



Exploratory Factor Analysis of Prevailing factors Affecting Outsourcing Decisions for Maintenance of Physical Facilities: A Case Study of Nigerian Army University Biu

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KEYWORDS

Exploratory Factor Analysis,
Outsourcing,
Decision,
Maintenance,
Facilities.

ABSTRACT

The deficit of outsourcing decision guidelines for maintenance services of physical facilities has attracted an extensive debate in the extant literature. As until now, little is known about the prevailing factors influencing the outsourcing decision of maintenance of physical facilities in most of the African universities. The aim of this study is to adopt EFA analytical approach to identify the prevailing factors required and further measure the strengths of such dominant factors in predicting outsourcing decisions in Nigerian Army University Biu. A survey research design was introduced for the study and structured questionnaires were distributed to 104 respondents to assess each factor influencing the decision to outsource maintenance services in the Nigerian Army University Biu. The respondents who have opted to outsource several of their maintenance services to specialty contractors were asked to indicate their perceived level of importance for each of the identified factors. The level of importance of the factors and the groups was then measured using PCA with Varimax Rotation, which determines the factor loadings. The Exploratory Factor Analysis was used to determine the correlation of the factors using the factor loadings. Results pointed out similarity in perceptions of respondents for the prevailing factors and their strength across six groups of factors, namely, Strategic Factors, Economic Factors, Management Factors, Technological Factors, Function Characteristics and Quality Factors. Prior to this, however, KMO value was achieved at 0.860, which indicates sample size sufficiency. It is concluded that, six major constructs, containing 38 items, emerged from the EFA analysis. 30 of the items were found to be more significant and reliable predictors of outsourcing decision of maintenance of physical facilities in the Nigerian Army University Biu.

CITATION

Abubakar, M., Umar, M. A., Abubakar, I., Nazifi, S., & Modu, M. A. (2026). Exploratory Factor Analysis of Prevailing factors Affecting Outsourcing Decisions for Maintenance of Physical Facilities: A Case Study of Nigerian Army University Biu. *FUDMA Journal of Humanities, Social Science and Creative Arts*, 2(2), 68-79. [https://doi.org/10.70882/fujohssaca.2026.v2\(2\).47](https://doi.org/10.70882/fujohssaca.2026.v2(2).47)

INTRODUCTION

Government in Nigeria is apportioning substantial capital resources to develop higher education (Uygun et al., 2023). This is evident by the recent increase in the number of federal and state-owned universities founded over the past ten years (Uygun et al., 2023). Owing to having a

diverse set of infrastructural facilities, a university campus can be viewed to be a city within the fabric of the metropolitan city it is located in (Pike et al., 2025). Diverse sets of infrastructural facilities in a university campus include educational and administrative buildings, students and faculty housing, utilities and services

networks(Pike et al., 2025; Sloniec & Scholar, 2023). Elements of this infrastructure need be continually maintained to ensure its optimal value over its lifecycle (Sloniec & Scholar, 2023). Being a non-core service activity to educational institutions, maintenance services are usually outsourced to specialty contractors in Nigeria (Zaato et al., 2024). Outsourcing refers to the situation where a client organization contracts with another external supply organization for the provision of peripheral business functions that could equally be provided by a person, unit or department within the organization that requires the function(Outsourcing & Chains, 2024; Zaato et al., 2024). There may be several of these contractual agreements operating in parallel for a range of functions from a diversity of external supply organizations(Assaf & Al-nehmi, 2023; Uygun et al., 2023). The responsibility for the supervising and controlling of these functions usually remains with the client organization (Assaf & Al-nehmi, 2023; Sloniec & Scholar, 2023).

The decision whether to outsource this vital support service is a complex one (Sun et al., 2025). It involves the investigation of a multitude of factors on the strategic, tactical or managerial as well as the operational levels (Assaf & Al-nehmi, 2023; Sun et al., 2025; Zaato et al., 2024).

Therefore, in order to achieve the aim of this study, it addresses the following questions: 1. What are the critical factors influencing the decision to outsource maintenance services in Nigerian Army University Biu. 2. What is the relative strength of correlation of each of the identified factors influencing the decision to outsource maintenance services in Nigerian Army University Biu.

