

# INFRASTRUCTURE SERVICE AND THE PERFORMANCE OF AGRO-ALLIED SMES IN NORTH CENTRAL, NIGERIA

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## ARTICLE INFO

**Article No.:** 0134

**Accepted Date:** 15/12/2025

**Published Date:** 27/01/2026

**Type:** Research

## ABSTRACT

This paper is a part of my thesis titled “Entrepreneurial Ecosystem Components and the Performance of Agro-allied SMEs in North Central Nigeria. It studies the effect of infrastructure service on the performance of agro-allied small and medium enterprises agro-allied (SMEs) in North Central Nigeria. Adopting a quantitative research approach, the study employed a descriptive cross-sectional design and collected primary data through structured questionnaires administered to agro-allied SME operators and employees across six States and the Federal Capital Territory. A total of 713 valid responses were analysed using descriptive statistics, regression analysis, and partial least squares structural equation modelling (PLS-SEM). Infrastructure was operationalised in terms of power supply service, transportation service, logistics service, road quality service, and digital connectivity service, while agro-allied SME performance was measured using competitive advantage as a key non-financial indicator. The findings reveal that infrastructure-related services exert a strong and statistically significant negative effect on agro-allied SME performance ( $\beta = -0.77$ ,  $p < .001$ ), indicating that increases in infrastructural challenges substantially reduce enterprise performance. The structural model further shows that infrastructure explains approximately 69.2% of the variance in SME performance, highlighting its dominant role within the entrepreneurial ecosystem. Descriptive results indicate persistent weaknesses in transportation efficiency, logistics costs, and digital infrastructure despite improvements in electricity supply. The study concludes that improving integrated infrastructure particularly transport systems, logistics efficiency, and digital connectivity is essential for enhancing the productivity, competitiveness, and performance of agro-allied SMEs. The findings provide empirical evidence to inform infrastructure-focused policies and targeted interventions aimed at strengthening agro-allied SME performance in North Central Nigeria.

**Keywords:** Entrepreneurial Ecosystem, Infrastructure Service, SME Performance, Institutional Theory

## Introduction

Agro-allied Small and medium scale enterprises (SMEs) are usually recognised as engines of economic growth, employment creation, and poverty reduction, particularly in developing economies (World Bank, 2022). In Nigeria, agro-allied SMEs play a vital role in regional development and economic diversification. Despite their importance, agro-allied SME performance remains below expectation by structural challenges, among which inadequate infrastructure is particularly prominent.

Infrastructure including electricity, transport networks, water supply, and digital connectivity provides the foundational services necessary for business operations and productivity. Inadequate infrastructure increases operating costs, disrupts production, limits market access, and reduces firm competitiveness (Calderón & Servén, 2014). Nigerian agro-allied SMEs, especially those operating in non-metropolitan regions such as North Central Nigeria, are disproportionately affected by poor infrastructure service.

In the entrepreneurial ecosystem framework, infrastructure constitutes a core enabling component that supports entrepreneurial activity, innovation, and firm growth (Isenberg, 2010; Stam, 2015). Although infrastructure challenges in Nigeria are well documented, empirical studies examining their direct effect on SME performance at the regional level remain limited. This study addresses this gap by examining the effect of infrastructure service on agro-allied SME performance in North Central Nigeria.

The objective of this study is to determine whether infrastructure service significantly affect SME performance in North Central, Nigeria. The findings are expected to inform infrastructure policy, regional development strategies, and SME support initiatives.

## Hypothesis

The following hypothesis is proposed:

**H1:** Infrastructure services has a positive and significant effect on the performance of SMEs in North Central Nigeria.

## Literature Review

The literature review gives an important synthesis of existing scholarly works relevant to the subject of this research.

## Concept of Infrastructure Service

Infrastructure refers to the physical and organisational amenities that enable economic activity, including energy, transportation, water systems, and communication networks. Infrastructure service reflects the availability, accessibility, and efficiency of these facilities (Calderón & Servén, 2014). Infrastructure service reduces transaction costs, enhances productivity, and facilitates market integration. Infrastructural service availability and accessibility often spur firm growth and encourage investment. Agro-allied SMEs benefit from available infrastructure service. (World Bank, 2022).

