

Factors Affecting Strategic Facilities Management in Nigerian Army University, Biu Borno State

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ABSTRACT

Effective facilities management (FM) is essential for the efficient operation of universities, particularly in ensuring optimal use of physical assets. However, challenges like inadequate funding, insufficient qualified personnel, and poor maintenance practices hinder FM at institutions such as the Nigerian Army University (NAUB) in Biu, Borno State. Budget constraints often result in repair delays, adversely affecting teaching and learning outcomes. This paper investigates the factors influencing strategic facilities management (SFM) at NAUB to enhance educational results. A quantitative methodology was employed, using a structured questionnaire distributed to 291 academic staff, achieving an 87% response rate with 252 completed surveys. Data analysis was conducted using Structural Equation Modelling. The results indicated that quality practices significantly influence SFM with a path coefficient of 0.16, while management practices and planning practices have coefficients of 0.31 and 0.40, respectively. Economic practices significantly affect SFM with a path coefficient of 0.14. Conversely, technological practices showed no significant effect on SFM, with a path coefficient of -0.07. Facility functionality emerged as a significant factor, with a path coefficient of 1.02. The study identified key challenges, including insufficient funding and deteriorating infrastructure, necessitating proactive management strategies to create a supportive learning environment. Recommendations include enhancing quality management practices, improving staff training, transitioning to proactive maintenance strategies, and exploring innovative funding models. The findings offered valuable insights in enhancing FM practices aiming to improve academic performance and institutional development in NAUB.

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INTRODUCTION

Facilities management is an essential component of efficient operation with regards to tertiary institutions. Efficient facilities management (FM) has become critical for institutions all over the world (Adegoriola, 2023; Lok et al., 2024). Similarly, the standard of the physical environment has a substantial impact on the academic experience, faculty productivity, and the institution's reputation (Gunduz et al., 2024). Proactive planning and efficient execution are necessary for the integration of digital tools and smart systems (Behera & Dave, 2024). It is essential for educational institutions to comprehend how facilities management affects teaching and learning results. This is because teaching and learning takes place in facilities like classrooms, studios, laboratories and workshops. Therefore, if these facilities are in good condition, teaching and learning becomes very effective. Hence, the management of this facilities is critical in tertiary institution. Since, facilities management (FM) involves day-to-day coordination of physical spaces and support services to maintain building operations, while Strategic Facilities Management (SFM) aligns these physical environments with long-term organizational goals, focusing on ROI, sustainability, and competitive advantage rather than just daily maintenance (Jensen, Nielsen, & Rasmussen, 2022). In addition, FM and SFM are both concern with short and long term coordinated plans for building and physical environment operations. Hence, physical environment has greatly impacted on students'

satisfaction, engagement, and learning results (Wong, Liem, Chan & Datu, 2024; Hill & Epps, 2010). Ageing infrastructure, financial limitations, environmental issues, quick technical breakthroughs, and shifting student expectations are some of these difficulties (Sa'ad et al, 2025). These issues call for the use of eco-friendly procedures and technologies, as well as the cautious prioritisation of maintenance and upgrade projects. Facilities management in tertiary institutions is complicated and requires multidisciplinary tasks, and eco-friendly procedures and technologies to accommodate the changing needs of students (Sa'ad et al, 2025).

The quality of teaching and learning in tertiary institutions is significantly impacted by the effectiveness of facilities management. Effective FM strategies can help Higher Educational Institutions (HEI) improve student experience, faculty productivity, lower operating costs, improve the institution's reputation, and support academic and research activities (Gunduz et al., 2024). Therefore, in recognition of the significance of FM role in improving the quality of academic activity. Similarly, in Nigerian Army University's structures which support knowledge delivery and learning outcomes are facing serious challenges in terms of proper maintenance. To support this assertion, a study by Sa'ad, et al., (2025) revealed that in Nigerian Army University FM repairs are not instantly repaired but through schedule of activities based on the budget at hand. This can affect the efficiency of the organisation and cause disruption is the core

delivery of education. Previous research also revealed that Nigerian Army University is experiencing a period of rapid growth but repairs are carried out mainly by in-house staff (Sa'ad, et al, 2025). The implication is that qualified professional might not be available. Therefore, the repair team may compromise the quality and efficiency of the repairs. It is suggested that it can outsource additional tasks to help manage the increased workload, engaging professionals to carry out repairs and replacement of building facilities damage (Sa'ad, et al., 2025). Due to the fact that the in-house staff may not have the expertise or experience to handle all types of repairs and replacements, especially if the damage is complex or severe (Sa'ad, et al, 2025).

