Examining the Relationship Between Academic Infrastructure Adequacy and Institutional Performance in Public Tertiary Institutions in Kebbi State, Nigeria

Muhammad-Jamil Abubakar, Sabiu Yahaya Baffa, Aliyu Galadima Shehu, Uthman Shehu Muhammad

Quantity Surveying, Federal University Birnin Kebbi, Birnin Kebbi, Kebbi, Nigeria

DOI: https://doi.org/10.51244/IJRSI.2025.12120120

Received: 28 December 2025; Accepted: 03 January 2026; Published: 16 January 2026

ABSTRACT

The condition and adequacy of physical infrastructure in Nigeria's tertiary education sector have remained a persistent challenge despite various government and donor interventions. In Kebbi State, where tertiary education is rapidly expanding through the establishment of new institutions, infrastructural inadequacies continue to constrain academic productivity, institutional growth, and the achievement of sustainable development goals. This study assesses infrastructure challenges and developmental needs across six public tertiary institutions in Kebbi State, Nigeria. A quantitative research design was adopted using a structured questionnaire administered to 420 respondents comprising academic staff, non-academic staff, and students. Data was analyzed using descriptive and inferential statistics, including mean ranking, correlation, and multiple regression analysis. Findings revealed significant inadequacies in key infrastructure components such as laboratories (mean = 2.35), student hostels (mean = 2.10), ICT facilities (mean = 2.28), and staff offices (mean = 2.52), while lecture halls (mean = 3.40) and water supply (mean = 3.55) were moderately adequate. Regression analysis indicated a strong positive relationship between infrastructure adequacy and institutional performance ($R^2 = 0.71$, $p < 0.05$), suggesting that improved physical and ICT facilities significantly enhance teaching effectiveness and research output. The study recommends a coordinated infrastructure development strategy emphasizing maintenance culture, ICT integration, and alternative funding mechanisms through public-private partnerships and alumni endowments. The findings provide empirical insights useful for policymakers, TETFund administrators, and institutional planners seeking to bridge Nigeria's tertiary infrastructure gap.

Keywords: Infrastructure challenges, Tertiary education, Developmental needs, Quantitative analysis, Kebbi State, Nigeria.

INTRODUCTION

Background of the Study

Infrastructure is fundamental to educational quality and institutional efficiency in higher education. Adequate physical and technological facilities—lecture halls, laboratories, libraries, hostels, and ICT—enable effective teaching, learning, and research (Adebayo & Oladipo, 2021). In Africa, infrastructural decay in public tertiary institutions undermines the attainment of Sustainable Development Goal 4 (World Bank, 2021). Nigeria's tertiary system has seen exponential enrolment growth without proportional facility expansion, leading to overcrowding and obsolete infrastructure (Adeleke & Akinyemi, 2022). This is acute in developing states like Kebbi, where institutional expansion outpaces resources. Kebbi hosts six public tertiary institutions critical for human capital development in northwestern Nigeria, yet they face challenges of deteriorating infrastructure and poor maintenance (Lawal & Sanni, 2020; Yahaya et al., 2023).

Problem Statement

Despite increased government allocations through TETFund and state interventions, infrastructural deficits remain visible across tertiary institutions in Kebbi State. Laboratories are under-equipped, lecture halls are overcrowded, power supply is inconsistent, and ICT networks are underdeveloped. This inadequacy has direct consequences on student performance, research productivity, and institutional competitiveness (Ajayi &

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

Ekundayo, 2018). Moreover, data-driven assessments of infrastructure adequacy across multiple institutions in Kebbi State remain scarce. The absence of empirical evidence limits policymakers' ability to prioritize developmental needs effectively.

Research Aim and Objectives

The aim of this study is to assess infrastructure challenges and developmental needs in public tertiary institutions in Kebbi State, Nigeria. The specific objectives are to:

1. Identify the major infrastructural challenges confronting public tertiary institutions in Kebbi State.
2. Assess the adequacy and functionality levels of existing physical and technological facilities.
3. Determine priority areas for infrastructure development and maintenance.
4. Analyze the relationship between infrastructure adequacy and institutional performance.