This paper seeks to identify the critical factors that influence the decision to outsource maintenance services in Nigerian Army University Biu and investigates the relative importance of the identified factors. This would provide practical value for facilities maintenance managers in institutions of higher education confronted with the decision of whether or not to outsource maintenance services in their campuses. The objectives of this study are stated as follows:

1. To identify the prevailing factors that influence the decision to outsource maintenance services in Nigerian Army University Biu.
2. To investigate the relative importance of each of the identified factors based on the expressed opinions of the in-house maintenance managers in the concerned maintenance departments in the university.

REVIEW OF LITERATURE ON THE OUTSOURCING OF MAINTENANCE SERVICES

Before the 1970s, outsourcing was adopted only to reduce costs (Assaf & Al-nehmi, 2023; Zaato et al., 2024). Assaf and Al-nehmi, (2023) stated that outsourcing is usually

supported by many factors in all organization levels. The decision to outsource should take account of many issues: scale of economy, outsourcer expertise, strategy, the need for cost savings, accountability with greater control of operating costs, moving from fixed into variable costs, and quality factors. Several studies have been completed on various aspects of outsourcing. (Kremic, 2003; Miroslava et al., 2010) indicated that a planned strategy for outsourcing has the potential to deliver a competitive advantage through allowing the organization to focus on core activities. This planned strategy involves assessing the readiness of the organization to introduce outsourcing, as well as identifying the activities which offer the best potential to the organization(Kremic, 2003). Kavosi et al., (2018) proposed a risk-minimizing model to outsourcing. Inherent issues in this approach include the quality of cost accounting systems, the loss of skills, and falls in employee morale. The model recommends comprehending the sources of the organization's competitive advantage and realizing the potential for dependency. A survey of more than 900 firms conducted by Schneider and Sunyaev, (2016) to determine the factors affecting the outsourcing decision resulted in identifying three crucial factors. These factors are cost savings associated with outsourcing, access to increased knowledge and expertise associated with specialty contractors and availability and quality of vendors. Hong and Chao, (2003) conducted a survey of 230 property management organizations in the US to examine their maintenance practices. The reported results focused on the policies concerning outsourcing and in-house maintenance services. The findings indicate that corrective maintenance, service maintenance, and deferred maintenance are mostly performed through selective outsourcing. Further, routine maintenance and preventive maintenance are mostly performed by in-house staff. Moreover, extraordinary maintenance is mostly performed by contractors. Cleaning of the interior and exterior of buildings is performed through full outsourcing. Inspection, repair and replacement of building components are performed by selective outsourcing. Kremic, (2003) developed a framework for the selection of appropriate sourcing strategy. The framework necessitated the identification of four strategies to perform maintenance service in facilities management. These strategies are in-sourcing, out-tasking, outsourcing for cost saving, and outsourcing for capability. The framework provided guidelines for implementing the selected sourcing option. Kremic et al. (2003) stated that the factors to be considered when organizations contemplate on outsourcing decisions include the relative costs of performing the function, how core is the function to the organization, the long-term strategy, and the environmental factors. The study presented the possible benefits, risks, and strategic issues of outsourcing, and

highlighted that the literature lacks guidelines on sustainable decisions and it needs further work.

Factors affecting outsourcing decisions

Outsourcing is an organization's opportunity to enhance the existing procedure in many aspects. Nevertheless, outsourcing is not easy, and it needs to be well planned and organized (Kremic, 2003; Montaseb, 2018; Taponen & Kauppi, 2025). Consequently, it is very vital to evaluate and identify the factors that are considered before a particular organization decides to outsource some functions. In some instances, outsourcing could cost the organization more than the in-house properties; thus, a thorough analysis should be accomplished (Ikediashi et al., 2009; Lok & Opoku, 2018; Tamás, 2025; Yang & Huang, 2000). A wide-ranging review of the available literature in the field of outsourcing maintenance services was carried out for the purpose of identifying and synthesizing the knowledge extents connect to the factors that influence outsourcing decisions (Bicchinnella, 2025; Kremic, 2003). In the following paragraphs, therefore, according to Assaf and Al-nehmi, (2023), the factors that influence the decision on outsourcing for maintenance services are presented, characterized and conversed under six key categories: strategic, economic, management, technological, function characteristics, and quality.