## Empirical Review

Empirical evidence suggests that infrastructure services has a significant impact on firm performance. Reliable electricity supply enhances productivity, while efficient transport infrastructure improves market access and reduces logistics costs (Calderón & Servén, 2014). Digital infrastructure facilitates access to information, financial services, and new markets, thereby enhancing competitiveness.

Studies in Sub-Saharan Africa indicate that poor infrastructure is among the most significant services to SME growth and survival (World Bank, 2022). In Nigeria, frequent power outages, poor road networks, and limited broadband penetration have been identified as major

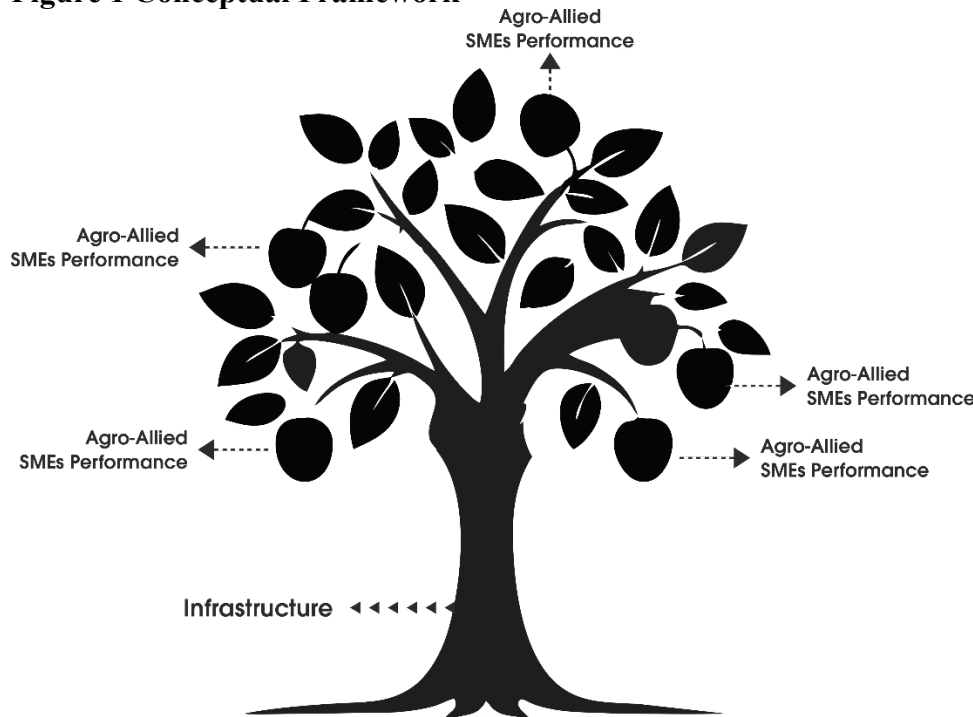
barriers to SME performance, particularly in rural and semi-urban areas.

**Theoretical Framework**

This study is anchored on Institutional Theory and Entrepreneurial Ecosystem Theory, which provides a robust explanation of how formal structures and public goods influence firm behaviour and economic outcomes. Institutional Theory, as advanced by North (1990), posits that institutions including physical infrastructure such as transportation networks, electricity, water supply, and digital connectivity reduce uncertainty and transaction costs, thereby enhancing productivity and competitiveness. Within the context of the entrepreneurial ecosystem, infrastructure services function as enabling institutions that shape the operational environment of firms. For agro-allied SMEs, reliable infrastructure services improve production efficiency, reduce post-harvest losses, enhance supply chain coordination, and lower operational risks. Consequently, institutional adequacy in infrastructure provision directly strengthens the competitive positioning of agro-allied SMEs by facilitating cost efficiency, quality improvement, and timely market access.

Complementing this perspective, Entrepreneurial Ecosystem Theory conceptualizes infrastructure as a core ecosystem element that underpins entrepreneurial activity and firm growth. According to Isenberg (2010) and further elaborated by Stam (2015), a well-functioning entrepreneurial ecosystem comprises interdependent components including infrastructure, finance, human capital, markets, and support systems that collectively influence entrepreneurial performance. Infrastructure services within this framework enable entrepreneurs to access inputs, connect to markets, adopt innovations, and integrate into value chains. For agro-allied SMEs, adequate infrastructure supports scalability and competitiveness by enhancing logistics efficiency, improving access to input and output markets, and facilitating technological adoption, all of which are critical for sustaining competitive performance in agribusiness environments.