Research Questions

1. What are the key infrastructural challenges faced by public tertiary institutions in Kebbi State?
2. How adequate and functional are existing facilities across the institutions?
3. What is the priority developmental needs required for sustainable institutional performance?
4. Is there a significant relationship between infrastructure adequacy and institutional performance?

Significance of the Study

This study provides empirical evidence to guide government and institutional decision-making regarding infrastructure investments. It contributes to the broader discourse on educational sustainability and aligns with the Nigerian Education Policy and TETFund's strategic objective of strengthening institutional capacity. Additionally, the findings will benefit higher education planners, facility managers, and policymakers by identifying priority development areas and informing them about the allocation of resources.

Scope and Delimitation

The study focuses exclusively on public tertiary institutions in Kebbi State. It assesses both physical infrastructure (buildings, hostels, utilities) and technological facilities (ICT, laboratories). The analysis is quantitative, based on responses from staff and students.

LITERATURE REVIEW

Concept of Educational Infrastructure

Educational infrastructure comprises physical, technological, and environmental resources supporting teaching, learning, and research (Adetunji & Olalekan, 2020). Its adequacy determines academic quality and institutional sustainability (Olayemi et al., 2019). In Nigeria, inadequacy stems from budgetary constraints and weak planning (Ugwoke et al., 2021).

Typology of Tertiary Education Infrastructure

Infrastructure is classified as: Academic (lecture halls, labs, libraries); Residential (hostels, staff quarters); Support (power, water, transport); and ICT (e-learning, digital libraries). Each category uniquely impacts functionality (Ojo & Eze, 2020).

Infrastructure Challenges in Nigerian Tertiary Institutions

Studies show widespread issues: aging facilities, inadequate funding, poor maintenance culture, over-enrolment,

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

and limited ICT (Akinwale et al., 2020; Okebukola, 2021). Kebbi's newer institutions face dual challenges of building and maintaining infrastructure.

THEORETICAL FRAMEWORK

Two theories underpin this study:

(a) **Human Capital Theory (Becker, 1993):** Investment in educational infrastructure enhances human productivity and socio-economic returns (Psacharopoulos & Patrinos, 2018).

(b) **Systems Theory (Bertalanffy, 1968):** Institutions are interdependent systems; deficiency in infrastructure negatively affects overall performance (Adebisi & Abubakar, 2021).

Empirical Review

Empirical studies highlight infrastructure deficits. Adebayo and Oladipo (2021) found 65% of Nigerian public institutions lack scheduled maintenance. Adeleke and Akinyemi (2022) linked 42% of student dissatisfaction to infrastructure deficits. In northern Nigeria, environmental challenges compound decay (Abubakar et al., 2023). Few studies quantitatively compare multiple institutions within a single state; this is a gap this study addresses.

Conceptual Framework

The study conceptualizes infrastructure adequacy (academic, residential, ICT, utilities, maintenance, funding) as independent variables influencing institutional performance (dependent variables: teaching, research, satisfaction), controlling for institution type, age, and population.