Strategic Factors

Strategic factors represent the extent to which outsourcing maintenance services supports the long-term objectives, core competencies, institutional focus, flexibility, and competitive or operational position of an organization. Empirical evidence indicates that outsourcing decisions are increasingly viewed as strategic rather than merely operational or cost-reduction decisions. McIvor (2000) found that organizations frequently make outsourcing decisions without adequately considering long-term strategic implications, thereby emphasizing the need to align outsourcing with organizational strategy. Similarly, Quélin and Duhamel (2003), in their study of large European manufacturing firms, found that strategic outsourcing was associated with concerns about core activities, access to external expertise, quality improvement, flexibility, and cost of capital. Espino-Rodríguez and Gil-Padilla (2005) further reported that outsourcing decisions were strongly associated with strategic considerations such as concentration on core activities, quality of service, and development of valuable resources rather than cost reduction alone. In the Nigerian facilities-management context, Ikediashi et al. (2014) found that improving organizational focus was among the most highly rated determinants of outsourcing FM services, while Ikediashi et al. (2012) demonstrated that outsourcing also entails strategic risks that organizations must evaluate before transferring FM responsibilities to

external providers. Thus, strategic factors are expected to influence the Nigerian Army University Biu's decision to outsource maintenance where external provision can enable the university to concentrate on its core educational and military-academic functions while obtaining specialized maintenance capabilities.

Management Factors

Management factors encompass managerial expertise, control, coordination, risk allocation, supplier management, personnel implications, and the capacity of management to monitor outsourced maintenance activities effectively. Empirical studies demonstrate that managerial considerations are central to outsourcing decisions because transferring maintenance responsibilities does not eliminate the need for effective organizational oversight. Assaf et al. (2011), in their investigation of public Saudi Arabian universities, found that management factors constituted one of the most important categories influencing maintenance-outsourcing decisions, with risk sharing with contractors ranking among the leading considerations. Lacity and Willcocks (1998), using evidence from 145 participants in information-technology outsourcing cases, found that outsourcing outcomes were better when senior executives and operational managers participated jointly in sourcing decisions and when contracts were carefully structured and monitored. McIvor and McHugh (2000) similarly demonstrated that outsourcing and partnership sourcing require active managerial involvement because supplier relationships can generate substantial organizational changes. In Nigeria, Ikediashi et al. (2012) identified significant risks associated with facilities-management outsourcing, including issues that require effective managerial control and supplier oversight, while Ikediashi et al. (2014) found that several outsourcing determinants were significantly interrelated, suggesting that management decisions cannot be based on isolated considerations.

For Nigerian Army University Biu, therefore, management factors may influence outsourcing decisions through the university's ability to select competent contractors, establish appropriate service-level requirements, monitor contractor performance, manage risks, and maintain accountability for the condition of its physical facilities.

Technological Factors

Technological factors relate to the availability of specialized technical knowledge, maintenance technologies, equipment, technical skills, information systems, and the contractor's capacity to provide technological capabilities that may not be readily available internally. Hassanain et al. (2015) identified technological factors as one of the six major groups affecting maintenance-outsourcing decisions and found that this

group received the lowest relative weight among the six categories in their Saudi university study, although it remained relevant to the overall decision. Assaf et al. (2011) similarly identified technological considerations among the factors assessed by maintenance managers in Saudi Arabian universities when determining whether maintenance services should be outsourced. In the Nigerian context, Ikediashi et al. (2014) found that facilities-management outsourcing decisions were influenced by multiple interrelated factors, including access to capabilities that could improve service provision. Espino-Rodríguez and Gil-Padilla (2005) found empirically that organizations outsourced information-system activities partly because external providers could supply valuable resources and capabilities that were not necessarily available internally. Furthermore, Rajaeian et al. (2017) demonstrated that technological and organizational characteristics, including perceived complexity and loss of organizational knowledge, significantly influenced outsourcing decisions in e-banking services. These findings suggest that technological factors may be particularly relevant to Nigerian Army University Biu where some physical facilities, such as electrical systems, air-conditioning installations, generators, water infrastructure, elevators, fire-protection systems, and other specialized installations, may require technical expertise and equipment beyond the university's internal maintenance capacity.

Economic Factors

Economic factors refer to the financial implications of outsourcing, including maintenance costs, labour costs, transaction costs, cost transparency, economies of scale, capital requirements, and the potential for cost savings. Existing empirical evidence consistently identifies economic considerations as important drivers of outsourcing decisions. Ikediashi et al. (2014), in their Nigerian study of commercial banks, found that making costs transparent was one of the three highest-rated determinants of facilities-management outsourcing, demonstrating the importance of financial considerations in the Nigerian environment. Summers and Visser (2021), studying maintenance outsourcing in South African processing industries, found that cost reduction was among the most important factors considered by both engineers and managers when evaluating previous outsourcing decisions. Quélin and Duhamel (2003) reported that operational cost savings remained a predominant concern among large European manufacturing organizations, although they cautioned that savings must be balanced against the costs of monitoring external suppliers. Espino-Rodríguez and Gil-Padilla (2005) found that outsourcing decisions were influenced by market transaction costs and the economic

