered to government officials, civil society groups, and community representatives. The study demonstrated that broad-based participation fosters transparency, builds trust within communities, and promotes sustainable development through enhanced accountability. The study recommended enhanced communication structures, deeper grassroots involvement in decision-making, and the implementation of community-driven monitoring mechanisms to improve public service outcomes.

Adejoh and Shaibu (2020) research examined the obstacles that restrict meaningful stakeholder involvement in Nigeria's infrastructure development projects. A qualitative design was utilised, with data collected from key informant interviews and policy document analysis. The study identified communication challenges, political interference, the influence of powerful interest groups, and bureaucratic inefficiencies as major impediments to effective engagement. The study recommended enhancing transparency tools, limiting political intrusion in project processes, and employing communication mechanisms that ensure timely and accessible information sharing.

Across the reviewed studies, a clear consensus emerges that engaging stakeholders significantly improves project delivery, promotes accountability, and supports sustainable development. However, recurring barriers, such as political interference, limited communication, and the exclusion of grassroots actors, continue to weaken participation in infrastructure projects. Although existing research in Minna highlights infrastructural decline and stakeholder-related issues, none of these studies directly examines how specific forms of stakeholder involvement relate to technical, social, and environmental sustainability indicators. This study, therefore, addresses this gap by providing empirical evidence on how different dimensions of stakeholder involvement influence the long-term sustainability of road infrastructure in Minna.

3.0 Methodology

This study employed a descriptive survey design to assess the effects of stakeholder involvement in sustainable road infrastructure projects in Minna, Niger State, Nigeria. The study focuses on stakeholders involved in road infrastructure projects in Minna, Niger State, encompassing government agencies, construction firms, community representatives, environmental groups, and project workers. A structured questionnaire was designed to capture key aspects of stakeholder engagement, including the identification of key stakeholders in road infrastructure projects, current stakeholder engagement strategies employed in the industry, the perceived impact of stakeholder engagement on sustainability outcomes, and challenges and barriers to effective stakeholder participation. Cochran's (1977) sample size formula was applied to determine the minimum required sample size for the study. Cochran's formula estimates the sample size for a proportion when the total population (N) is large or unknown.

It is given as:

$$n_0 = \frac{Z^2 pq}{e^2} \quad \text{----- (1)}$$

Where:

n_0 = Required sample size for an infinite population

Z = Z-score (1.96 for a 95% confidence level)

p = Estimated proportion of the population (assumed to be 0.5 when unknown)

e = Margin of error (set at 0.05 for 95% confidence)

Substituting these values into the formula:

$$n_0 = \frac{(1.96)^2 \times (0.5) \times (0.5)}{(0.05)^2}$$

$$n_0 = \frac{3.8416 \times 0.25}{0.0025}$$

$$n_0 = \frac{0.9604}{0.0025} = 384$$

Thus, a minimum of 384 respondents is required for a large or unknown population to ensure statistical significance at a 95% confidence level.

4. Results and Discussion

4.1 Demographic Characteristics of Respondents

Table 1 displays important demographic variables including age, marital status, income, education, occupation, experience, and gender of the participants. These factors provide a detailed overview of the respondents' backgrounds, enabling an understanding of how demographic variation may impact the study's results. The table lists both the frequency counts and percentages for each subgroup, making it easier to interpret the composition of the sample and draw comparisons across categories. This structured presentation supports clearer insight into the characteristics of the study population.

Table 1: Demographic Profiles of Respondents

Demographic Factor	Category	Frequency (n)	Percentage (%)
Age Group	18–30 years	73	20
	31–40 years	75	20
	41–50 years	90	24
	51 years and above	127	34
Marital Status	Divorced	69	18
	Married	73	20
	Separated	81	22
	Single	68	18
	Widowed	74	20
Income	Below #70,000	50	13
	#70,000 - #100,000	64	17
	#101,000 - #130,000	66	18
	#131,000 - #160,000	63	17
	#161,000 - #190,000	61	16
	Above #191,000	61	16
Educational Level	HND/Bachelor's Degree	86	23
	Master's Degree and above	98	26.8
	OND/NCE	103	28
	SSCE	78	21.4