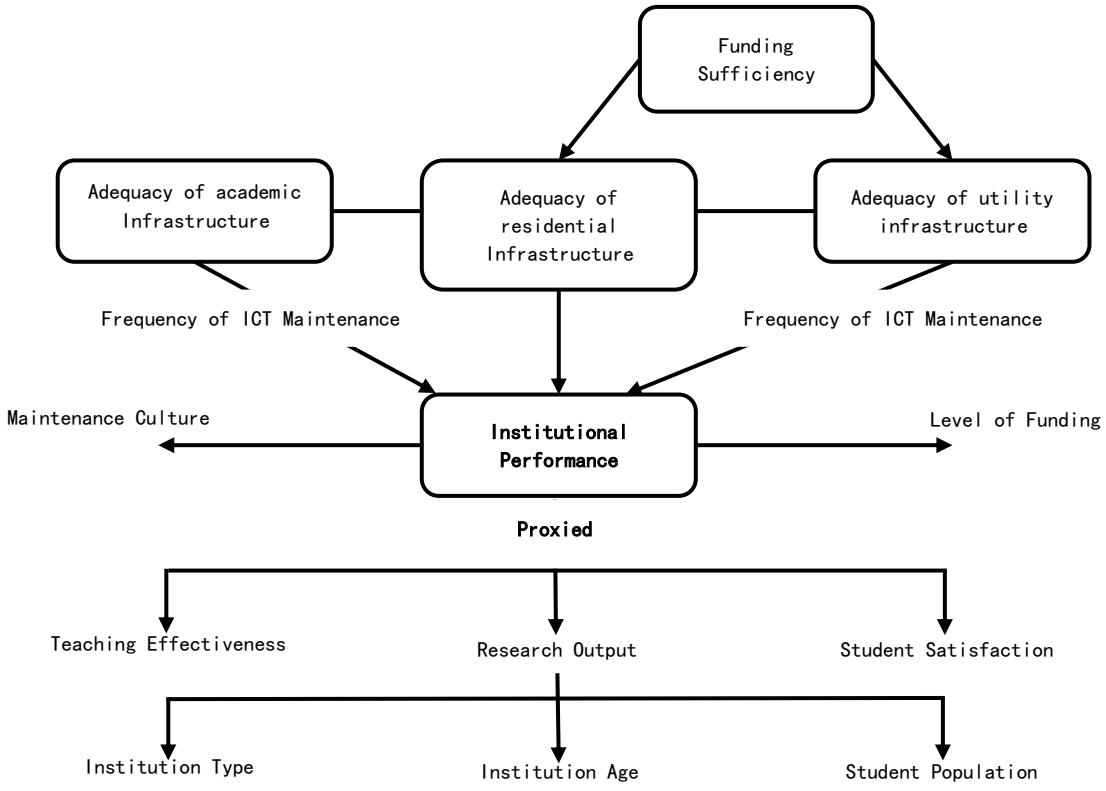

Figure1Conceptual framework of the relationship between infrastructure adequacy and institutional performance

METHODOLOGY

Research Design

A quantitative, cross-sectional survey design was used to collect data at a single point, allowing systematic measurement and statistical testing (Creswell & Creswell, 2018).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

Study Area

The study covered six public tertiary institutions in Kebbi State: Federal University Birnin Kebbi (FUBK), Waziri Umaru Federal Polytechnic (WUFPBK), Kebbi State University of Science and Technology Aliero (KSUSTA), Kebbi State Polytechnic Dakin Gari (KBSP), Federal University of Agriculture Zuru (FUAZ), and Adamu Augie College of Education Argungu (AACOE).

Population and Sampling

The target population (~13,000) included staff and students. Using Yamane's (1967) formula (95% confidence, 5% margin), a minimum sample of 385 was calculated. This was increased to 420, distributed via stratified random sampling proportional to institutional size (Table 1).

Table 1. Sampling distribution across institutions

Institution	Population Estimate	Sample Size	Percentage (%)
FUBK	2,400	70	17
WUFPBK	2,800	80	19
KSUSTA	2,000	65	16
KBSP	1,500	60	14
FUAZ	1,200	55	13
AACOE	1,100	50	12
Total	**11,000**	**420**	**100**

Research Instrument

A structured questionnaire had four sections: A (Demographics), B (Infrastructure Adequacy), C (Infrastructure Challenges), D (Institutional Performance). Sections B-D used a 5-point Likert scale (1=Very Inadequate, 5=Very Adequate).

Validity and Reliability

Face and content validity were established through expert review. A pilot test (n=30) yielded a Cronbach's alpha of 0.86, confirming reliability.

Data Collection and Analysis

Questionnaires were administered physically. Data analysis used SPSS v28.0 and SmartPLS for descriptive statistics, correlation, regression, and factor analysis.

Ethical Considerations

Approval was obtained from FUBK's Research Ethics Committee. Participation was voluntary, anonymous, and confidential.

Results and Analysis

Demographic Profile

Of 420 questionnaires, 398 were valid (94.7% response rate). Respondents: 58.3% male, 41.7% female; 40.2% academic staff, 24.6% non-academic staff, 35.2% students (Table 2).