characteristics of external sourcing, even though their evidence suggested that strategic and quality considerations could be more important than cost reduction alone. Similarly, McIvor (2000) argued that organizations often pursue outsourcing primarily because of short-term cost-reduction expectations, but cautioned that such decisions should also consider their long-term strategic consequences. Accordingly, economic factors are likely to affect outsourcing decisions at Nigerian Army University Biu through considerations of budget constraints, lifecycle maintenance costs, contractor charges, internal staffing costs, and the potential economic advantage of obtaining maintenance services from specialized external providers.

Quality Factors

Quality factors concern the expected standard, reliability, responsiveness, effectiveness, continuity, and overall performance of maintenance services obtained through outsourcing. Empirical evidence suggests that quality is one of the most influential considerations in maintenance-outsourcing decisions. Assaf et al. (2011), in their study of Saudi Arabian universities, found that quality was among the most important factor groups and reported improvement in quality requirements as one of the three most influential individual factors affecting outsourcing decisions. Hassanain et al. (2015) similarly found that the quality factor group received the highest overall weight in their multi-criteria maintenance-outsourcing model, indicating that maintenance managers placed considerable importance on service quality when deciding whether to outsource. Ikediashi et al. (2012), examining facilities-management outsourcing risks in Nigeria, found poor quality of services to be the most critical risk, highlighting the importance of quality assurance when external contractors are used. Ikediashi et al. (2014) also identified improvement in stakeholders' satisfaction as one of the highest-rated determinants of FM outsourcing among Nigerian commercial banks, thereby linking outsourcing decisions with perceived service quality and stakeholder outcomes. In another empirical study, Summers and Visser (2021) found that improved work quality was among the most important factors identified by managers in previous maintenance-outsourcing experiences. These findings indicate that quality factors may be particularly significant at Nigerian Army University Biu because poorly maintained physical facilities can disrupt teaching, accommodation, administrative activities, research, and other institutional operations; consequently, the ability of external contractors to deliver reliable and high-quality maintenance may be an important determinant of outsourcing decisions.

Functional Characteristics Factors

Functional characteristics factors describe the inherent characteristics of the maintenance activity being considered for outsourcing, including its complexity, strategic importance, specificity, frequency, measurability, substitutability, transferability, and the extent to which it can be separated from the organization's core functions. Hassanain et al. (2015) explicitly identified function characteristics as one of the six categories of factors influencing maintenance-outsourcing decisions, demonstrating that the nature of the maintenance function itself is an important consideration in deciding whether to retain or outsource it. Assaf et al. (2011) likewise incorporated functional characteristics factors into their empirical assessment of maintenance outsourcing in Saudi Arabian universities, showing that outsourcing decisions depend partly on the characteristics of the particular maintenance activity rather than on a general preference for outsourcing. Espino-Rodríguez and Padrón-Robaina (2005), using empirical evidence from the hotel sector, found that activity performance, substitutability, and transferability can determine whether an activity is suitable for outsourcing and that the characteristics of the activity affect organizational performance following outsourcing. Mclvor (2008) further demonstrated that organizations should distinguish between processes that should remain internal and those that should be outsourced based on organizational capabilities and the characteristics of the activity. Summers and Visser (2021) similarly found that maintenance and asset managers assess different decision factors according to the particular maintenance activities being considered, suggesting that outsourcing should not be treated as a uniform decision across all maintenance functions. In the context of Nigerian Army University Biu, this implies that the decision to outsource may vary according to the

characteristics of individual facilities-maintenance functions; routine activities such as cleaning, landscaping, plumbing, or preventive maintenance may be more readily outsourced than highly sensitive, specialized, or strategically important functions requiring direct institutional control.

