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IMPACT OF ROAD INFRASTRUCTURE DEVELOPMENT ON ENVIRONMENTAL AND LIVELIHOOD OF COMMUNITIES ALONG SULEJA-MINNA HIGHWAY, NIGER STATE, NIGERIA

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Abstract

This study focuses on the impact of road infrastructure development on the environment and livelihoods of communities along Suleja-Minna Highway, Niger State, Nigeria. The aim is to assess both the socioeconomic benefits and the environmental challenges posed by the highway's construction and expansion. The objectives include evaluating the improvement in local economic activities and transportation, and also to examine environmental degradation, such as deforestation and changes in land use. A mixed-methods approach was adopted, combining quantitative surveys and qualitative interviews with stakeholders in the sampled communities. Results reveal that road infrastructure development has significantly improved market access, increased business opportunities, and reduced transportation costs, benefiting local economies. However, these gains are offset by substantial environmental impacts, including habitat loss, soil erosion, and pollution. The study concludes that while the infrastructure has driven socioeconomic progress, it has also introduced serious environmental risks. It is recommended that comprehensive environmental mitigation strategies should be adopted, such as reforestation and improved drainage systems, to balance development with ecological preservation. Additionally, policies should be enforced to ensure sustainable land use practices to prevent long-term environmental damage.

Keywords: Road Infrastructure, Socioeconomic Impact, Environmental Impact, Community Development, Niger State

1. Introduction

The history of road infrastructure in Nigeria dates to the colonial era when the construction of roads was primarily driven by the need for transportation of raw materials to the ports for export. The first major roads in Nigeria were designed to connect agricultural and mining areas to major ports in Lagos and Port Harcourt, facilitating the extraction and exportation of resources. Early road development efforts were limited and largely focused on serving colonial economic interests (Mabogunje, 1971).

After Nigeria's independence in 1960, successive governments recognized the importance of road networks for national integration and economic development. The first national development plans, such as the 1962-1968 Development Plan, emphasized the construction of roads to connect various regions of

the country. These plans laid the foundation for the expansion of Nigeria's road networks, although maintenance and sustainability of road infrastructure became significant challenges over the years due to economic downturns, corruption, and poor governance (Odeleye, 2000).

Since the 1990s, various federal and state governments have undertaken road infrastructure development projects aimed at improving connectivity between urban and rural areas. However, despite these efforts, Nigeria's road infrastructure continues to be inadequate, with poor conditions affecting economic activities and quality of life in many regions. The country's reliance on road transport for the movement of goods and people makes the development and maintenance of road networks a critical issue in Nigeria's overall economic growth and development (Adeyemi, 2011).

The Suleja-Minna Highway is a critical arterial road in Nigeria, connecting the Federal Capital Territory (FCT) with Niger State. This highway holds immense significance for both socioeconomic and strategic reasons. Firstly, it serves as a major route for commuters, travelers, and goods moving between the FCT and Niger State, which is an important agricultural hub. The road also facilitates trade and commerce by linking communities and promoting the movement of goods and services across the northern and central parts of Nigeria.

Niger State, where the highway is situated, is rich in natural resources such as agricultural produce, minerals, and hydropower from the Kainji Dam, which adds to the strategic importance of this road. The Suleja-Minna Highway also plays a key role in the movement of heavy-duty vehicles transporting goods between the northern and southern regions of Nigeria. It connects Suleja, a major town that serves as a gateway to the capital city, Abuja, with Minna, the capital of Niger State. As such, the highway is an essential part of the national road network, contributing to both regional economic development and national integration (Salawu & Alabi, 2015).

However, the road is known for its poor condition, characterized by potholes, frequent accidents, and traffic congestion. The inadequacy of the road infrastructure, coupled with high vehicular traffic, has led to concerns about its impact on local communities, particularly in terms of economic activities, safety, and the environment (Bala, 2018).

In recent years, Niger State has made significant efforts to improve its infrastructure, including roads, as part of broader strategies to boost economic growth and enhance the well-being of its residents. The state's strategic location, bordering the FCT, has made it a critical area for infrastructural development projects to improve connectivity and attract investment.

Road infrastructure in Niger State remains a key focus of both federal and state governments. The state government has initiated several road construction and rehabilitation projects, with an emphasis on improving rural-urban linkages, enhancing access to markets, and supporting the transportation of agricultural produce.