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

Table 2. Demographic characteristics of respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	232	58.3
	Female	166	41.7
Designation	Academic Staff	160	40.2
	Non-Academic Staff	98	24.6
	Students	140	35.2
Years of Experience	<5 years	115	28.9
	5–10 years	170	42.7
	>10 years	113	28.4

Adequacy of Institutional Infrastructure

Mean adequacy ratings (1-5 scale) revealed significant deficits (Table 3 unchanged):

Table 3. Mean adequacy ratings of institutional infrastructure

Infrastructure Component	Mean	SD	Rank	Adequacy Level
Lecture Halls	3.40	0.72	2	Moderate
Laboratories/Studios	2.35	0.81	5	Low
Libraries	3.00	0.70	3	Moderate
ICT Facilities	2.28	0.85	6	Low
Hostel Accommodation	2.10	0.95	7	Very Low
Staff Offices	2.52	0.76	4	Low
Power Supply	3.15	0.68	1	Moderate
Water Supply	3.55	0.60	—	Moderate

Low/Very Low: Laboratories (2.35), ICT (2.28), Hostels (2.10), Staff Offices (2.52).

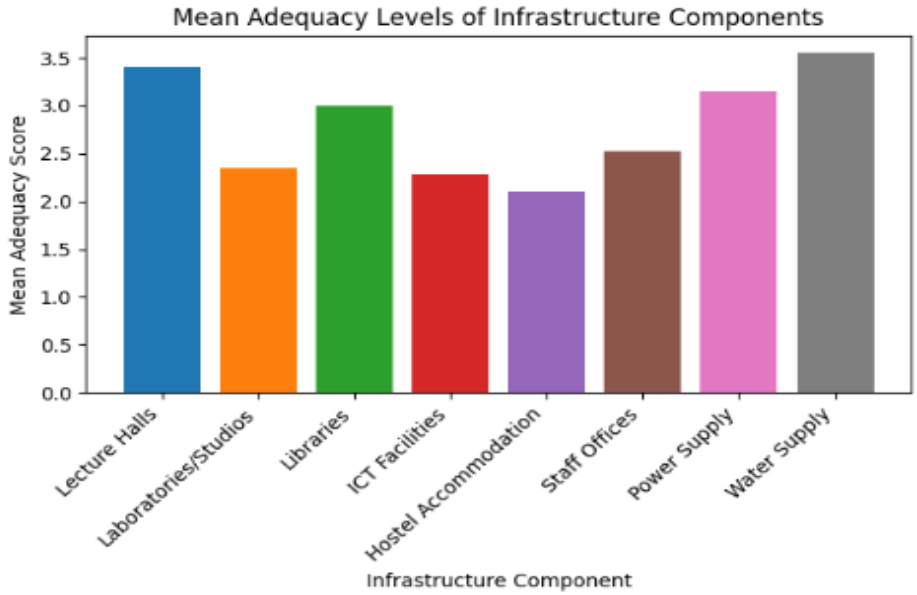

Figure 2 Mean adequacy levels of infrastructure components (descriptive comparison)

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

Identified Infrastructure Challenges

Top challenges: Insufficient maintenance funding (Mean=4.45), project delays (4.10), inadequate ICT (3.98), overcrowding (3.80), poor maintenance culture (3.76).

Correlation Analysis

Pearson correlation showed strong positive relationships ($p<0.01$) between infrastructure adequacy, maintenance culture, funding, and institutional performance (Table 4).

Table 4. Correlation matrix of major variables

Variables	Infrastructure Adequacy	Maintenance Culture	Funding Level	Institutional Performance
Infrastructure Adequacy	1.000	—	—	—
Maintenance Culture	0.614**	1.000	—	—
Funding Level	0.532**	0.473**	1.000	—
Institutional Performance	0.842**	0.694**	0.601**	1.000

Note: p < 0.01 (2-tailed).

Regression Analysis

Multiple regression with Institutional Performance as dependent variable yielded $R^2 = 0.71$ ($p < 0.05$). Infrastructure adequacy ($\beta=0.61$, $p=0.000$) was the strongest predictor, followed by maintenance culture ($\beta=0.24$, $p=0.002$). Funding level was positive but not significant ($\beta=0.12$, $p=0.067$) (Table 5).