METHODOLOGY

The scope of this research was focused on obtaining responses on the developed questionnaire survey from the in-house maintenance department managers/staffs of Nigerian Army University Biu. The maintenance department managers and staffs were considered as subject matter experts in the domains of maintenance and outsourcing practices, as they have opted to outsource several of their maintenance services to specialty contractors. These professionals are responsible for overseeing all the technical and administrative actions intended to retain the infrastructure of their campuses in ideal conditions. Using a cross-sectional survey method, data were gathered on the bases of total sampling technique in the study. In whole, 104 in-house maintenance department managers/staffs were approached for the data collection. These include, both the university staffs and the temporary staffs retained as in-house staffs of the maintenance department. Exploratory Factor Analysis EFA was used for the data analysis to be able to respond to the research objectives of the study. In an entirety, 38 items signifying outsourcing decision dimensions were exposed to principal component analysis using varimax rotation in order to find out the factor structure. In this, the factors with factor loadings greater than or equal to 0.5 were recollected and reserved as the prevailing outsourcing factors (Tri et al., 2023; Zhang et al., 2024). The outcomes were also used to identify the sampling adequacy Kaiser-Meyer-Olkin (KMO).

Table 1: Operationalization of Research Variables and Coding

Variables	Variable Descriptions	Variable Codes
Strategic Factors	Risk sharing with contractors	STG1
	Access to world class capabilities	STG2
	Strategic alliance with contractors	STG3
	Focus on core activities	STG4
	Lack internal resource for a service	STG5
	Freeing resources for core activities	STG6
	Improve flexibility	STG7
	regulations governing outsourcing practices	STG8
	accelerate re-engineering benefit	STG9
Economic Factors	Improve the cash flow	ECO1
	Reduce the operating cost	ECO2
	Save the overall cost	ECO3
	Cash infusion	ECO4
	Increase economic efficiency	ECO5
	make the capital funds more available for core activities	ECO6
	make the fixed cost in to variable cost	ECO7

Variables	Variable Descriptions	Variable Codes
Management Factors	Function difficult to manage	MGT1
	Save management time	MGT2
	Need for special management	MGT3
	Increase speedy implementation	MGT4
	Reduce management load	MGT5
	Safety management	MGT6
	Consolidation and decentralization	MGT7
Technological Factors	Acquire new technical knowledge	TEC1
	Initiate innovative ideas/techniques	TEC2
	Need for specialize expertise	TEC3
	Technology requirements uncertainty	TEC4
	Achieve flexibility in changing technology	TEC5
	Improve the technology for competitive advantage	TEC6
Functional Characteristics Factors	Lack of equipment/tools	FCH1
	Function integration and structure	FCH2
	Flexibility of function	FCH3
	Function difficult to control	FCH4
	lack of spare parts	FCH5
Quality Factors	Procure reliability and competency	QTY1
	Improve quality requirements	QTY2
	Achieve quality competitive advantage	QTY3
	Improve service quality	QTY4

RESULTS AND DISCUSSION

Exploratory factor analysis (EFA)

EFA is typically employed to determine construct suitability or interrelationship among the combination of variables (Zhang et al., 2024). Similarly, EFA is also viewed as a factor reduction method which takes a large number of variables and look for the way the data may be reduced or summarised using a smaller set of components or factor (Tri et al., 2023; Zhang et al., 2024). In this research, EFA was performed to establish the perfect factor loadings which would enable the researcher to identify the required factors affecting outsourcing decision to maintain physical assets and facilities in the Nigerian Army University Biu, using data from the respondents' responses. Consequently, all the indicators or items that were used during the EFA analysis were reduced to the perfect factor loadings that are more relevant and suitable to the main constructs of outsourcing decisions. Therefore, EFA indicates a strong correlations and perfect loading between an item and its main construct on the bases of threshold of 0.5 factor loading, thus all the poor loadings of less than 0.5 were removed as shown in rotated component matrix Table.

In the process of conducting EFA the suitability and sampling adequacy of data needs to be measured (Zhang et al., 2024). Similarly, EFA can offer evidence based on internal structure when the constructs and several

aspects are evaluated (Tri et al., 2023; Zhang et al., 2024). Furthermore, Kaiser Meyer Olkin's Criterion was also used to indicate that only factors with eigenvalues of more than one were reserved for the analysis (Tri et al., 2023; Zhang et al., 2024). The Scree Plot test was used to substantiate the reserved factors. Then, most importantly, in the research, principal component analysis and rotated component matrix were achieved to evaluate the core structure of the 38 items of outsourcing factors which were exposed to the test of total variance explained in the EFA (Tri et al., 2023; Zhang et al., 2024).

Sampling Adequacy and Suitability of data

The first set of result obtained from the EFA technique was about sampling adequacy in which Kaiser-Meyer-Olkin measure (KMO) was used. The suggested minimum threshold for KMO is 0.5 (Rosdi, 2025; Tri et al., 2023; Upadhyaya & Malek, 2024; Zhang et al., 2024).