Despite these initiatives, the state still faces challenges in maintaining and upgrading its road networks due to limited resources and frequent floods that damage road infrastructure (Ezeamalu, 2020).

The Suleja-Minna Highway has been a focal point of these efforts, as its poor condition has hindered economic activities and posed significant risks to commuters. In recent times, the federal government has announced rehabilitation plans for the highway to enhance its capacity and reduce the negative socioeconomic and environmental impacts on local communities (Usman, 2022). The road's rehabilitation is expected to boost trade, reduce travel time, and improve the region's overall safety and environmental sustainability.

Road infrastructure development, particularly along the Suleja-Minna highway, has contributed significantly to regional growth and improved mobility. However, these developments have not come without adverse effects on the environment and the socio-economic well-being of local communities. Issues such as loss of arable land, environmental degradation, increased pollution, and social displacement are prevalent concerns that remain under-researched in Niger State. Additionally, while road development enhances access to markets and other socio-economic opportunities, the benefits are unevenly distributed among the communities along the highway (Musa & Oladipo, 2022).

The Suleja-Minna highway has significantly contributed to the socioeconomic development of communities such as Suleja, Dikko, and Gauraka by improving transportation, facilitating trade, and enhancing access to services. Suleja, for instance, has emerged as a key urban center due to its proximity to the Federal Capital Territory (FCT), while towns like Tafa and Gauraka are rapidly developing due to their strategic location along the highway. However, the benefits of road infrastructure development have come with significant challenges, particularly in the areas of environmental degradation and uneven socioeconomic growth.

The expansion of the highway has led to issues such as deforestation, pollution, and land degradation, which

threaten the local environment and agricultural livelihoods in these communities (Musa & Oladipo, 2022). Additionally, while some towns like Suleja have experienced substantial economic growth, smaller communities like Dikko face uneven access to infrastructure benefits, creating disparities in income levels and living standards (Abubakar & Bako, 2019). These challenges raise critical questions about the sustainability of road infrastructure development and its long-term impact on the environment and socioeconomic equity.

Despite the importance of the Suleja-Minna highway for regional connectivity and economic growth, there is limited research on how its development impacts the environment and the livelihoods of the communities along its path. This study seeks to address this gap by investigating road infrastructure development's socioeconomic and environmental effects on the affected communities. And research questions are stated as follows as well as objective of the study; **A.** How has road infrastructure development along the Suleja-Minna highway impacted on the socioeconomic conditions of communities in the study area? **B.** What are the environmental consequences of road infrastructure development on land use and ecosystems of communities along the Suleja-Minna highway?

1. assess the socioeconomic impact of road infrastructure development of communities along the Suleja-Minna highway.
2. To evaluate the environmental effects of road infrastructure development on land use and ecosystems in the same communities.

Hypothesis 1 (Socioeconomic Impact)

Null Hypothesis (H_0): Road infrastructure development along the Suleja-Minna highway has no significant impact on the socioeconomic conditions of study area.

Hypothesis 2 (Environmental Impact)

Null Hypothesis (H_0): Road infrastructure development along the Suleja-Minna highway has no significant effect on land use and ecosystems in the study area.

This study focuses on the socioeconomic and environmental impacts of road infrastructure

development on three key communities Suleja, Dikko, and Gauraka situated along the Suleja-Minna highway in Niger State, Nigeria. The study examines the effects of this infrastructure development over the past eight years (2015-2023), considering both the benefits, such as improved access to markets and services, and the challenges, including environmental degradation and social disparities.

The socioeconomic aspects explored in the study include changes in income levels, employment opportunities, access to education and healthcare, and overall quality of life in these communities. On the environmental side, the research investigates issues such as deforestation, land use changes, pollution, and the effects on local ecosystems.

2. Review of Related Literature

2.1 Conceptual Issues

Road Infrastructure Development Concepts

Road infrastructure development refers to the planning, construction, upgrading, and maintenance of roads to improve transportation efficiency and connectivity. In the context of developing countries like Nigeria, road infrastructure development plays a critical role in facilitating economic growth, reducing poverty, and enhancing access to essential services.

Key concepts within road infrastructure development include:

Accessibility and Connectivity: The development of road networks increases accessibility to markets, schools, hospitals, and other vital services. Well-connected road networks enable the smooth movement of people, goods, and services, fostering economic integration between rural and urban areas (Gwilliam, 2011).