The need to ensure the effective management of these facilities contributed significantly to the emergence of facilities management (FM) practice in the tertiary institutions (Kamarazaly, Mbachu & Phipps, 2013; Odediran, Gbadegesin, & Babalola, 2015; Temple & Barnett, 2007). Previous studies have focused on the identification of the success factors, barriers and drivers for effective FM practice in tertiary institutions globally (Alsayyari, et al., 2019; Amaratunga & Baldry, 2000; Oladokun & Ajayi, 2018). Various scholars have investigated FM practice in tertiary institutions from different perspectives and made salient contributions towards fostering fit-for-purpose facilities for teaching and learning in these institutions (Adegoke & Adegoke, 2013; Isa & Yusoff, 2015; Adegoke et al., 2020). Therefore, it is evident that most of the Nigerian Army University structures which support teaching and learning have shown different types of defects ranging from physical

and functional obsolescence. However, SFM is highly required to mitigate these issues.

The first issue concerning the SFM practices is implementation towards sustainability within the institution of higher learning as a vital element in this research. The research therefore focuses on the degree or extent of implementation and practices of FM effectiveness within Nigerian Army University Biu. Therefore, this paper aimed to identify the factors affecting strategic FM in Nigerian Army University with a view to resolve and to improve FM practice for a positive impact on academic activities.

MATERIALS AND METHODS

The conceptual framework for this paper was adopted from Sa'ad et al (2024). He carried out a study on Factors influencing FM strategy in North-Eastern Universities in Nigeria. These are: Federal University Kashere, University of Maiduguri, Modibbo Adama University Yola, Federal university Wukari and Nigerian Army University, Biu. The outcome of the study revealed that quality practice, management practice, economic practice, planning practice, technological factors and functional facility are the factors influencing strategic facility management in North-East Universities. Therefore, these variables are adopted for this research to specifically determine the actual factors influencing strategic facilities management in Nigerian Army University, Biu with a view to propose ways to resolve (SFM) implementation problems to enhance the overall academic performance of the university.

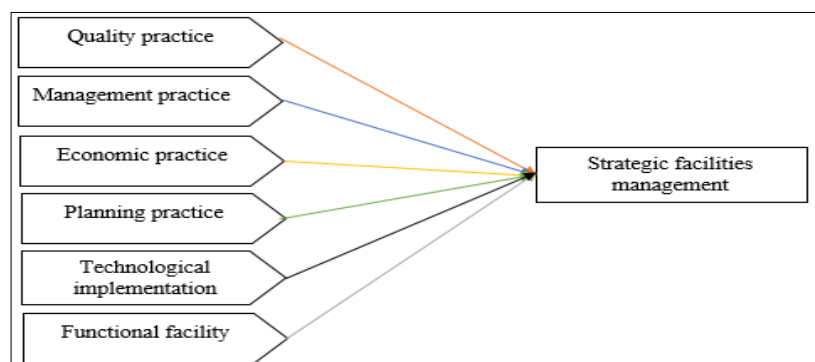


Figure 1: Conceptual Framework Adopted from Sa'ad et al. (2024)

The aim of this research paper is to identify the factors affecting strategic facilities management in Nigerian Army University Biu. The following are the alternate hypotheses for this paper:

- H1 Quality practices significantly affects strategic facilities management
- H2 Management practices significantly affects strategic facilities management
- H3 Planning practices significantly affects strategic facilities management
- H4 Economic practices significantly affects strategic facilities management
- H5 Technological implementation significantly affects strategic facilities management
- H6 Functional facility significantly affects strategic facilities management