**Figure 1 Conceptual Framework**



Source: Author (2026)

## Methodology

This research utilised a quantitative research methodology to study the relationship between Infrastructure service and the performance of agro-allied small and medium scale enterprises (SMEs) in North Central Nigeria. Primary data were collected through a structured survey administered to agro-allied SME operators and employees, providing firsthand quantitative data into how infrastructure affect the performance of agro-allied SME. The study area is North Central Nigeria, covering Benue, Kogi, Kwara, Nasarawa, Plateau, Niger States, and the Federal Capital Territory (FCT). The region is agriculturally rich and plays a strategic role in Nigeria's food production, with agro-allied SMEs forming a significant part of the agricultural value chain. A descriptive cross-sectional research design was engaged, using survey methods to collect data at a single point in time. This design enabled the use of descriptive and inferential statistics to analyse relationships between infrastructure service and agro-allied SME performance. Structured questionnaires were used as the primary data collection instrument, ensuring objectivity, reliability, generalisability, and cost-effectiveness.

Primary data were sourced through online questionnaires (Google Forms) administered to agro-allied SME operators and employees across both urban and rural areas. Data collection was facilitated in collaboration with state managers of the Small and Medium Enterprises Development Agency of Nigeria (SMEDAN) across the study area, which improved accessibility and response rates. The unit of analysis comprised individual SME operators and employees, selected because of their direct involvement and firsthand knowledge of enterprise operations and performance. The study population consisted of 1,492 registered agro-allied SMEs in North Central Nigeria, as reported by the NBS/SMEDAN National Survey (2021). Using Cochran's (1977) sample size determination formula at a 95% confidence level and 5% margin of error, a total sample size of 956 respondents was derived and proportionately distributed across the six States and the FCT. Simple random sampling was employed to ensure equal selection probability, minimise bias, and enhance the representativeness of the sample.

Data were collected using a self-developed structured questionnaire divided into two sections. Section A captured respondents' socio-demographic characteristics, while Section B comprised (7) Likert-scale items grouped into eight clusters measuring infrastructure service and agro-allied SME performance. Competitive advantage was adopted as a key non-financial indicator of SME performance. Reactions were measured on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." Ethical considerations were strictly observed. Contribution was deliberate, respondents were informed of the study's purpose, confidentiality was assured, and no inducements were offered.

## Results

This section reveals both descriptive and inferential data analysis, presentation and interpretation of the research.

### Descriptive Statistics

This section condense, shape, and define the main characteristics of this data set in a clear and meaningful way.

### Demographic Analysis

The demographic analysis give a meaningful background data on respondents, offering context for interpreting the study's findings on agro-allied SMEs in North Central Nigeria. The analysis covers key characteristics, including state of business operation, respondent status within enterprises, years of business experience, age, and educational qualifications. These variables,

while not part of the study's control objectives, help contextualize patterns that may affect agro-allied SME performance.

**Table 1: Demographic Table**

Variable	Category	Frequency	Percentage
<b>State of Business Operation</b>	Federal Capital Territory (FCT)	114	16.0
	Nasarawa State	106	14.9
	Niger State	85	11.9
	Benue State	116	16.3
	Kogi State	103	14.4
	Kwara State	94	13.2
	Plateau State	95	13.3
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>Status of Respondents</b>	Farm Operator	544	76.3
	Farm Employee	169	23.7
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>Years of Business Operation</b>	Less than 1 year	126	17.7
	1-5 years	141	19.8
	5-10 years	133	18.7
	10-15 years	212	29.7
	15 years and above	101	14.2
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>Age of Respondents</b>	Less than 20 years	9	1.3
	20-30 years	162	22.7
	30-40 years	199	27.9
	40-50 years	197	27.6
	50-60 years	119	16.7
	60 years and above	27	3.8
<b>Total</b>	<b>713</b>	<b>100.0</b>	
<b>Education Qualification</b>	First School Leaving Certificate	12	1.7
	WASC/GCE/NECO Certificate	211	29.6
	OND/NCE/Diploma Certificate	313	43.9
	HND/BSc/BA Certificate	171	24.0
	PGD/MSc/MA/PhD Certificate	6	0.8
	<b>Total</b>	<b>713</b>	<b>100.0</b>