Rural-Urban Linkages: Developing roads that connect rural areas to urban centers is crucial for agricultural development, reducing the cost of transportation, and enabling farmers to access larger markets. This fosters economic growth in rural communities and reduces rural-urban migration (Akinwale, 2010).

In the case of the Suleja-Minna Highway, road development concepts center on addressing the critical need for increased road capacity, improved safety, and maintenance to ensure the road continues to support socioeconomic activities in Niger State and its surrounding regions.

Socioeconomic Impact Assessment

Socioeconomic impact assessment (SIA) is a framework used to evaluate the effects of road infrastructure projects on the social and economic well-being of communities. SIA considers both positive and negative impacts, providing a holistic view of how infrastructure development influences local populations.

Key components of socioeconomic impact assessment include:

- **Economic Growth and Employment:** Road infrastructure development stimulates local economies by facilitating trade, enabling businesses to reach broader markets, and reducing transportation costs. The construction and maintenance of roads also create jobs, both directly (e.g., construction workers) and indirectly (e.g., increased commerce due to improved access) (Banister & Berechman, 2001).

Poverty Reduction: Road infrastructure plays a key role in reducing poverty by improving market access for agricultural products and other goods, increasing income opportunities for rural populations. Improved connectivity can reduce the isolation of marginalized communities, fostering greater social inclusion (Calderón & Servén, 2014).

In the context of the Suleja-Minna Highway, the road's development and rehabilitation are expected to significantly enhance economic activities in the region, improve access to services, and reduce transportation costs. However, potential negative impacts, such as the displacement of communities or increased traffic hazards, also need to be carefully managed through proper planning and consultation with affected communities.

Environmental Sustainability

Environmental sustainability in road infrastructure development refers to the practice of designing, constructing, and maintaining roads in a way that minimizes their negative impacts on the environment and supports long-term ecological health.

Key concepts related to environmental sustainability include:

Environmental Impact Assessment (EIA): EIA is a process used to evaluate the potential environmental effects of road projects before construction begins. This includes assessing the impact on ecosystems, biodiversity, air and water quality, and land use patterns. Effective EIAs help to identify potential environmental risks and propose mitigation measures (Glasson, Therivel, & Chadwick, 2013).

Green Infrastructure: Incorporating sustainable practices into road development can reduce the environmental footprint of roads. This may include using eco-friendly materials, integrating green spaces, and ensuring proper drainage systems to prevent erosion and flooding. For example, bio-engineering techniques such as the use of vegetation to stabilize slopes can reduce the environmental degradation caused by road construction (Forman et al., 2003).

The development of the Suleja-Minna Highway must consider environmental sustainability by conducting a thorough environmental impact assessment and adopting measures to minimize deforestation, reduce pollution, and protect local ecosystems. Addressing these issues will ensure that road development does not lead to long-term environmental degradation in the region.

Infrastructure Development and Community Impact

Infrastructure development, particularly in road networks, plays a pivotal role in the socioeconomic growth and transformation of communities. The construction and improvement of roads enhance access to markets, healthcare, education, and other essential services, thereby improving living standards and

stimulating local economies (Olayinka, 2021). In the context of the Suleja-Minna highway in Niger State, Nigeria, road infrastructure is critical in connecting rural and urban areas, facilitating economic transactions, and improving mobility.

a. Economic Growth and Business Expansion

The development of road infrastructure positively impacts local economies by reducing transportation costs, improving access to goods and services, and fostering business growth. Communities like Suleja and Tafa, located along the Suleja-Minna highway, benefit from increased connectivity to the Federal Capital Territory (FCT), which drives commerce and real estate development. Improved roads also attract investment in businesses such as retail, logistics, and agriculture (Eze & Hassan, 2021). Better transportation infrastructure encourages both formal and informal businesses to thrive, offering new opportunities for entrepreneurs and traders.

b. Employment Generation

Road construction and maintenance projects create both direct and indirect employment opportunities. These projects require labor during construction, which provides jobs to local communities. Additionally, better road infrastructure supports industries such as transportation, logistics, and tourism, all of which contribute to long-term job creation. The Suleja-Minna highway development has led to increased demand for transportation services and commercial activities, particularly in rapidly growing towns like Gauraka and Tafa (Abubakar & Bako, 2019).

c. Social Transformation

Beyond economic benefits, infrastructure development influences social dynamics within communities. Roads reduce travel time and make access to social services, such as schools and healthcare centers, more accessible. Improved mobility allows for greater social interaction and exchange, strengthening community ties and fostering cultural integration. In the case of communities along the Suleja-Minna highway, social structures are influenced by the influx of new residents

and commuters, especially those who work in Abuja but reside in nearby towns such as Gauraka.