Methodology

The research methodology for this paper is designed to identify the factors affecting strategic facilities management practice in NAUB. In this regard, the research examined the

state of facilities management practice in the built environment in Nigerian Army University with a view to promote strategic facilities management services in the built environment, to make it more conducive for teaching and learning. Quantitative research was applied in order to achieve the aim of the research through administering questionnaires to the respondents on identifying the factors that affect strategic facilities management practice in NAUB. The research objectives are designed to discover the personnel responsible for strategic management of the school facilities. The process employed in the managing these facilities strategically and the factors affecting the strategic facilities management practice in north eastern universities. The sample size is drawn from the sample population of the staff of Nigeria Army University. The population is 1,490 as at 2024. Where, 819 are Non-academic staff and 671 are the number of academic staff. The inclusion criteria is that the respondents must be an academic staff, so as to be able to appraise the condition of the facilities that supports teaching and learning at Nigerian Army University. A population is the entire collection of objects or outcomes about which

information is sought (Berlin, 2007). While, a sample is a subset of a population, containing the objects or outcomes that are actually observed. Therefore, according Saunders *et al.*, (2009) table of sample size, the adequate sample size for this research paper at 95% confidence, 5% margin of error is 291 respondents according to (Saunders *et al.*, 2009). The research paper employed random sampling in the data collected using a questionnaire administered to 291 academic staff (respondents). In addition, 252 questionnaires were retrieved and analysed which is above the adequate sample size of 246 respondents. This represents about 87% response rate. They are asked to rate their answers to the questions on a scale (Likert scale 1-5). Thus, the range captures the intensity of their feelings for a given item, they could rate each item on a 1-to-5 response scale where: 1 = strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = strongly agree.

The Questionnaire was formulated to extract data from the respondents to achieve the fourth objective of this study. The questionnaire is designed into 2 sections. Section (A) is designed to get the respondents background profile such as,

employment status, employment sector, gender, race, occupation, age, marital status, field of study (specialization) and educational background. While, section (B) is designed to obtain information on the impact of factors that affect strategic facilities management practice in NAUB. The research explored the key challenges and problems faced in the strategic facilities management (SFM) practice within universities in the Nigeria Army University Bui. The study investigated how these SFM challenges impact the learning outcomes and academic performance of students in these universities. to facilitate the achievement of the research objectives and to propose a framework. Using a cross-sectional survey method, data were collected from the academic staff of Nigeria Army University Bui. Structured questionnaire was used for data collection. The data processing tool used is Structural equation modelling using AMOS software. The validity and reliability of the questionnaire were tested which correlates with the total item score in one variable. Table 1 shows the result of the reliability test conducted.

Table 1: Reliability Test of the Research Variables

Constructs	QLT	MGT	PLG	ECO	TEC	FCT	SFM
Measurement Items	QLT1	MGT1	PLG1	ECO1	TEC1	FCT1	SFM1
	QLT2	MGT2	PLG2	ECO2	TEC2	FCT2	SFM2
	QLT3	MGT3	PLG3	ECO3	TEC3	FCT3	SFM3
		MGT4	PLG4	ECO4	TEC4	FCT4	SFM4
					TEC5	FCT5	
Cronbach Alpha	0.874	0.943	0.855	0.821	0.921	0.942	0.911

The reliability results for each construct or component of the entire research variables. Three items/indicators were used under QLT construct (QLT1, QLT2 and QLT3), Cronbach Alpha value for this construct is 0.874, which is a very good reliability that is above the minimum acceptable limit of 0.600 (Pallant, 2010).

The research data from the questionnaires were run in the AMOS Graphics program; the following are the results of the analysis. The model fit index descriptions, Model Fitness

Indices, Measurement Model Indices and the Structural Model. Generally, if the fit indices demonstrate good fit, the model is always accepted. However, instead of being rejected, the model with unacceptable fit indices will typically be respecified to improve the model fit. Hence, it is important to note that fit indices are also normally classified as either absolute or incremental (Hoyle & Panter, 1995); they are described in table 2.