Occupation	Community member/resident	79	21.6
	Contractor/Engineer	85	23.3
	Government official	64	17.5
	NGO/Development partner	68	18.6
	Other	69	18.9
Gender	Female	75	20.5
	Male	290	79.5
Years of Experience in infrastructural related activities	Less than 2 years	104	28.5
	2 – 5 years	89	24.4
	6 – 10 years	84	23
	More than 10 years	88	24

Source: Field Survey, 2025

The demographic data in Table 1 highlights a predominantly experienced group of stakeholders with the largest proportion aged 51 years and above, suggesting that their insights on road infrastructure sustainability are grounded in extensive practical experience. The relatively balanced distribution of marital status indicates participants come from a variety of household situations that could impact their priorities and perspectives. Income levels are varied, capturing views from multiple economic strata. The income of stakeholders was a necessary demographic factor in this study to assess how economic status influences stakeholders' perspectives, participation levels, and capacity to engage effectively in road infrastructure projects. Recognising that income disparities may affect social inclusion, resource access, and ultimately project sustainability and acceptance. This understanding enables the design of targeted engagement strategies that ensure equitable involvement and address socio-economic barriers in infrastructure development.

The educational qualifications range from technical diplomas (OND/NCE) to advanced degrees, reflecting a mix of technical expertise and community-based knowledge vital for tackling sustainability issues. The occupational diversity, ranging from community members to government officials and contractors, ensures that multiple stakeholder viewpoints, including those directly involved in infrastructure development and those impacted by it, are represented. Additionally, a spread of years of experience and gender further enriches this stakeholder representation. This demographic profile confirms that the study intentionally incorporates a wide range of stakeholders, which is critical for fostering inclusive engagement, resolving conflicts, aligning project goals, and ultimately supporting the environmental, social, and economic sustainability of road infrastructure projects.

Professionally, the study effectively captured a balanced range of stakeholders, with contractors and engineers forming the largest group (23.3%), closely followed by community members (21.6%), and significant representation from government officials, NGOs, and other relevant parties. The distribution of years of experience was fairly even, encompassing new entrants and highly seasoned professionals. However, a notable imbalance was observed in gender, with males constituting a substantial majority (79.5%), a finding attributed to the prevalent male dominance within the construction and infrastructure sectors in Niger State. The demographic composition highlights a broad and diverse range of perspectives, which are critical for understanding stakeholder involvement in sustainable road infrastructure projects.

The demographic structure implies that while stakeholder engagement in Minna's road sector is diverse and inclusive in many respects, critical areas, especially gender balance and

stakeholder capacity building, require policy attention to achieve truly sustainable and participatory infrastructure development.

4.2 The Impact of stakeholder engagement on project planning, design, implementation, and maintenance decisions.

Table 4.2 highlights the respondents' views on the impact of stakeholder engagement across different stages of road infrastructure projects. It details statistical measures, including frequencies, means, standard deviations, ranks, and Relative Importance Indices (RII) for statements related to stakeholder involvement during planning, design, implementation, maintenance, and overall accountability. This data highlights the crucial role that stakeholder participation plays in enhancing transparency, fostering collaboration, reducing conflicts, and improving accountability, all of which are vital for the successful delivery and sustainability of road infrastructure projects.

Table 2: Impacts of Stakeholder Engagement

	Description	Frequency	Mean	Std. D	Rank	RII
1.	Stakeholders are adequately involved during the planning stage of road projects.	365	2.98	1.435	4	0.596
2.	Engagement of stakeholders improves the design quality of road infrastructure.	365	2.98	1.423	4	0.596
3.	Stakeholder inputs are considered during project implementation.	365	2.96	1.406	6	0.592
4.	Maintenance decisions are influenced by stakeholder feedback.	365	2.91	1.404	8	0.582
5.	Early involvement of stakeholders helps in minimising project delays.	365	2.98	1.440	4	0.596
6.	Community consultations reduce land acquisition disputes.	365	2.84	1.426	10	0.568
7.	Stakeholder engagement enhances transparency in decision-making.	365	3.05	1.402	2	0.610
8.	Contractors and local communities collaborate effectively during project execution.	365	2.88	1.404	9	0.576
9.	Stakeholder participation leads to improved accountability in road projects.	365	3.06	1.427	1	0.612
10.	Feedback mechanisms exist for stakeholders throughout the project lifecycle.	365	2.90	1.425	7	0.580

