Effectiveness of Facilities Management Strategies Employed by Universities in Northeast Nigeria

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Abstract- ***This study investigated the effectiveness of facilities management (FM) strategies employed by universities in Northeast Nigeria, addressing issues of operational efficiency and resource optimization. The issues of ineffective FM in Nigerian universities leads to a range of negative effects, including deteriorating infrastructure, increased costs and disruptions to academic activities. Therefore, this study aimed to determine the predominant available FM strategies utilized and assess their effectiveness in achieving operational efficiency. Exploratory sequential mixed-methods approach was employed, involving 14 supervisory and managerial staff and 325 senior staff from works and maintenance departments across seven federal universities. Purposive and stratified random sampling techniques were used to categorized and select the study samples. Results revealed that hybrid and outsourced FM strategies were most available (42.9%), while facilities simulation and condition-based strategies were least utilized (21.4%). In terms of effectiveness, in-house corrective FM, condition-based FM and facilities replacement strategies demonstrated high effectiveness. Equally, building simulation/forecasting and in-house preventive FM strategies were found to be less effective. The study recommended that university stakeholders should focus on increasing awareness of the long-term benefits of technologies like facilities simulation and condition-based maintenance. This involve providing educational resources, developing case studies showcasing successful implementations, and offering incentives to encourage initial investments in these technologies***

Indexed Terms- ***Effectiveness; Facilities Management Strategies; In-house; Out-tasking; Hybrid***

I. INTRODUCTION

In the rapidly changing world of higher education today, efficient facilities management (FM) has become critical for institutions all over the world (Adegoriola, 2023; Lok *et al.*, 2024). From classrooms and labs to administrative offices and residence halls, FM includes a wide range of services and tactics targeted at maximizing the use, upkeep, and overall performance of university buildings, infrastructure, and support services. 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). Effective FM presents numerous issues for colleges around the world. Ageing infrastructure, financial limitations, environmental issues, quick technical breakthroughs, and shifting student expectations are some of these difficulties. These issues call for the use of eco-friendly procedures and technologies, as well as the cautious prioritization of maintenance and upgrade projects. Universities also need to change to accommodate students' changing needs (Yusuf and Ibrahim, 2024). Universities in Africa, struggle with the complexities of FM services, just like their competitors around the world. For instance, Mewomo *et al.* (2022) study on the factors influencing effective FM practices in Kwazulu Natal, South Africa, found that the state of facility deterioration, occupants' knowledge of FM, the lack of a policy guiding FM practice, and design concepts and scope were all major obstacles to effective FM practices. This is comparable to the situation in Nigeria, where political meddling, outdated infrastructure, corruption and resource mismanagement make it more difficult to allocate funds effectively and interfere with FM planning. For example, the study of Adeyemi (2023) demonstrates that the primary challenges are insufficient money, a shortage of qualified staff, and poor maintenance cultures. These results offer

insightful information for enhancing FM procedures in Nigerian academic institutions. As a result, efficient FM procedures are essential for making the most of current facilities, guaranteeing their upkeep, and making plans for future infrastructure requirements. By providing comfortable, safe, and functional learning environments, optimizing energy use, minimizing maintenance, and extending asset lifespan, as well as by promoting sustainability and supporting academic and research activities, effective FM strategies can help universities improve student experience, faculty productivity, lower operating costs, improve the institution's reputation, and support academic and research activities (Gunduz *et al.,* 2024). Consequently, research on FM practices in Nigeria has been studied, although little of it has been done with a particular focus on the North East. The contextual factors influencing FM effectiveness in this region's institutions were not sufficiently covered in the literature that was previously available. By filling in these gaps, this study will help identify the variables that affect FM techniques' efficacy in the unique North East environment and offer insightful information to FM experts, university administrators, and legislators. Thus, the following research questions are the focus of this study:

What are the predominant FM strategies employed by universities in the North East region of Nigeria and how effective are these strategies in achieving desired outcomes, such as operational efficiency?

II. STRATEGIES UTILSED IN FM PRACTICE IN TERTIARY INSTITUTIONS

Facility management (FM) encompasses a wide range of strategies aimed at optimising the lifecycle of a built environment asset, ensuring its functionality, efficiency, and user well-being (Olaniyi, 2017; Islam *et al.,* 2021). These strategies can be categorised into several key areas such as implementing preventive and corrective maintenance plans to extend asset lifespan and minimise downtime, implementing strategies to reduce energy consumption and associated costs, such as building automation, renewable energy sources, and occupant behaviour change programme (Hamasha *et al.,* 2023), Reducing water consumption through equipment upgrades, leak detection, and landscaping practices and minimising waste generation and implementing responsible disposal methods such as recycling and composting (Abubakar *et al.,* 2022). Lindkvist *et al.* (2021) explained that an effective FM plan should begin with the educational policy that caters for individual needs in a dynamic and knowledge-based economy. The need of FM for facilities in tertiary institutions cannot be overemphasized. In line with the thought of Opoku and Lee (2022) management has the responsibility to ensure that FM is a collective effort and the management processes involve planning, organising, decision-making, leading, coordinating and controlling. The study of Samuel (2023) revealed that the current FM strategy practices in Nigerian tertiary institutions include;