Table 2: Fitness Index Description

Name of Category	Name of Index	Index Full Name	Supportive Literature
Absolute Fit	Chi-Square	Discrepancy Chi Square	Weaton <i>et al</i> (1977)
	RMSEA	Root Mean Square Error of Approximation	(Browne <i>et al.</i> , 1993)
	GFI	Goodness of Fit Index	Joreskog and Sorbom (1984)
Incremental Fit	AGFI	Adjusted Fit Index	(Tanaka & Huba, 1985)
	CFI	Comparative Fit Index	(Bentler, 1980)
	TLI	Tucker Lewis Index	(Bentler & Bonett, 1980)
	NFI	Normed Fit Index	(Bollen, 1989)
	Chisq/df	Chi-square /degree of Freedom	(Marsh <i>et al.</i> , 1985)

Absolute fit indices are connected to the degree or extent to which the hypothesised or proposed model reproduces and represent the sample (Shah & Goldstein, 2006). The most rudimentary index of this type of measure is Chi-square usually represented as (χ^2) statistics, which usually include the value of χ^2 , degree of freedom (*df*) and significance level (*p*-value). Normally, the non-significant χ^2 indicates that the model fits the data, consequently the model is accepted. Similarly on the other side, significant χ^2 ($p < 0.05$) recommends that the model does not actually fit the data and for this reason should be rejected. Because of such a traditional opposing rule, there are several ambiguities and uncertainties linked to the interpretation of χ^2 (Hoyle &

Panter, 1995). Further, χ^2 itself is a function of the sample size; thus, it is considered sensitive and biased, particularly, when the sample size is large (Kline, 2005). It is as a result of these issues, many other substitute fit indices have been developed to measure or quantify the degree of model fit (Shah & Goldstein, 2006). This is why some corresponding indices were provided, these include: relative Chi- square (χ^2/df); adjusted-goodness-of-fit index (AGFI); goodness-of-fit index (GFI); standardised root means square residual (SRMR); and root mean square error of approximation (RMSEA).

2. Incremental fit indices are connected to the extent to which the model in question is superior to the following alternative

models: (1) the null model in which no covariances among the variables are specified; and the model that fits perfectly with the data (Hoyle & Panter, 1995; Shah & Goldstein,

2006). Some of the most popular incremental fit indices are: normed-fit index (NFI), Tucker-Lewis index (TLI) and comparative-fit index (CFI).

Table 3: Model Fitness Indices

Name of Category	Name of Index	Levels of Acceptance	Comments
Absolute Fit	RMSEA	RMSEA < 0.08	RMSEA=0.020 Acceptable
	GFI	GFI > 0.90	GFI = 0.992 is a good fit
Incremental Fit	AGFI	AGFI > 0.90	AGFI > 0.90 is a good fit
	CFI	CFI > 0.90	CFI = 0.998 is a good fit
	TLI	TLI > 0.90	TLI = 0.997 is a good fit
	NFI	NFI > 0.90	NFI = 0.985 is a good fit
	Chisq/df	Chisq/df<5.0	Chisq/df=1.121 is a good fit

Uni-dimensionality can be evaluated through model fit indices and the threshold limit of the indices are presented in table 3 above (Koufteros, 1999). Uni-dimensionality takes place when the indicator variables load on only one construct.

If the fit indices of the model, with all the factors specified to be loaded on only a single construct, are satisfactorily subject to the aforementioned fit indices criteria including the achievement of uni-dimensionality.

Table 4: Measurement Model Indices

Constructs	ChiSq	df	P-Value	ChiSq/df	TLI	CFI	NFI	GFI	RMSEA
QLT	87.34	48	0.001	1.82	0.94	0.95	0.95	0.92	0.070
MGT	50.21	32	0.000	3.31	0.97	0.96	0.90	0.99	0.030
PLG	43.11	44	0.002	1.42	0.92	0.94	0.97	0.94	0.022
ECO	51.21	38	0.000	2.11	0.98	0.91	0.94	0.96	0.040
TEC	24.12	22	0.002	4.20	0.94	0.88	0.98	0.91	0.032
FCT	41.55	36	0.000	2.22	0.99	0.93	0.92	0.91	0.051
Structural Model	5.60	50	0.347	1.12	0.99	0.99	0.98	0.99	0.020