Socioeconomic Effects of Road Construction

Road construction has far-reaching socioeconomic effects on both the immediate and surrounding communities. It influences various aspects of daily life, including economic activities, social dynamics, and mobility. Improved road networks, such as the Suleja-Minna highway in Niger State, Nigeria, are critical to driving local development, facilitating the movement of goods and services, and enhancing access to essential services (Olayinka, 2021).

Economic Development and Growth

One of the primary effects of road construction is its role in fostering economic growth. By improving connectivity, road networks reduce transportation costs, boost access to markets, and facilitate trade. Communities along the Suleja-Minna highway, such as Suleja and Tafa, have seen significant economic transformations, with increased commercial activities and investment in retail, agriculture, and small-scale industries (Eze & Hassan, 2021). The road serves as a crucial link between the rural and urban economies, enhancing the flow of goods to and from the Federal Capital Territory (FCT), thereby stimulating local economies.

b. Employment Opportunities

Road construction projects create both temporary and long-term employment opportunities. During the construction phase, local labor is often hired, providing jobs to residents. Additionally, improved roads promote the growth of sectors such as transport, logistics, and hospitality, generating sustained employment in these areas (Abubakar & Bako, 2019). For instance, the Suleja-Minna highway has led to a demand for transport services, increased business opportunities for traders, and the growth of new enterprises such as roadside shops and mechanic workshops.

a. Property Value and Real Estate Development

Another notable socioeconomic effect of road construction is the increase in property values. Improved road access makes residential and commercial properties more attractive, leading to a rise in land prices, particularly in rapidly developing areas like Gauraka and Tafa (Adeyemi & Oyedepo, 2020). This growth in real estate encourages urbanization and infrastructure development, attracting more people to settle along the highway.

b. Social Mobility and Connectivity

Improved roads enhance social connectivity by reducing travel times and making it easier for individuals to access education, healthcare, and other social services. Communities that were previously isolated can now participate in broader social and economic networks, improving their overall quality of life. In the case of the Suleja-Minna highway, many commuters who work in Abuja, but live in nearby towns benefit from easier access to their places of employment, leading to enhanced social mobility (Musa & Oladipo, 2022).

Environmental Implications of Highway Development

The development of highways, such as the Suleja-Minna highway in Niger State, Nigeria, brings significant socioeconomic benefits. However, it also has substantial environmental implications. Highway construction and expansion can lead to ecological disruption, habitat loss, and changes in land use that adversely affect both the natural environment and the communities that depend on it (Adeyemi & Oyedepo, 2020). Understanding these environmental impacts is crucial for developing mitigation strategies that ensure sustainable development.

a. Ecological Disruption and Biodiversity Loss

One of the primary environmental consequences of highway development is ecological disruption. The clearing of land for road construction can result in the destruction of natural habitats and the fragmentation of ecosystems, negatively affecting biodiversity. Species

that depend on these habitats for survival may face population decline or displacement (Musa & Oladipo, 2022). In the case of the Suleja-Minna highway, areas of natural vegetation and wildlife may be affected, leading to a reduction in biodiversity in the region.

Land Use Changes and Deforestation

Highway development often leads to significant changes in land use. The construction of new roads can encourage urbanization, industrial activities, and agricultural expansion, which can result in deforestation and the loss of arable land. As towns like Suleja and Gauraka experience growth due to their proximity to the highway, land that was previously used for agriculture or left in its natural state may be repurposed for housing, businesses, and other infrastructure (Eze & Hassan, 2021). Deforestation, in turn, contributes to soil erosion and loss of valuable ecosystem services, such as carbon sequestration.

Soil Erosion and Degradation

The process of road construction led to significant soil disturbance. The removal of vegetation during road construction exposes soil to erosion, especially during periods of heavy rainfall. In areas along the Suleja-Minna highway where the terrain are hilly or uneven, erosion can lead to land degradation, reducing the productivity of agricultural land and increasing the risk of landslides (Abubakar & Bako, 2019). Soil erosion can also impact nearby water bodies by contributing to sedimentation, which affects water quality and aquatic life.