In this study the result of KMO was .860 which revealed that sample size was sufficient for other remaining results of EFA. In addition to the test of sampling adequacy, the Bartlett's test of Sphericity was also achieved to test the homogeneity of variance (Tri et al., 2023; Upadhyaya & Malek, 2024; Zhang et al., 2024). The result revealed that the Bartlett's test of Sphericity was significant, $X^2(780) = 5473.739$, $p < 0.001$.

Table 2: Kaiser-Meyer-Olkin Measure (KMO) and Bartlett's Test

KMO Measure of Sampling Adequacy		0.860
Bartlett's Test of Sphericity	Approx Chi-Square	5473.739
	Df	780
	Sig	0.000

From Table 2, it is established that the data was suitable for further EFA which include Principal Component Analysis (PCA), the outcomes of this test is embodied in Table 3 which displays the total variance explained in the concluded EFA.

Total variance explained

The indicators or items used in the research questionnaire were exposed to the principal component analysis which

displayed the existence of six constructs related to outsourcing decision, these are (Strategic, Economic, Management, Technological, Function Characteristics, and Quality) each with eigenvalues more than one explaining 47.634%, 23.253%, 5.446%, 5.446%, 3.182% and 2.065% of the variance table: 3, which resulted in to 84.909% cumulative (table 3). This percentage value is greater than the suggested least threshold of 60%.

Table 3: Total variance explained

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
STG	19.054	47.634	47.634	19.054	47.634	47.634
ECO	9.301	23.253	70.887	9.301	23.253	70.887
MGT	2.179	5.446	76.333	2.179	5.446	76.333
TEC	1.331	5.446	81.779	1.331	5.446	81.779
FCH	1.273	3.182	84.961	1.273	3.182	84.961
QTY	1.826	2.065	87.026	.826	2.065	87.026

For the six constructs (Strategic, Economic, Management, Technological, Function Characteristics, and Quality) with eigenvalues greater than one as shown by Scree Plot, Table 2 lists every factor taken from the analysis results along with its eigenvalues and cumulative variances.

Scree Plot for Factors of Outsourcing Decision

A statistical graph of eigenvalues shown against each of the extracted components is called a scree plot. According

to Tri et al., (2023), the Scree Plot is a method of analyzing the eigenvalues graph by observing the graph curve's break point, natural bend, or flattening out. The Scree Plot thus aids the researcher in figuring out how many elements should be removed or extracted from the rotated component matrix. Six elements may be suitable or applicable for the break point where the data in the graph curve flattens, according to an inspection or check-up study using Scree Plot in Figure 1.

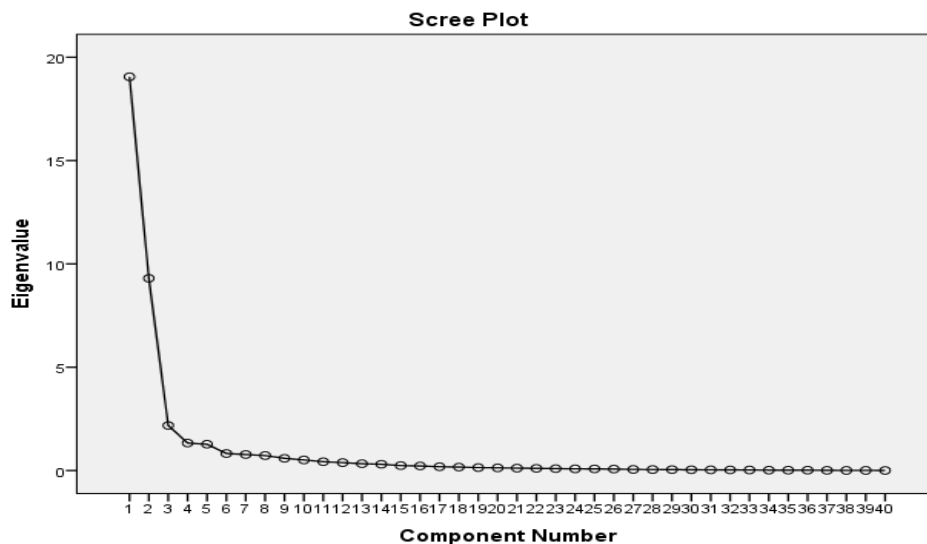


Figure 1: Scree Plot for Factors of Outsourcing Decision

According to Tri et al., (2023); Zhang et al., (2024) proposed that all components above the elbow of the Scree Plot should be reserved because they significantly contribute to the explanation of the variance for the set of variables used in the analysis. This view is further supported by the rotated component matrix in Table 3, which shows the six components (Strategic, Economic, Management, Technological, Function Characteristics, and Quality). Figure 1, shows the sixth component, which corresponds to the elbow where the graph flattens out.