Reactive maintenance is a traditional approach that focuses on repairing breakdowns when they occur, leading to higher long-term expenses. Preventive maintenance involves scheduled inspections, routine tasks, and condition monitoring to prevent breakdowns and extend asset lifespan. Computerized maintenance management systems (CMMS) streamline workflows and improve preventive maintenance practices. Some institutions outsource specific FM functions to specialized companies for expertise and cost savings, but careful contract management is required. User engagement fosters ownership and efficient resource utilization by engaging students, faculty, and staff in responsible usage and reporting of facility issues. In Nigeria, Aka *et al.* (2022) assessed the underlying strategies for FM practice in a Nigerian Polytechnic regularly. The outcome revealed that the available facilities are not being inspected; this implies that unplanned or corrective maintenance (waiting for breakdown before taking action) is being adopted in the institution. This might have led to the deplorable conditions of the facilities in the institution. Based on the findings of Ikediashi (2014) and Odediran *et al.* (2015) there are several strategies available for FM in Nigerian tertiary institutions. These options include in-house, where a service is provided by a dedicated resource directly employed by the organisation even though the monitoring and control of performance is conducted under the terms of conventional employer/employee relationship. Outsourcing where a service is commissioned from an external supply organisation usually under the terms of a formal contractual

arrangement based upon terms and conditions derived from a service level agreement. Public private partnership (PPP) where a partnership or strategic alliance is formed between the organisation and service provider based on the sharing of the responsibility for the delivery and performance of the service, including the sharing of the profits arising from any efficiency gains and cost savings. Total facilities management (TFM) where a whole range of services are bundled together and externalised to a single supplier which becomes totally responsible for the delivery, monitoring, control and attainment of stated performance objectives in the contract.

However, the choice of which of the approaches to adopt will depend on a number of factors such as cost considerations, flexibility and transfer of risks. The best approach should be the one that provides value for money to the institutions. Many public institutions including those in Nigeria are vigorously adopting outsourcing as a way of improving sustainable resource management practice while most of them have functional FM units (Ikediashi, 2014; Ikediashi, 2023). Zimba (2023) further explained that the rising popularity of FM coupled with the growing interest of the public sector in the outsourcing of FM services underscores the need for organisations to make careful and informed decision about whether to outsource or use in-house staff.

2.1 Challenges of strategies utlised in FM practice by Nigerian Universities

Effective (FM) plays a crucial role in ensuring a conducive learning environment and supporting academic excellence in Nigerian universities (Abdullahi, 2017). However, numerous challenges such as inadequate funding, poor policy implementation, limited expertise and training, reactive approach and lack of user awareness hinder the successful implementation of various FM strategies in these institutions (Durdyev *et al.,* 2022; Moghayedi *et al.,* 2024). Aka *et al.* (2022) further highlighted the lack of dedicated funding, poor management attitudes, and inadequate staff training as significant barriers to effective FM practice in Nigerian tertiary institutions. Njoku and oluwuo (2018) studied the challenges and strategies of FM for knowledge delivery in Universities in Rivers and Bayelsa States: The study exposed the concerns about limited funding, managerial incompetence's, and the absence of clear FM policies in Nigerian universities. Odediran (2015) also investigated FM practices in the Nigerian public universities: The outcome identified the low level of innovation, insufficient finance, and poor policy enforcement as significant challenges impacting FM practices. The study of Gbadegesin (2015) pointed out that passive approach to FM is leads to deterioration and obsolescence, and recommended outsourcing solutions and adopting a more proactive strategy.

Oladokun and Ajayi (2018) revealed these FM challenges interact and create a complex environment for FM in Nigerian universities. Inadequate funding often leads to limited training and out-dated technology, perpetuating reactive approaches and further straining resources. Poor policy implementation and lack of awareness among users exacerbate the situation. Overcoming the challenges of FM in Nigerian universities requires a multi-pronged approach. Addressing funding limitations, building capacity, promoting a proactive maintenance culture, and leveraging technology are key steps towards achieving efficient and effective FM practices. This, in turn, will create a more conducive learning environment for students, faculty, and staff, ultimately enhancing the overall quality of Nigerian universities (Amos *et al.,* 2021; Amos, 2022). The study of Yusuf *et al.* (2022) further explained that Nigerian universities face numerous challenges in maintaining their facilities due to budget constraints, aging infrastructure, and a lack of strategic maintenance practices. These challenges are associated with three main facility management strategies employed by Nigerian universities that include in-house, out-tasking, and hybrid approaches (Jensen *et al.,* 2017).