Source: Field Survey (2025)

The findings in Table 2 on the impacts of stakeholder engagement illustrate that stakeholder engagement has a significant positive effect across all phases of road infrastructure projects by enhancing accountability, promoting transparency, improving design quality, and reducing delays and disputes, which aligns with previous studies emphasising that active involvement in planning, implementation, and feedback processes leads to better project outcomes and smoother execution (Khan et al., 2021; El-Gohary et al., 2021; Matu et al., 2020).

4.3 The Effect of Stakeholder Involvement on Key Sustainability Measures

Table 4.3 illustrates the impact of stakeholder involvement on critical sustainability dimensions in road infrastructure projects, reflecting respondents' views on the effect of participation on environmental impact reduction, infrastructure durability, cost efficiency, operational functionality, and adherence to environmental regulations. The table provides detailed statistical data, including frequency, mean, standard deviation, ranking, and Relative Importance Index (RII), which collectively emphasise stakeholder contributions to promoting environmentally friendly practices, enhancing quality and social acceptance, lowering costs, and supporting the long-term sustainability of road infrastructure.

Table 3: Effect of Stakeholder Involvement on Key Sustainability Measures

Description	Frequency	Mean	Std. D	Rank	RII
1. Stakeholder engagement helps to reduce environmental impact of road projects.	365	3.03	1.443	7	0.606
2. Involving stakeholders improves the durability and quality of road infrastructure.	365	3.11	1.397	1	0.622
3. Consultation with communities enhances cost efficiency in project execution.	365	2.97	1.416	9	0.594
4. Stakeholder participation contributes to long-term functionality of roads.	365	3.05	1.451	5	0.610
5. Involving environmental groups ensures better compliance with environmental laws.	365	3.03	1.403	7	0.606
6. Road users' feedback helps in designing safer and more sustainable roads.	365	3.10	1.416	2	0.620
7. Stakeholder input reduces operational and maintenance costs over time.	365	3.02	1.462	8	0.604
8. Engaged stakeholders promote adoption of eco-friendly construction practices.	365	2.95	1.427	10	0.590
9. Stakeholder participation improves social acceptability of road projects.	365	3.09	1.420	3	0.618
10. Long-term sustainability of road infrastructure depends on active stakeholder involvement.	365	3.01	1.432	6	0.602

Source: Field Survey (2025)

Table 3 demonstrates that stakeholder involvement plays a crucial role in improving sustainability outcomes in road infrastructure projects by reducing environmental impacts, enhancing durability and quality, fostering cost efficiency, and promoting long-term functionality and compliance; these results corroborate numerous studies highlighting that consistent and meaningful stakeholder engagement throughout project phases is essential for achieving sustainability, improved performance, and broader social acceptance.

5. Discussion of Findings

The demographic data in Table 1 reveals a predominantly experienced and diverse group of stakeholders, with a large share aged 51 and above, and variation across marital status, income,

education, occupation, years of experience in infrastructure-related activities, and gender; this diversity supports comprehensive stakeholder insights, which prior research identifies as critical for enhancing the effectiveness and sustainability of road infrastructure projects (Abwolo, Onwura and Njagi, 2023).

The findings presented in Table 2 indicate that stakeholder participation has a significant contribution to the success and sustainability of road infrastructure projects in Minna, Niger State. With a mean score of 3.06 and a Relative Importance Index (RII) of 0.612, the statement "Stakeholder participation leads to improved accountability in road projects" ranked highest, indicating that respondents strongly agree that inclusive engagement promotes transparency and responsibility in project execution. Similarly, the role of stakeholder engagement in enhancing transparency in decision-making ranked second (mean = 3.05; RII = 0.610), supporting earlier research by Nyangena and Kagiri (2024), which found that participatory governance mechanisms reduce corruption and foster trust between project implementers and the community.