Rotated Component Matrix

The EFA produced the rotated component matrix in order to identify the items that can be loaded onto the same factor. (Tri et al., 2023) suggests the loading of an absolute value is 0.5 and above. Therefore, in this research the rotated component matrix was formed by suppressing any loadings of less than 0.5 and setting the variables by loading size to support the easier interpretation (Table: 4).

Table 4: Rotated Component Matrix

	Component					
	1	2	3	4	5	6
STG4	.871					
STG2	.864					
STG6	.704					
STG1	.768					
STG5	.636					
STG3	.582					
STG7	.551					
STG9	.463 Delete					
STG8	.444 Delete					
Cronbach's Alpha Value of STG 0.912						
ECO3		.816				
ECO2		.803				
ECO1		.772				
ECO4		.658				
ECO5		.544				
ECO6		.476 Delete				
ECO7		.442 Delete				
Cronbach's Alpha Value of ECO 0.932						
MGT5			.621			
MGT2			.610			
MGT3			.601			
MGT4			.597			
MGT1			.591			
MGT6			.528			
MGT7			.482 Delete			
Cronbach's Alpha Value of MGT 0.922						
TEC5				.749		
TEC2				.733		
TEC4				.713		
TEC3				.708		
TEC1				.637		
TEC6				.442 Delete		
Cronbach's Alpha Value of TEC 0.924						
FCH3					.705	
FCH2					.691	
FCH1					.572	
FCH4					.442 Delete	
FCH5					.470 Delete	
Cronbach's Alpha Value of FCH 0.833						
QTY4						.826
QTY2						.802

QTY3	.796
QTY1	.672

Cronbach's Alpha Value of QTY 0.841

0 Extraction Method: Principal Component Analysis.

6 components extracted.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 25 iterations.

Name of Components 1. STG = Strategic, 2. ECO= Economic, 3. MGT= Management, 4. TEC= Technological, 5. FCH= Function Characteristics, 6. QTY= Quality

Prevailing Factors determining outsourcing decision in NAUB

Table 3: above presents the rotated component matrix of the prevailing factors of outsourcing decision, The table identified six main constructs (Components 1 to 6). Loaded on to each component, are the measurement items with their corresponding factor loadings explaining each main construct on the bases of strength of correlation. The strength of correlation is determined by the threshold limit of 0.5 and above. This implies that any factor with less than 0.5 factor loading should therefore be deleted from the analysis because it turned out to be a weak factor and therefore cannot be able to explain the main construct.

Factor one (Strategic factors) ranges from .871 to .551, two items were deleted STG9 and STG8 with reliability value of

0.912. Factor two (Economic factors) ranges from .816 to .544, two items were also deleted ECO6 and ECO7, with reliability value of 0.932, factor three (Management factors) ranges from .621 to .528, in this component only one item was deleted MGT7 with reliability value of 0.922. Factor four (Technical factors) ranges from .749 to .637, one item was also deleted from this scale TEC6 and the reliability value is 0.924. Factor five (Functional characteristics) ranges from .705 to .572, two items were deleted FCH4 and FCH5 with reliability value of 0.833 and factor six (Quality factors) ranges from .826 to .672 with reliability value of 0.841. Nevertheless, 38 factors across 6 constructs tested, 30 emerged as the prevailing factors of outsourcing decision.

Table 5: Component Metrix of Prevailing Factors determining outsourcing decision in NAUB

	Component					
	Strategic Factors	Economic Factors	Management Factors	Technological Factors	Function Characteristics	Quality Factors
Focus on core activities	.871					
Access to world class capabilities	.864					
Freeing resources for core activities	.704					
Risk sharing with contractors	.768					
Lack internal resource for a service	.636					
Strategic alliance with contractors	.582					
Improve flexibility	.551					
Cronbach's Alpha Value of Strategic Factors = 0.912						
Save the overall cost		.816				
Reduce the operating cost		.803				
Improve the cash flow		.772				
Cash infusion		.658				
Increase economic efficiency		.544				
Cronbach's Alpha Value of Economic Factors = 0.932						
Reduce management load			.621			
Save management time			.610			
Need for special management			.601			
Increase speedy implementation			.597			
Function difficult to manage			.591			
Safety management			.528			
Cronbach's Alpha Value of Management Factors = 0.922						
Achieve flexibility in changing technology				.749		
Initiate innovative ideas/techniques				.733		
Technology requirements uncertainty				.713		
Need for specialize expertise				.708		