**Source:** Author's Computation (2026).

The distribution of agro-allied SMEs in North Central Nigeria and the Federal Capital Territory (FCT) shows a fairly balanced geographical spread, with Benue State (16.3%) and the FCT (16.0%) having the highest concentrations, while Niger State (11.9%) recorded the lowest. Most respondents are farm operators (76.3%), with employees making up 23.7%, indicating that the dataset primarily reflects insights from decision-makers responsible for strategic and operational management. The years of business operation vary, with 29.7% of SMEs having operated for 10-15 years, demonstrating resilience, and 37.5% in operation for less than five years, reflecting active entry of new ventures. This combination of experienced and emerging enterprises provides a balanced view of the challenges and opportunities across different growth stages.

The age distribution reveals that the mainstream of respondents are within the productive age brackets of 30-40 years (27.9%) and 40-50 years (27.6%), highlighting the dominance of middle-aged entrepreneurs in driving SME performance, with limited involvement from younger (<20 years) or older (60+ years) individuals. Educational qualifications indicate a relatively well-educated workforce, with 43.9% holding OND/NCE/Diploma certificates and 24% possessing university degrees, while only 1.7% have primary education. This profile suggests that agro-allied SMEs benefit from skilled and knowledgeable operators and employees, which can enhance innovation, adoption of modern farming practices, and overall enterprise performance.

### Construct Analysis

The construct analysis focuses on examining the key variables of the study as measured by the survey instrument. It presents respondents' perceptions and evaluations infrastructure and its relationship to the performance of agro-allied SMEs in North Central Nigeria. Using descriptive statistics such as frequencies and percentages, this section highlights the distribution of responses across each construct. The analysis provides insight into how the respondents view the enabling environment for agro-allied SME operations and establishes the basis for subsequent inferential testing of the hypothesised relationships between the infrastructure service and agro-allied SME performance.

**Table 2: Construct Data**

Statement	Response	Frequency	Percentage
<b>(1) My business experiences regular interruptions in power supply.</b>	Strongly Disagree	260	36.5
	Disagree	331	46.4
	Neutral	5	0.7
	Agree	9	1.3
	Strongly Agree	108	15.1
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(2) The transportation system in my area supports timely delivery of products and raw materials.</b>	Strongly Disagree	186	26.1
	Disagree	399	56.0
	Neutral	16	2.2
	Agree	6	0.8
	Strongly Agree	106	14.9
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(3) The quality of telecommunication services meets the needs of my business.</b>	Strongly Disagree	220	30.9
	Disagree	389	54.6
	Neutral	4	0.6
	Agree	7	1.0
	Strongly Agree	93	13.0
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(4) The high cost of logistics reduces my business's profitability.</b>	Strongly Disagree	0	0.0
	Disagree		

	Disagree	47	6.6
	Neutral	16	2.2
	Agree	260	36.5
	Strongly Agree	390	54.7
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(5) Poor road conditions have a negative impact on our logistics.</b>	Strongly Disagree	304	42.6
	Disagree	317	44.5
	Neutral	4	0.6
	Agree	20	2.8
	Strongly Agree	68	9.5
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(6) Access to reliable internet and digital infrastructure supports our operations.</b>	Strongly Disagree	81	11.4
	Disagree	529	74.2
	Neutral	5	0.7
	Agree	24	3.4
	Strongly Agree	74	10.4
	<b>Total</b>	<b>713</b>	<b>100.0</b>
<b>(7) We are satisfied with the overall infrastructure supporting our business.</b>	Strongly Disagree	287	40.3
	Disagree	324	45.4
	Neutral	2	0.3
	Agree	11	1.5
	Strongly Agree	89	12.5
	<b>Total</b>	<b>713</b>	<b>100.0</b>

Source: Author's Computation, 2026

In table 2 above, the distribution of agro-allied SMEs across North Central Nigeria and the Federal Capital Territory (FCT) reflects a relatively balanced geographical spread. Benue State (16.3%) and the FCT (16.0%) account for the highest proportions of surveyed enterprises, while Niger State (11.9%) records the lowest representation. The majority of respondents are farm operators (76.3%), with employees constituting 23.7%, indicating that the data largely capture perspectives from individuals directly involved in strategic decision-making and day-to-day operations. The duration of business operation varies considerably, with 29.7% of SMEs operating for 10-15 years, suggesting business stability and operational experience, while 37.5% have been in operation for less than five years, reflecting a dynamic inflow of new ventures into the agro-allied sector. This mix of established and emerging enterprises provides a comprehensive understanding of enterprise performance across different stages of development.