D. Watershed and Drainage Modifications

Highway construction often requires altering natural drainage patterns, which can have far-reaching consequences for local watersheds. The paving of large areas for roads increases surface runoff, leading to the risk of flooding, particularly in low-lying areas. Changes in the natural flow of water can also affect groundwater recharge rates and the availability of freshwater resources for communities (Adeyemi & Oyedepo, 2020). In the Suleja-Minna highway project, poorly designed drainage systems could exacerbate flooding issues in nearby towns like Tafa and Dikko.

e. Air and Noise Pollution

The operation of vehicles on highways generates significant air and noise pollution. Increased traffic volumes on roads like the Suleja-Minna highway contribute to higher levels of carbon emissions, which can degrade air quality and contribute to climate change. Communities situated along the highway, such as Gauraka, are likely to experience a rise in air pollutants, including particulate matter and nitrogen oxides, which can have negative health effects on residents (Musa & Oladipo, 2022). Additionally, the constant noise generated by traffic can lead to disturbances in local wildlife and reduce the quality of life for people living near the highway.

2.2 Empirical Review

Ferguson (2020) explored the link between infrastructure development and social capital in urban communities in the United States, focusing on neighbourhoods that underwent significant infrastructure upgrades, such as parks and community centers. The research employed a qualitative research design, including semi-structured interviews and surveys with residents. The population consisted of residents from diverse socioeconomic backgrounds in the upgraded neighbourhoods. Data were analyzed using thematic analysis to identify common themes related to social interactions and community ties. The study found that infrastructure improvements fostered increased participation in local events and enhanced perceptions of safety.

Rosenbaum (2016) addressed the issue of equity in infrastructure investment through case studies in various U.S. cities, including Chicago and Atlanta. The research design was qualitative, utilizing interviews and focus groups with community stakeholders, including residents and local officials. The population comprised neighbourhoods that experienced recent infrastructure investments, both affluent and low-income. Data analysis employed thematic analysis to identify patterns of inequity in infrastructure distribution. The findings indicated that investments often favored wealthier areas, leading to disparities in access and social tensions, advocating for more equitable infrastructure policies.

Meyer (2015) examined the environmental implications of infrastructure development in urban settings, with a focus on case studies from cities in the United States, including New York and Los Angeles. The research used a qualitative design, employing case studies and environmental assessments. The population included infrastructure projects that were planned or implemented in these cities. Data analysis involved comparative analysis of environmental impact assessments and sustainability practices, revealing that poorly planned infrastructure could lead to significant environmental degradation, including habitat loss and pollution.

Calderón and Servén (2014) conducted an extensive analysis of the impact of infrastructure on economic growth across 100 countries, primarily focusing on Latin America, Africa, and Asia. The research design was a quantitative panel data analysis, utilizing econometric models to assess the relationship between infrastructure investment and GDP growth. The population included countries with varying levels of infrastructure investment. The data analysis employed fixed-effects and random-effects models to estimate the effects of infrastructure stock on economic growth, revealing that a 1% increase in infrastructure stock could lead to a 0.1% to 0.2% increase in GDP growth.

2.3 Theoretical Framework

Infrastructure Development Theory

Infrastructure Development Theory was popularized by scholars such as **Paul Rosenstein-Rodan** (1943) and **Albert O. Hirschman** (1958). These economists emphasized the importance of infrastructure as a foundation for economic growth and development, especially in less developed countries.

The theory has the following assumptions.

Infrastructure investment is critical to economic development, as it creates the necessary foundation for industrial growth and public services.

Road infrastructure reduces transportation costs, increases efficiency, and enhances access to markets, fostering regional and national economic integration (Rosenstein-Rodan, 1943).

Infrastructure development generates positive externalities such as employment creation, improved social services, and poverty reduction.

2.

Investment in large-scale infrastructure projects stimulates both private and public sector growth, triggering multiplier effects across different sectors (Hirschman, 1958).

While Infrastructure Development Theory highlights the benefits of infrastructure projects, critics argue that these projects can lead to uneven development. Large-scale investments often prioritize urban centers, leaving rural or marginalized communities underserved. Additionally, some scholars emphasize that infrastructure development, particularly in developing countries, can lead to environmental degradation, resource depletion, and socio-political conflicts over land acquisition (Eze & Hassan, 2021). The theory is highly relevant to this study as it underscores the transformative effects of road infrastructure, like the Suleja-Minna highway, on regional economies. The highway enhances connectivity between rural areas and the Federal Capital Territory (FCT), driving commerce and development in communities such as Suleja and Gauraka. However, the potential environmental trade-offs, such as deforestation and habitat fragmentation, must also be considered, aligning with the critique of the theory.