Table 5. Regression model summary

Predictor Variable	Standardized Coefficient (β)	t-value	Sig. (p)
Infrastructure Adequacy	0.61	8.72	0.000
Maintenance Culture	0.24	3.94	0.002
Funding Level	0.12	1.83	0.067
$R^2 = 0.71$, Adjusted $R^2 = 0.69$, $F(3,394) = 32.6$, $p < 0.05$			

71% of the variance in institutional performance is explained by infrastructure adequacy, maintenance culture, and funding levels. Infrastructure adequacy was the strongest predictor

Factor Analysis

EFA (KMO=0.823) extracted three dominant factors explaining infrastructure challenges: 1) Academic Infrastructure Deficit, 2) Support Services, 3) ICT & Maintenance Challenges.

DISCUSSION OF FINDINGS

Overview

The study revealed persistent infrastructure deficits across public tertiary institutions in Kebbi State. These deficits include dilapidated classrooms, outdated laboratories, unreliable power supply, and limited ICT facilities constraints that directly undermine instructional quality, research productivity, and administrative effectiveness.

The observed infrastructure shortcomings reflect broader structural challenges in Nigerian tertiary institutions, where inadequate funding and maintenance culture have been widely documented as recurring impediments to quality infrastructure provision. Empirical literature shows that infrastructural deficits particularly in physical

and technological facilities significantly hinder teaching, learning, and research outcomes across Nigerian higher education (e.g., Ogunode & Ibrahim, 2025; Ibe, 2018; Folayan, 2019). These studies similarly report that limited funding and deferred maintenance result in deteriorated facilities and reduced institutional capacity to satisfy academic demands, consistent with findings in Kebbi State context. The findings confirm national reports on infrastructural inadequacies impede quality tertiary education (TETFund, 2022; NUC, 2023).

Infrastructure Adequacy

Though some infrastructural elements exist within the identified institutions, their adequacy and functionality remain suboptimal. The library and e-learning support infrastructures were found to be inadequate relative to the needs of a growing student population; many ICT laboratories lack modern equipment, and access to reliable internet remains limited, undermining digital learning and research activities.

This pattern is supported by national literature demonstrating how insufficient funding in Nigerian tertiary institutions not only affects physical infrastructure but also constrains technological capacity necessary for contemporary academic engagement. Shortages in essential facilities such as classrooms, laboratories, and libraries disrupt teaching and learning processes, leading to reduced student engagement and outcomes, as reported in broader studies on Nigerian tertiary education infrastructure challenges.

Priority Areas for Infrastructure Development and Maintenance

Given the functionality challenges, institutional stakeholders identified priority areas for infrastructure intervention, including rehabilitation of classrooms and laboratories, upgrading of ICT systems, steady power supply installations, and structured maintenance frameworks.

These prioritizations reflect facility planning principles that advocate need-based investment decision-making. Aligning infrastructural interventions with functional imperatives is consistent with best practice frameworks in infrastructure management, which stipulate that facilities directly related to core academic production should be prioritized for improvement and maintenance.

Funding inadequacy was the top challenge, confirming chronic underfunding trends (Okebukola, 2021). The low score for maintenance culture supports Adeboye et al. (2019) on the preference for new construction over preventive maintenance. Regression results align with Systems Theory, showing infrastructure subsystems significantly affect overall performance.

Institutional Performance Implications

Relationship Between Infrastructure Adequacy and Institutional Performance

The inferential analysis confirmed a statistically significant relationship between infrastructure adequacy and institutional performance indicators such as staff productivity, teaching effectiveness, and student satisfaction across the studied institutions. Institutions with relatively adequate and functional infrastructure such as Federal University, Birnin Kebbi and Kebbi State University of Science and Technology recorded better performance metrics compared to institutions with more pronounced infrastructural deficits.

This finding aligns with broader Nigerian studies indicating that the quality of infrastructure directly influences institutional outcomes, including academic administration, student achievement, and research productivity. Empirical evidence suggests that insufficient infrastructure negatively affects program delivery and institutional efficiency, reinforcing the central role of adequate physical and technological facilities in enhancing tertiary education performance

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study examined infrastructure challenges and development needs in public tertiary institutions in Kebbi State, Nigeria, with particular emphasis on infrastructure adequacy, functionality, prioritization, and performance

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI |Volume XII Issue XII December 2025

implications. The findings demonstrate that infrastructure deficits remain pervasive and multidimensional, affecting both physical and technological facilities.