Equally, areas such as community consultations to reduce land disputes (mean = 2.84; RII = 0.568) and collaboration between contractors and local communities (mean = 2.88; RII = 0.576) ranked lower, suggesting that despite some level of engagement, there are still gaps in effective community integration during road project execution. Overall, the findings indicate moderate stakeholder involvement across all project phases, with mean values ranging from 2.84 to 3.06, suggesting that engagement practices are present but not optimal. The relatively lower ranking of items related to maintenance feedback (mean = 2.91; RII = 0.582) and continuous stakeholder input during implementation (mean = 2.96; RII = 0.592) suggests a lack of sustained interaction after project initiation. This aligns with the study of Otieno, Ondiek and Ayuya (2023), who noted that participation in many Nigerian infrastructure projects tends to decline after the design phase, limiting opportunities for adaptive management and sustainability.

The findings, as shown in Table 3, indicate that stakeholder engagement has a strong positive influence on the sustainability and quality of road infrastructure in Minna, Niger State. The statement "*Involving stakeholders improves the durability and quality of road infrastructure*" recorded the highest mean score (3.11) and RII (0.622), emphasising that inclusive participation enhances construction quality and long-term performance (Chinyio and Akintoye, 2019). Similarly, "*Road users' feedback helps in designing safer and more sustainable roads*" ranked second (mean = 3.10; RII = 0.620), highlighting the importance of integrating user experiences in road design, which aligns with Bello and Tijani (2022) assertion that participatory engagement promotes user-centred and context-appropriate infrastructure solutions. The perception that "*Stakeholder participation improves social acceptability of road projects*" (mean = 3.09; RII = 0.618) also suggests that inclusive engagement fosters community trust and reduces opposition to projects, consistent with findings by Nyangena and Kagiri (2024), who argue that stakeholder involvement enhances project legitimacy and local support. Overall, the results reveal moderate but consistent support for stakeholder involvement in achieving durable, socially accepted, and functionally efficient road infrastructure.

However, findings related to environmental outcomes ranked lower, with "*Engaged stakeholders promote adoption of eco-friendly construction practices*" (mean = 2.95; RII = 0.590) and "*Involving environmental groups ensures better compliance with environmental laws*" (mean = 3.03; RII = 0.606) scoring below other indicators. This implies that while technical and social aspects of stakeholder participation are relatively strong, environmental

considerations receive less attention. The implication is that Minna's road sector sustainability strategies still prioritise construction quality and cost efficiency over ecological protection, echoing the observations of Mwangi, Kamau and Wanjohi, (2021) that environmental performance is often secondary in developing-country infrastructure contexts. Therefore, policymakers and project managers should strengthen stakeholder engagement mechanisms by involving environmental experts and local communities from the early planning stages to ensure a more balanced integration of social, technical, and environmental sustainability dimensions Mwila and Chirwa, (2025).

5. Conclusion and Recommendations

The study concludes that stakeholder participation significantly contributes to improving the sustainability, quality, and public acceptance of road infrastructure projects in Minna, Niger State. The results demonstrate that active involvement of stakeholders enhances road durability and functionality, promotes better design outcomes through user input, and strengthens transparency and accountability in project processes. Nonetheless, environmental aspects of sustainability, such as adopting green construction methods and adhering to environmental standards, appear to receive less attention, suggesting the need for greater inclusion of environmental actors in the process. Consequently, the study emphasises that achieving durable, socially inclusive, and environmentally responsible road infrastructure in Niger State depends on comprehensive stakeholder engagement involving professionals, local communities, and environmental advocates.

In line with the findings of this study, the following recommendations were made:

- i. The government should institutionalise inclusive Stakeholder Frameworks to improve transparency and reduce conflicts.
- ii. Environmental considerations should be prioritised by involving environmental protection agencies, NGOs, and local environmental groups in decision-making and monitoring processes.
- iii. Enhance Capacity Building and Feedback Mechanisms to improve their understanding of sustainable infrastructure practices and effective communication strategies.
- iv. Additionally, establishing formal feedback channels will enable stakeholders to monitor project progress, provide timely inputs, and promote accountability throughout the project lifecycle

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