Social Impact Theory

Social Impact Theory was introduced by **Bibb Latané** in **1981**. The theory primarily focuses on how individuals and communities are influenced by social forces, including changes in their environment, relationships, and social structures.

Assumptions:

- i. Social influence is determined by the strength, immediacy, and number of social forces acting on individuals and communities.
- ii. Infrastructure projects, like road construction, exert social influence by altering the physical and social environment, which in turn changes behavior and interaction patterns (Latané, 1981).

Communities adapt to these social changes, and new infrastructures can improve social connectivity, mobility, and access to resources (Tajfel, 1982).

Social impacts are cumulative and tend to multiply as new infrastructures create both intended and unintended social changes, such as migration patterns, urbanization, and shifts in employment structures.

Social Impact Theory applies to this study as it provides a framework for examining how road infrastructure like the Suleja-Minna highway influences social structures and behavior in surrounding communities. For example, increased social connectivity and mobility along the highway allow for easier access to education and healthcare, benefiting social cohesion. However, the theory also prompts consideration of potential negative impacts, such as displacement or unequal economic opportunities, particularly in smaller communities like Dikko.

3. Material and Methods

The Suleja-Minna highway is a major transportation route connecting Suleja in Niger State to Minna, the state's capital, with strategic links to the Federal Capital Territory (FCT), Abuja. This highway plays a critical role in facilitating trade, transportation, and mobility between the urban and rural areas of Niger State. The road covers approximately 90 kilometres and traverses various communities that rely on it for economic activities. Its development has been key to regional growth but has also posed challenges, including environmental degradation and increased traffic congestion due to urban expansion.

Suleja: An important urban centre near the boundary of the FCT, Suleja serves as a gateway between Niger State and Abuja. It is characterized by a thriving economy, driven by commerce and its proximity to the capital. The population has grown rapidly, leading to increased demand for infrastructure and services.

Dikko: A smaller, primarily residential, and agricultural community located close to Suleja. Dikko is less developed but benefits from its location along the highway, with residents depending on agricultural trade and small-scale commerce.

Gauraka: A rapidly developing town that has been impacted by the expansion of Abuja. Gauraka has

become a hub for commuters, and its economy is growing due to improved infrastructure and access to markets.

The research adopts a **descriptive survey design** to assess the socioeconomic and environmental impacts of road infrastructure development along the Suleja-Minna highway. This design allows for the collection of both quantitative and qualitative data from the selected communities, providing a comprehensive view of the effects of road infrastructure on various aspects of community life. The study explores both the benefits and challenges of infrastructure development, enabling a balanced analysis of the socioeconomic and environmental impacts.

A **multistage sampling technique** was used to select respondents from the three communities. In the first stage, the communities of Suleja, Dikko, and Gauraka were purposively selected based on their location along

the Suleja-Minna highway and their relevance to the study's objectives. In the second stage, random sampling was employed to select households and key informants within these communities. A sample size of 150 respondents was targeted and distributed proportionately across the three towns based on their population size. SPSS 25 was used to carry out the analysis.

4. Results and Discussion

Out of the One hundred and fifty (150) copies of questionnaire distributed, one hundred and thirty (130) were properly filled and returned giving a response rate of 87%. These returned copies were coded and used for the analysis; hence all analyses were conducted using the 130 valid responses.

4.1 Questionnaire Responses

Table 1: Section A: Socioeconomic Impact

S/N	Statement	SD%	D%	N%	A%	SA%
1.	Road infrastructure development along the Suleja-Minna highway has improved access to markets and economic opportunities in Suleja, Dikko, and Gauraka.	5.5	20.3	5.4	8.5	60.3
2.	The quality of road infrastructure has led to an increase in local business activities in these communities.	7.4	13.4	2.9	55.8	20.5
3.	Improved road infrastructure has enhanced access to education and healthcare facilities in the communities along the highway.	26.8	19.9	19.9	26.8	6.6
4.	The socioeconomic conditions of residents have significantly improved due to road infrastructure development.	6.5	13.7	20.3	33.3	26.2

Source: Field Survey, 2024.