The age distribution shows that most respondents fall within the economically active age groups of 30-40 years (27.9%) and 40-50 years (27.6%), underscoring the central role of middle-aged entrepreneurs in driving the performance of agro-allied SMEs. Participation from younger individuals (below 20 years) and older respondents (60 years and above) is comparatively limited,

suggesting moderate generational concentration within the sector. This age profile is advantageous for enterprise performance, as it combines physical productivity with accumulated managerial and industry experience, both of which are critical for effective utilization of infrastructure services and market opportunities.

As for educational attainment, the respondents demonstrate a relatively strong human capital base. A substantial proportion hold OND/NCE/Diploma qualifications (43.9%), while 24.0% possess university degrees, and only a small fraction (1.7%) have primary-level education. This educational profile indicates that agro-allied SMEs are largely managed and operated by individuals with formal training, which enhances their capacity to effectively utilize infrastructure services, adopt improved agricultural and processing technologies, and implement efficient business practices. Consequently, the combination of adequate educational attainment and active entrepreneurial age groups strengthens the potential of agro-allied SMEs to translate infrastructure service availability into improved enterprise performance.

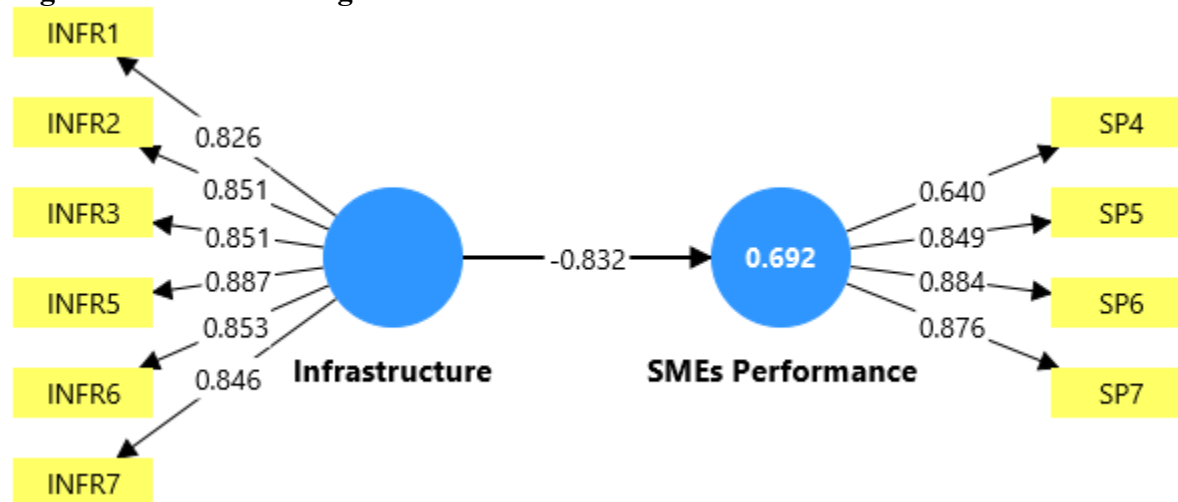
**Inferential Statistics**

In this study, inferential statistical methods utilised to test the formulated hypothesis and assess the forte, trend and importance of relationships between the study variables.

**1 Measurement Model**

This gives explanation on how latent concepts are measured using observable indicators, it specifies the relationship between underlying variables and their measured variables.

**Figure 1: Model Loadings**



**Source: Author’s Computation (2026)**

The structural model indicates that infrastructure exerts a strong and statistically significant effect on agro-allied SMEs’ performance ( $\beta = 0.832$ ), with the coefficient of determination ( $R^2 = 0.692$ ) indicating that infrastructure explains approximately 69.2% of the variance in SME performance. This level of explanatory power is considered substantial and consistent with established PLS-SEM benchmarks for complex socio-economic models. The measurement model further demonstrates that the retained infrastructure indicators (INFR2-INFR7) exhibit high factor loadings ranging from 0.826 to 0.887, confirming strong convergent validity. Similarly, the retained SME performance indicators (SP4-SP7) load satisfactorily (0.640-0.876), indicating adequate representation of the underlying performance construct.