In this study, the CFA was performed on each construct using the AMOS program, which is an extension program to SPSS (Shah & Goldstein, 2006). The outcomes of each construct are obtainable in Table 4 above. The item or factor loading, *t*-value and level of significance of each variable, indicated in the table demonstrated the extent for the convergent validity. The model fit indices are also presented for the purpose of uni-dimensionality assessment of the research construct. The measurement model construct are presented in Table 3. The structural model has a satisfactory fit: $\chi^2 = 5.60$; $df = 5$; $\chi^2/df = 1.121$; GFI = 0.99; TLI = 0.99; CFI = 0.99; NFI = 0.98; and RMSEA = 0.020. Both the structural and measurement model constructs had all their factor loadings, ranging from 0.58 to 0.74, were found to be higher than the threshold limit of 0.50, and were all significant at **p-value < 0.001** level, signifying convergent validity. all the R^2 values were either greater than, or close to, 0.50, indicating the reliability of the variables. Similarly, all the correlation coefficients among each pair of factors, ranging from 0.586 to 0.785, were less than 0.850, therefore indicating the discriminant validity of the construct. In conclusion, since the model fit indices demonstrated good fit, uni-dimensionality was established.

RESULTS AND DISCUSSION

The result revealed that Quality practice (QLT) significantly affects strategic facilities management (SFM). This result is shown on the path coefficients with a positive sign of 0.016, with an CR value of 0.271, and P-value (p) of 0.00 is obtained which is smaller than the specified significant Level of 0.05. This corresponds with the findings of (Aluko *et al.*, 2021a; Ikediashi & Mbamali, 2014b). Similarly, according to Yoon & Cha (2017) reliability of service, timely responsiveness to emergency, tenant's safety, customer satisfaction and work execution control determined FM performance while, management practice (MGT) also significantly affects strategic facilities management (SFM with regression weight

of 0.031 and CR value of 0.773 and P-Value of 0.00 which is also less than the minimum threshold of 0.05. This outcome is in line with the findings of BIFM, 2013; Booty, 2006; Atkin & Brooks, 2009; Blanchard, Verma & Peterson, 1995). They found out that well-managed services enable an organisation to function at its most efficient and effective level, offering real added value improvements to the organization's core business and more importantly costs savings. More so, planning practice (PLG) also significantly affects strategic facilities management (SFM) with a path coefficient of 0.040 and P-value (p) of 0.00. Furthermore, on the issue of planning the results revealed that there is no plan to strategically manage facilities. The facilities are managed using corrective maintenance that is when the building defects is obvious. This finding is consistent with Saad *et al.*, (2025) found out that in North East universities FM preventive maintenance is less effective and not strategically planned. It's also in line with the findings of Marocco & Garofolo (2021) emphasised on the significance of planning FM proactive maintenance to enhance performance and costs reduction.

Economic practice (ECO) significantly affects strategic facilities management (SFM) with a path coefficient of 0.014 and a P-value of 0.00. this result is consistent with Grossi *et al.* (2020) found out that universities are experiencing growing financial constraints, due to shrinking budgets, rising costs of materials. Similarly, Saad *et al.*, (2024) revealed that the impact of economic practice in universities challenges its sovereignty in view of ways of operationalisation, effective and efficient management of the system.

The result shows that Technology practice (TEC) has no significant effect on (SFM) with path coefficient of -0.07 and P-value of 0.773 which is greater than the specified significant Level of 0.05. The result is inconsistent with the findings of Rodríguez-Abitia *et al.* (2020) who found out that technology significantly affects strategic FM in universities. Facility functionality (FCT) significantly affects strategic

facilities management (SFM) with a path coefficient of 1.02 and P-value (p) of 0.00. this finding is consistent with the Saad *et al.*, (2024) facilities function and availability influence the strategic FM. It is also consistent with the findings of Etebefia, Victor & Anthony, (2026) discovered that learning environment is a determinant of academic

performance in Nigerian Universities. Therefore, it can be deduced that with functional facilities, strategic FM can be thrive efficiently. Thereby, making the environment more conducive for teaching and learning. Similarly, the structural model for Factors Affecting Strategic Facilities Management in Nigerian Army University is presented in Figure 2.