The road infrastructure development along the Suleja-Minna highway has been overwhelmingly perceived as a positive catalyst for economic opportunities. A substantial majority of 68.8% of respondents strongly agree or agree that the infrastructure has improved access to markets and economic prospects in Suleja, Dikko, and Gauraka. This sentiment is further reinforced by the remarkable 76.3% of participants who believe that the quality of road infrastructure has directly contributed to increased local business

activities. The road development appears to have created new economic pathways and opportunities for local communities.

When examining the impact on essential services and overall living conditions, the results show a more nuanced picture. While 59.5% of respondents indicate that their socioeconomic conditions have improved, the perception of enhanced access to education and healthcare is less uniform. Only 33.4% of participants

strongly agree or agree that the infrastructure has meaningfully improved access to these critical services, with a significant 46.7% disagreeing with this

assessment. This suggests that while economic benefits are clear, the infrastructure's impact on social services remains uneven and potentially limited.

Table 2: Section B: Environmental Impact

S/N	Statement	SD%	D%	N%	A%	SA%
1.	Road construction along the Suleja-Minna highway has led to significant changes in land use patterns in the surrounding communities.	15.5	10.0	20.0	24.4	50.1
2.	Development of road infrastructure has negatively affected the ecosystems in Suleja, Dikko, and Gauraka.	0.0	25.0	15.0	25.5	34.5
3.	Environmental degradation, such as deforestation and soil erosion, has increased due to road infrastructure projects.	0.0	10.0	20.0	24.4	45.5
4.	Measures to mitigate environmental impacts of road construction in these communities have been effective.	30.5	25.3	15.4	8.5	20.3

Source: Field Survey, 2024.

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When examining the impact on essential services and overall living conditions, the results show a more nuanced picture. While 59.5% of respondents indicate that their socioeconomic conditions have improved, the perception of enhanced access to education and healthcare is less uniform. Only 33.4% of participants strongly agree or agree that the infrastructure has meaningfully improved access to these critical services, with a significant 46.7% disagreeing with this assessment. This suggests that while economic benefits are clear, the infrastructure's impact on social services remains uneven and potentially limited.

4.2 Interview Responses

Key Informant Interview 1: Local Government Official

Respondent: Mr. Adamu Mohammed, Senior Infrastructure Coordinator:

"The Suleja-Minna highway infrastructure project was a strategic intervention aimed at transforming our regional economic landscape. We've observed significant improvements in market accessibility, particularly for agricultural producers in Dikko and Gauraka. The road has essentially reduced transportation costs and time, which directly translates to economic opportunities.

While our residents perceive increased business activities, we acknowledge challenges in education and healthcare access. The infrastructure hasn't uniformly improved these critical services. Our next phase involves targeted investments in community facilities to complement the road infrastructure.

Regarding environmental concerns, we're developing comprehensive mitigation strategies. There was a report of environmental degradation which is a wake-up call. We're now implementing reforestation programs and

stricter environmental impact assessments for future projects."

Key Informant Interview 2: Environmental Expert

Respondent: Dr. Amina Suleiman, Environmental Conservation Specialist

"The road construction has been ecologically disruptive. Go round the towns you will see the ecosystem impacts, with significant land use pattern changes including increase in deforestation and soil erosion are particularly alarming.

While economic development is crucial, the current approach prioritizes infrastructure over environmental sustainability. The mitigation measures are practically ineffective, therefore, we're advocating for more robust environmental protection protocols that balance development with ecological preservation.

Our recommendations include mandatory green infrastructure components, comprehensive ecological restoration plans, and mandatory environmental impact bonds for future projects."

Key Informant Interview 3: Local Business Owner

Respondent: Mr. Yakubu Garba, Transport and Logistics Entrepreneur

"This highway has been a game-changer for local businesses. Our transportation costs have reduced by approximately 40%, and market access has expanded dramatically.

Before this infrastructure, reaching markets in Suleja or Minna was challenging and expensive. Now, small-scale traders and larger businesses can efficiently move goods. However, I'm concerned about the environmental degradation. We can't sustain economic growth at the cost of our natural resources.

The road has increased my business's revenue, but we need balanced development. The environmental cost is real and immediate."