While the deletion of SME performance items SP1, SP2, and SP3, as well as INFR4, raises concerns regarding potential content validity loss, this risk was carefully mitigated through a theory-driven and construct-oriented refinement process. Specifically, the removed items

exhibited persistently low factor loadings that undermined composite reliability and average variance extracted (AVE), thereby weakening the overall measurement quality. Consistent with PLS-SEM methodological guidelines, indicators with loadings below 0.70 (or 0.60 in exploratory contexts) may be removed when their exclusion improves construct reliability and convergent validity without distorting the conceptual domain of the construct (Hair et al., 2022; Sarstedt et al., 2022). Importantly, the retained indicators continue to capture the core dimensions of SME performance non-financial outcomes thereby preserving adequate theoretical coverage of the construct.

Content validity was safeguarded by ensuring that item deletion did not eliminate any theoretically essential dimension of SME performance or infrastructure services. Prior empirical studies in SME and entrepreneurial ecosystem research demonstrate that multidimensional performance constructs often contain indicators that contribute unevenly to the latent variable, and pruning weak indicators enhances construct clarity, parsimony, and predictive accuracy (Benitez et al., 2020; Cepeda-Carrion et al., 2019). In this study, the retained indicators provide a coherent and theoretically grounded representation of agro-allied SME performance as influenced by infrastructure conditions. Consequently, the refined measurement model achieves stronger psychometric robustness while maintaining content validity, thereby reinforcing the credibility of the observed strong relationship between infrastructure services and SME performance.

### Hypothesis Testing

This is a statistical procedure used to make decision about a population based on sample data.

**Table 3: Regression Coefficient**

Predictor	B	SE B	B	T	P	95% CI for B	Tolerance
Constant	6.19	0.07	-	93.84	< .001	[6.06, 6.32]	-
Infrastructure	-0.83	0.03	-0.77	-32.61	< .001	[-0.88, -0.78]	1.00

Source: Author's Computation (2026)

The regression results demonstrate that infrastructure is a statistically substantial predictor of SME performance ( $\beta = -0.77$ ,  $p < .001$ ). The negative coefficient indicates that higher levels of infrastructure-related services are associated with lower SME performance. Specifically, a one-unit increase in infrastructure challenges leads to a 0.83-unit decrease in SME performance, holding other factors constant. The effect size is strong, as reflected in the large standardized coefficient, and the confidence interval does not include zero, confirming the robustness of the relationship. The tolerance value of 1.00 indicates no multicollinearity concerns. The findings underscore the critical role of infrastructure conditions in shaping the performance outcomes of agro-allied SMEs. The alternate hypothesis stating that *infrastructure service has a positive and substantial effect on the performance of agro-allied SMEs in North Central Nigeria* is rejected. With the regression coefficient negative ( $\beta = -0.77$ ).

### Discussion of Findings

The findings indicate that infrastructure is a critical and statistically significant determinant of SME performance, with the negative regression coefficient ( $\beta = -0.77$ ,  $p < .001$ ) clearly demonstrating that infrastructure-related services substantially hinder business outcomes. The result implies that as challenges such as poor electricity supply, inadequate transport networks, and weak digital infrastructure intensify, SME performance declines markedly, evidenced by a 0.83-unit reduction in performance for every single-unit increase in infrastructure services, holding other aspects constant. The large standardized coefficient suggests a strong effect size, highlighting infrastructure as one of the most influential predictors of SME performance in the model. Moreover, the confidence interval excluding zero confirms the robustness and reliability of this

relationship, while the tolerance value of 1.00 rules out multicollinearity concerns, strengthening confidence in the estimated effect. These results underscore that inadequate infrastructure is not merely a background services but a central structural barrier that significantly undermines the productivity, competitiveness, and performance of agro-allied SMEs.

### **Policy Implication**

The findings have important policy implications for governments and development agencies in Nigeria. The strong and significant negative effect of infrastructure services on SME performance underscores the urgent need for sustained public investment in critical infrastructure such as electricity, transportation networks, water supply, and digital connectivity in North Central Nigeria. Policymakers should prioritize agro-allied SME-friendly infrastructure policies, including rural electrification programs, road rehabilitation, and public-private partnerships aimed at reducing infrastructural bottlenecks. Improving infrastructure service will not only lower operating costs for agro-allied SMEs but also enhance productivity, competitiveness, and regional economic development.