The study concludes that existing infrastructure in most institutions is inadequate and functionally constrained, largely due to poor maintenance practices, insufficient funding, and lack of strategic infrastructure planning. Furthermore, the observed positive relationship between infrastructure adequacy and institutional performance confirms that infrastructure investment is a critical determinant of educational quality and institutional effectiveness.

By providing empirical evidence from Kebbi State, the study contributes to the growing body of knowledge on infrastructure management in public tertiary education and offers context-specific insights that can inform policy formulation, funding allocation, and institutional planning in Nigeria and similar developing-country contexts.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. **Strategic Infrastructure Planning**

   Public tertiary institutions should adopt comprehensive infrastructure development and maintenance plans aligned with institutional goals, enrollment growth, and academic priorities. Such plans should be periodically reviewed and evidence based.

2. **Increased and Targeted Funding**

   Government and regulatory agencies should increase funding for tertiary education infrastructure, with allocations explicitly tied to rehabilitation, modernization, and maintenance of critical academic facilities rather than solely new construction.

3. **Strengthening Maintenance Culture**

   Institutions should establish dedicated facility management units with clear maintenance schedules, performance benchmarks, and accountability mechanisms to prevent premature infrastructure deterioration.

4. **ICT Infrastructure Upgrading**

   Priority should be given to the expansion and modernization of ICT facilities to support digital learning, research, and administrative efficiency, particularly in response to evolving global educational practices.

5. **Performance-Based Infrastructure Investment**

   Infrastructure funding and intervention programs should be linked to measurable performance outcomes, ensuring that investments translate into improved teaching quality, student experience, and staff productivity.

Limitations and Future Research

Reliance on self-reported data is a limitation. Future research should employ longitudinal designs with physical assessments and cost analyses. Studies could expand to other northwestern states for comparison and utilize GIS mapping and PLS-SEM for enhanced analysis.

ACKNOWLEDGEMENT

The authors are appreciative of Tertiary Education Trust Fund (TETFUND) Institutions Based Research (IBR) Grant and Federal University Birnin Kebbi for providing the necessary resources and financial assistance that facilitated the successful execution of this research. Their commitment to fostering academic excellence allowed us to focus on the research project without financial burdens.