Acquire new technical knowledge	.537
Cronbach’s Alpha Value of Technological Factors = 0.924	
Flexibility of function	.705
Function integration and structure	.691
Lack of equipment/tools	.572
Cronbach’s Alpha Value of Functional Characteristics = 0.833	
Improve service quality	.826
Improve quality requirements	.802
Achieve quality competitive advantage	.796
Procure reliability and competency	.672
Cronbach’s Alpha Value of Quality Factors = 0.841	
0 Extraction Method: Principal Component Analysis.	
6 components extracted.	
Rotation Method: Varimax with Kaiser Normalization.	
Rotation converged in 25 iterations.	

Discussion and implications

Due to the current differences in the specialization and technological capabilities of individual organizations, this study concentrated on the outsourcing decision of maintenance of physical facilities in NAUB. As a result, the study looks at the factors that influence outsourcing decision in the study area. The study's conclusions showed that, out of the 38 items or predictors of outsourcing decision, 30 stood out as the most accurate and prevailing factors of outsourcing decision in NAUB. The results of several studies, including one by (Assaf & Al-nehmi, 2023; Sun et al., 2025), support this conclusion that a number of factors have a major impact on decision to outsource. In the light of this, six main constructs were identified from the outcome of this study analysis. The exploratory factor analysis (EFA) result revealed six major constructs which are Strategic factors, Economic factors, Management factors, Technological factors, Functional characteristics and Quality factors. Additionally, each of the 30 measuring items, that emerged, had an acceptable factor loading of 0.5 or higher across the previously specified constructs. Accordingly, 8 items with factor loadings less than 0.5 were eliminated since they had no correlation with the six constructs or components of outsourcing that were determined from the respondents' responses. Two of the eight measurement items that were removed came from strategic construct. These consist of accelerate re-engineering benefit and regulations governing outsourcing practices. Also, two items that could not load to their component came from economic construct, which include make the capital funds more available for core activities and make the fixed cost in to variable cost. Further, there are other two factors from management and technical constructs which are consolidation and decentralization, and improve the technology for competitive advantage, respectively. While, the remaining two items among the eight unloaded factors came from function characteristics factors, these include function difficult to control and lack of spare parts. This

may be explained by the fact that the outsourcing practice is not at a higher scale in the organization, thus the respondents' experience may not cover the unloaded factors.

CONCLUSION

Given the study findings, six major constructs were found from the EFA analysis, and out of the 38 items included in the first analysis, 30 of them stood out as more significant and reliable predictors of outsourcing decision of maintenance of physical facilities in the Nigerian Army University Biu. Seven factors are loaded under the strategic construct, five are related to the economic construct, six are related to the management construct, five are related to technological factors, three are related to function characteristics construct and four items are related to quality factors.

Ethical Considerations

The study, titled (Exploratory Factor Analysis of Prevailing Factors Affecting Outsourcing Decisions for Maintenance of Physical Facilities: A Case Study of Nigerian Army University Biu), have strictly adhered to established ethical principles governing research involving respondents in a social setting (case study). Prior to data collection, appropriate permission has been obtained from the relevant authorities of Nigerian Army University Biu, while informed consent was also sought from all respondents after clearly explaining the purpose, scope, procedures, and voluntary nature of the study. Respondents were informed that participation is entirely voluntary and that they have the right to decline participation or withdraw at any stage without penalty or adverse consequences. Confidentiality and anonymity have been maintained by avoiding the collection of unnecessary personally identifiable information and by ensuring that responses were used strictly for academic purposes. Given the institutional and military-related context of the study, particular care was taken not to solicit or disclose classified, operationally sensitive, or security-related

information. Data collected were securely stored, accessed only by the researcher and authorized research personnel, and reported in aggregate form so that individual respondents or specific units cannot be identified. The researcher also ensured that findings were presented accurately and objectively, without fabrication, falsification, manipulation, or misrepresentation of respondents' views. All relevant academic sources were properly acknowledged using appropriate citation and referencing practices, thereby upholding academic integrity and avoiding plagiarism. Through these measures, the study protected the participants' rights and welfare while ensuring that the research process was conducted with integrity, transparency, confidentiality, and respect for institutional and ethical standards.

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