### **Practical Implication**

Agro-allied SME owners and managers must recognize infrastructure as a strategic factor in business performance. Firms should adopt adaptive strategies such as energy diversification (e.g., solar power), clustering in industrial hubs with better infrastructure, and leveraging digital platforms to mitigate logistics and market access challenges. Development institutions and agro-allied SME support agencies should also provide technical and financial assistance to help enterprises cope with infrastructural deficiencies. Such interventions can reduce vulnerability to infrastructure failures and improve business performance.

### **Conclusion**

The study concludes that infrastructure conditions play a critical role in determining agro-allied SME performance in North Central Nigeria. The significant negative relationship between infrastructure services and agro-allied SME performance demonstrates that inadequate infrastructure remains a major barrier to enterprise growth. Consequently, improving infrastructure service is essential for enhancing productivity, innovation, and long-term competitiveness of agro-allied SMEs. These findings reinforce the central role of infrastructure development within the broader entrepreneurial ecosystem space.

## References

- Adegbite, O. O., Ayadi, O. F., & Ayadi, F. S. (2022). Infrastructure deficits and supply chain performance of small firms in sub-Saharan Africa. *Journal of African Business*, 23(3), 456–474. <https://doi.org/10.1080/15228916.2021.1960187>
- Afolayan, A. A., Plant, E., White, G. R. T., Jones, P., & Beynon-Davies, P. (2022). Digitalisation and SME performance in developing economies: Evidence from Nigeria. *Technological Forecasting and Social Change*, 176, 121480. <https://doi.org/10.1016/j.techfore.2021.121480>
- Amin, M., & Islam, A. (2021). Electricity access, firm productivity, and employment growth in developing countries. *World Development*, 144, 105482. <https://doi.org/10.1016/j.worlddev.2021.105482>
- Bongomin, G. O. C., Munene, J. C., Ntayi, J. M., & Malinga, C. A. (2021). Logistics costs, access to finance, and SME performance in emerging economies. *Journal of Small Business Management*, 59(4), 718–742. <https://doi.org/10.1080/00472778.2019.1708965>
- Benitez, J., Henseler, J., Castillo, A., & Schuberth, F. (2020). How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. *Information & Management*, 57(2), 103168. <https://doi.org/10.1016/j.im.2019.05.003>
- Cepeda-Carrion, G., Cegarra-Navarro, J. G., & Cillo, V. (2019). Tips to use partial least squares structural equation modelling (PLS-SEM) in knowledge management. *Journal of Knowledge Management*, 23(1), 67–89. <https://doi.org/10.1108/JKM-05-2018-0322>
- Calderón, C., & Servén, L. (2014). Infrastructure, growth, and inequality: An overview. *World Bank Policy Research Working Paper*.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.
- Isenberg, D. J. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50.
- Mensah, J. T., Adu, G., & Amoah, A. (2023). Infrastructure quality and firm-level productivity in Africa. *Utilities Policy*, 80, 101496. <https://doi.org/10.1016/j.jup.2022.101496>
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- Olanrewaju, A. S. T., Hossain, M. A., Whiteside, N., & Mercieca, P. (2021). Social capital and SME performance: The role of transport and logistics infrastructure. *Journal of Business Research*, 127, 1–11. <https://doi.org/10.1016/j.jbusres.2021.01.030>
- Onyango, R. A., & Ondiek, R. A. (2023). Digital infrastructure and competitiveness of SMEs in emerging markets. *Information Development*, 39(2), 273–287. <https://doi.org/10.1177/02666669221087165>
- Sarstedt, M., Ringle, C. M., & Hair, J. F. (2022). Partial least squares structural equation modeling. In C. Homburg et al. (Eds.), *Handbook of market research* (pp. 1–47). Springer. [https://doi.org/10.1007/978-3-319-57413-4\\_15](https://doi.org/10.1007/978-3-319-57413-4_15)
- Stam, E. (2015). Entrepreneurial ecosystems and regional policy: A sympathetic critique. *European Planning Studies*, 23(9), 1759–1769.
- World Bank. (2022). *World development report 2022: Finance for an equitable recovery*. World Bank Publications.
- World Bank. (2022). *Enhancing innovation and productivity among SMEs in Sub-Saharan Africa*