REFERENCES

1. Abubakar, I., & Adebayo, S. (2020). Assessment of facilities management practices in Nigerian universities. Journal of Building Performance, 11(2), 55–69.
2. Adeboye, O. O., & Oladipo, T. (2023). Sustainable campus infrastructure: An assessment of Nigerian tertiary institutions. International Journal of Built Environment Studies, 18(1), 22–34.
3. Adejumo, T. S., & Olatunji, J. O. (2021). Public funding and infrastructural development in Nigerian polytechnics. African Journal of Educational Research, 12(4), 63–77.
4. Afolabi, A. O., Oyeyipo, O. O., & Aina, O. (2022). Infrastructure performance indicators and student satisfaction in Nigerian universities. Sustainability, 14(9), 4983. https://doi.org/10.3390/su14094983
5. Agboola, T., & Ibrahim, Y. (2021). Smart facilities management for Nigerian public institutions. Facilities Management Journal, 39(7/8), 645–662.
6. Akanni, P. O., & Adeoye, B. O. (2020). An evaluation of public university infrastructure and its impact on academic productivity. Nigerian Journal of Construction Management, 8(3), 41–59.
7. Aliyu, M., & Bello, U. (2019). Maintenance culture and institutional sustainability: Evidence from northern Nigeria. Journal of African Development Studies, 7(2), 101–115.
8. Ameh, J. O., & Odusami, K. T. (2018). Building maintenance management in Nigerian universities. Journal of Construction Engineering and Management, 144(3), 04017119. https://doi.org/10.1061/(ASCE)CO.19437862.0001424
9. Atiku, S. O., & Lawal, M. (2022). Public–private partnerships in higher education infrastructure development. International Review of Economics and Business Research, 9(2), 89–106.
10. Awoleye, O. M., & Oyebanji, A. (2021). Evaluating campus infrastructure resilience in a volatile economy. Journal of Facilities Design and Management, 17(4), 312–328.
11. Bamidele, A., & Musa, Y. (2023). The role of TETFund in improving tertiary education facilities in Nigeria. Higher Education Policy Review, 20(1), 77–93.
12. Becker, G. S. (1993). Human capital: A theoretical and empirical analysis, with special reference to education (3rd ed.). University of Chicago Press.
13. Bertalanffy, L. von. (1968). General system theory: Foundations, development, applications. George Braziller.
14. Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE Publications.
15. Eneh, O. C., & Nwachukwu, M. A. (2020). Sustainability assessment of Nigerian higher education facilities. Built Environment Journal of Africa, 5(1), 17–33.
16. Eze, P. C., & Okoye, F. (2019). The impact of inadequate infrastructure on academic performance in Nigerian colleges. African Educational Review, 14(2), 215–231.
17. Falade, J. A., & Hassan, A. (2021). Financing higher education infrastructure: Challenges and strategies. Journal of Infrastructure Development Studies, 9(1), 45–61.
18. Goni, M. U., & Ibrahim, A. (2018). Energy efficiency strategies for Nigerian universities. Energy and Buildings, 174, 297–304. https://doi.org/10.1016/j.enbuild.2018.06.043
19. Hassan, I. U., & Yahaya, A. (2022). Comparative analysis of physical facilities in federal and state universities in Nigeria. Journal of Education Infrastructure Studies, 10(3), 34–50.
20. Ismail, Z., & Usman, M. (2020). Barriers to infrastructure development in sub-Saharan tertiary education. African Journal of Construction Studies, 15(2), 87–103.
21. Kareem, R. O., & Lawal, M. A. (2019). Maintenance management models for institutional facilities. Journal of Building Engineering, 25, 100809. https://doi.org/10.1016/j.jobe.2019.100809
22. Musa, S. I., & Bello, K. A. (2023). Assessment of physical learning environments and student satisfaction in Nigeria's public institutions. Environmental Design Research Journal, 19(3), 201–217.
23. National Universities Commission (NUC). (2023). Annual report on infrastructure and capacity in Nigerian universities. NUC Publications.
24. Nwosu, C. U., & Oladimeji, T. (2020). Infrastructure sustainability in higher education: The Nigerian experience. Journal of Sustainable Built Environment, 6(2), 123–138.
25. Ogunlana, S. O., & Olalekan, K. (2017). Project planning and maintenance in the educational sector. International Journal of Project Management, 35(9), 1848–1860. https://doi.org/10.1016/j.ijproman.2017.08.009
26. Olayiwola, M. O., & Abdulkarim, S. (2021). Performance evaluation of TETFund interventions in Nigeria's higher education system. African Policy Journal, 16(4), 101–117.

27. Oluwole, F., & Ibrahim, L. (2019). Constraints to sustainable infrastructure delivery in Nigerian polytechnics. Construction Economics Review, 7(1), 51–64.
28. Oyenuga, A., & Shittu, A. (2022). Infrastructure gap analysis in Nigerian higher education. International Journal of Facility Management, 13(2), 66–83.
29. Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: A decennial review of the global literature. Education Economics, 26(5), 445-458. https://doi.org/10.1080/09645292.2018.1484426
30. Salihu, A. M., & Ibrahim, U. (2024). Sustainable infrastructure planning for northern Nigerian universities. Sustainability in Construction Journal, 15(5), 223–239.
31. Tam, V. W. Y., & Le, K. N. (2020). Smart campus development and the role of facility management. International Journal of Educational Technology in Higher Education, 17(1), 24. https://doi.org/10.1186/s41239-020-00200-7
32. Tella, O., & Obot, I. (2023). The role of digital infrastructure in institutional development. Built Environment and Society Journal, 18(2), 98–117.
33. Tertiary Education Trust Fund (TETFund). (2022). Annual performance review report. TETFund.
34. UNESCO. (2022). Education and infrastructure for sustainable development in Africa. United Nations Educational, Scientific and Cultural Organization.
35. World Bank. (2023). Nigeria: Higher education development and infrastructure report. World Bank. https://documents.worldbank.org/en/publication/documentsreports/documentdetail/099125303072236903/P1782520c81a1f06a0a4e701be2a5a7a97b
36. Yusuf, A., & Gidado, I. (2021). Challenges in implementing sustainable campus infrastructure in Nigeria. Journal of Sustainable Architecture and Engineering, 10(3), 145–161.