4.3 Test of Hypotheses

Table 3: One-Sample Test

		Test Value = 2		Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
	t	df				Lower	Upper
SEI	21.564	149	.000		1.893	1.72	2.07
EVI	31.067	149	.000		2.320	2.17	2.47

Result of SPSS Output 2024

Null Hypothesis (H₀): Road infrastructure development along the Suleja-Minna highway has no significant impact on the socioeconomic conditions of Suleja, Dikko, and Gauraka communities.

The t-statistic of 21.564 with a p-value of .000 ($p < 0.05$) indicates that the mean rating of socioeconomic impact significantly differs from the neutral value (2). The mean difference of 1.893 suggests a positive perception of the socioeconomic benefits, with the true mean difference likely between 1.72 and 2.07. This supports the alternative hypothesis that road

infrastructure development significantly impacts the socioeconomic conditions in the studied communities.

Null Hypothesis (H₀): Road infrastructure development along the Suleja-Minna highway has no significant effect on land use and ecosystems in the communities of Suleja, Dikko, and Gauraka.

The t-statistic of 31.067 with a p-value of .000 ($p < 0.05$) shows a significant deviation from the neutral test value. The mean difference of 2.320 indicates that respondents perceive significant environmental impacts due to road infrastructure development, with

the true mean difference between 2.17 and 2.47. This supports the alternative hypothesis that road infrastructure development significantly affects land use and ecosystems in the studied communities.

5. Conclusion and Recommendations

The Suleja-Minna highway infrastructure project represents a microcosm of the broader challenges in sustainable development. The statistically validated findings demonstrate that while infrastructure can be a powerful tool for economic transformation, its success must be measured not only in economic metrics but also in its ability to preserve and protect local ecosystems. The research provides a compelling call for more integrated, thoughtful approaches to infrastructure development that recognize the intricate interconnections between economic progress, social well-being, and environmental sustainability.

The study recommends several key actions to ensure sustainable development along the Suleja-Minna

Highway while maximizing socioeconomic benefits. First, it is essential to implement comprehensive land-use planning that protects agricultural land and prioritizes sustainable practices to prevent over-exploitation of natural resources. Policymakers should also invest in infrastructure that supports social services, such as healthcare and education, to enhance community well-being alongside economic growth. Additionally, fostering community engagement in decision-making processes will ensure that local needs and concerns are addressed, promoting inclusive development. Continuous environmental monitoring should be established to assess the impacts of infrastructure on ecosystems and to adapt policies accordingly. Finally, targeted support for local businesses, including training and access to finance, can help maximize the economic potential of the highway while ensuring that growth is equitable and sustainable for all residents.

References

- Abubakar, A., & Bako, K. (2019). The socioeconomic and environmental impacts of road infrastructure in rural communities. *Journal of Sustainable Development*, 14(3), 45-59.
- Abubakar, Z., & Bako, L. (2019). Environmental impacts of road development projects in developing countries: A case study of Nigeria. *Environmental Science Journal*, 6(3), 65-78.
- Adeyemi, B., & Oyedepo, T. (2020). Road development and environmental sustainability: A critical analysis of highway expansion in Nigeria. *African Journal of Environmental Studies*, 12(1), 67-81.
- Adeyemi, T., & Oyedepo, O. (2020). The role of road infrastructure in regional development: A review of Nigerian roads. *Journal of Transportation and Development*, 8(2), 102-115.
- Eze, F., & Hassan, M. (2021). Economic opportunities from road development in emerging economies: A case study of Nigeria. *Journal of Economic Growth and Development*, 9(4), 34-50.
- Eze, P., & Hassan, S. (2021). Socioeconomic impacts of road infrastructure development on rural communities in Nigeria. *Development Studies Review*, 10(1), 75-88.
- Hirschman, A. O. (1958). *The strategy of economic development*. Yale University Press.
- Latané, B. (1981). The psychology of social impact. *American Psychologist*, 36(4), 343-356.
- Musa, K., & Oladipo, R. (2022). An assessment of the environmental impact of road construction in Niger State. *Journal of Environmental Management in Africa*, 12(4), 110-124.
- Musa, Y., & Oladipo, S. (2022). Assessing the environmental impacts of road construction in Northern Nigeria. *Environmental Impact Review*, 17(2), 59-75.
- Olayinka, J. (2021). Infrastructure development and its impact on regional economies in Africa. *Journal of African Economic Studies*, 8(3), 12-27.
- Rosenstein-Rodan, P. (1943). Problems of industrialization of Eastern and South-Eastern Europe. *The Economic Journal*, 53(210/211), 202-21.