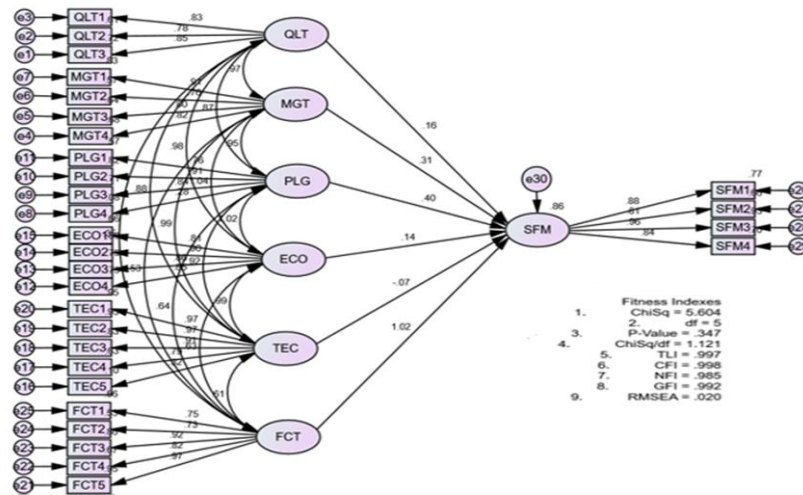


Figure 2: Structural Model for Factors Affecting Strategic Facilities Management in Nigerian Army University, Biu Borno State

Table 5: Presents the regression weight of the model. The detailed results of each hypothetical path between the

independent and the dependent variables, in the Amos Graphic SEM model, is presented in Table 5.

Table 5: Regression Weight

Model Paths	Estimate	S.E.	C.R.	P-Value	Result
SFM <--- QLT	.16	.271	.766	***	Significant
SFM <--- MGT	.31	.504	.773	***	Significant
SFM <--- PLG	.40	.685	1.907	***	Significant
SFM <--- ECO	.14	.120	1.267	***	Significant
SFM <--- TEC	-.07	.736	.255	.799	Not Significant
SFM <--- FCT	1.02	.090	11.975	***	Significant

CONCLUSION

The study's findings underscore the critical role of various management practices in enhancing Strategic Facilities Management (SFM). The results demonstrate that Quality Practice (QLT), Management Practice (MGT), Planning Practice (PLG), Economic Practice (ECO), and Facility Functionality (FCT) significantly contribute to the effectiveness of SFM in educational institutions. Specifically, QLT and MGT exhibit strong positive relationships with SFM, as indicated by their respective path coefficients and significant p-values. Conversely, Technology Practice (TEC) did not show a significant impact on SFM, suggesting a need for further investigation into how technology can be better integrated into facilities management strategies. The study aligns with previous research, confirming the importance of reliable service delivery, timely responsiveness, and proactive planning in improving facilities management performance. Furthermore, the findings highlight the challenges faced by universities, particularly regarding financial constraints and the necessity for strategic planning in maintenance practices.

The outcome of the paper necessitated certain recommendations to resolve the identified issues. The university should prioritize the implementation of quality management practices to improve service delivery and customer satisfaction, thereby enhancing overall SFM

effectiveness. Additionally, training programs for facilities management staff should be developed to ensure best practices are followed, which can lead to increased efficiency and effectiveness in operations. It is crucial to shift from reactive to proactive maintenance strategies. Developing comprehensive strategic plans for facilities management will help mitigate issues before they arise and improve resource allocation. Furthermore, universities must explore innovative funding models and cost-saving measures to alleviate financial pressures, ensuring that facilities are adequately maintained and managed. In addition, given the non-significant impact of technology practices on SFM, further research should be conducted to identify barriers to effective technology implementation and explore how technology can be leveraged to enhance facilities management. More, the university should ensure that facilities are functional and conducive to teaching and learning should be a priority. Regular assessments of facility functionality can help identify areas for improvement and investment. By adopting these recommendations, the educational system can be more enhanced in strategic facilities management practices, ultimately leading to improved operational efficiency and a better environment for teaching and learning.

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