2.2 Theoretical underpinning

The study's foundation was strategic management theory, which highlights how crucial it is to match an organization's talents and resources with its strategic goals in order to gain a competitive edge. This translates to making sure that facilities are run in a way that advances the purpose, vision, and objectives of the university in the framework of FM (Fialho *et al.,* 2022). According to the research of Gunduz *et al.* (2024), strategic management theory may be applied to FM (FM) in Nigerian universities. By coordinating

FM strategies with the strategic goals of the university, these establishments can make sure that their facilities complement their purpose and vision. This could entail giving facilities that improve research, teaching, learning, and student life top priority when making investments. Also, Akinwusi (2024) revealed that strategic management principles can also help optimize resource allocation for FM, such as implementing energy-efficient technologies, outsourcing non-core FM services, and adopting preventive maintenance strategies. By tracking key performance indicators (KPIs), these universities can monitor the effectiveness of their FM strategies and identify areas for improvement. This data-driven approach can inform decision-making and lead to continuous improvement in FM performance (Segubiense Fernandez *et al.,* 2021).

Thus, universities in North East Nigeria can use strategic management theory to tackle particular issues including scarce resources, security worries, and adjusting to a quickly changing environment. In order to solve environmental problems like desertification and water scarcity, the emphasis should be on sustainability, which includes energy efficiency, water conservation, and waste reduction. These universities may adapt to regional concerns, make sure their FM practices are in line with their mission, and establish a supportive learning environment for both professors and students by implementing a strategic management strategy.

III. METHODOLOGY

This study adopted exploratory sequential mixed method due to the nature of research questions that required an in-depth interview and questionnaire to gain insight into issues regarding strategies utilised and its effectiveness in the study area. The exploration is convenient in exploring new issues especially in a particular territory (Antony *et al.,* 2023). The approach allows the researcher to gather qualitative data first on the available strategies utilised in managing building facilities which allows the researcher to explore the complex experiences of participants regarding FM strategies available in North East universities' FM practice which may not be well-documented in the literature (Löhr *et al.,* 2020). The qualitative data are then utilised for the development of a quantitative survey instrument that accurately captures relevant variables on measuring strategy effectiveness. The mixed methods approach also provides a comprehensive understanding of the complex issue under investigation, incorporating both in-depth qualitative insights and generalisable quantitative data.

The target population for the study comprises fourteen (14) supervisory and managerial role staff in facilities/maintenance management unit and 325 senior staff from works and maintenance departments across seven (7) federal universities of North East Nigeria. The sample size for the senior staff from works and maintenance departments was drawn Yamane sample size model as follows:

$$n = \frac{N}{1+ N(e)^2}$$

Where n = sample size; N= target population, which is 325; e = level of precision or sampling of error which is ± 5%.

$$n = \frac{N}{1+ N(e)2}$$

$$n = \frac{325}{1+ 325(0.05)2} = n = \frac{325}{1+ 325(0.05)2} = n = \frac{325}{1.8125}$$

n = 179.61 rounded to 200

To ensure statistical precision, Cai and Wang (2024) explained that it is common to round up to the nearest whole number when determining sample sizes. This is because rounding up whole number can maintain a margin of error within the desired limit of 5%. This is especially important if the population is large and diverse. An addition of 20 samples was added to the calculated sample size of 200 to arrive at the total sample size of 220. This addition necessitated by the need to adequately take care of the likelihood of some respondents not returning their completed questionnaires, those that returned damage and those that returned with incomplete response. For the interview, two (2) interviewees from the works and maintenance departments of the seven federal universities who held managerial or supervisory positions in facilities/maintenance management and had at least five years of FM experience were selected for the in-person interview, making a total of fourteen (14) interviewees.

Purposive sampling and stratified random sampling were used in the study. Stratified random sampling

separates a population into pertinent strata, or universities, such that each university is fairly represented in the sample. Based on their geographic locations (states), the universities in the North East geopolitical zone were divided into seven groups for this study's questionnaire survey. A sample was chosen from each university. Purposive sampling was used in the study for the qualitative component since it is a method where specific respondents are specifically chosen to offer crucial information that cannot be found through other options.

For the qualitative strand, semi-structured interview was conducted to achieve explore the available strategies utilised in FM by universities in the study area. The interviews were done in person. Face-to-face interviews aid in eliminating bias from respondents who might have provided false information to illustrate their own curiosity. A structured questionnaire served as the research tool for gathering quantitative data for the quantitative strand. The purpose of the questionnaire was to gauge how well the FM strategy employed by the universities in the research region was working. The questionnaire's approach involves using closed-ended questions with a 5-point Likert scale. Every response on the Likert scale yields numerical data, allowing for statistical analysis and comparison among the universities in the sample. The study's measurement scale was modified from research by Heo *et al.* (2022) and Jenkins (2020). The decision rule interval for the descriptive analysis employed in this study is shown in Table 3.1, and the level of response for the total number of questionnaires distributed as well as those returned and used for analysis is shown in Table 3.5.

Table 3.1: Decision Rule Adopted for Descriptive Analysis

Descriptors	Variable of measurement	Mean score decision interval	Remark
Very effective to less effective	Strategy effectiveness	1-1.80	Not effective
		1.81-2.60	Less effective
		2.61-3.40	Moderate
		3.41-4.20	Effective
		4.21-5.0	Very effective

Source: Jenkins, (2020) and Heo *et al.* (2022)

Table 3.2: Questionnaire Administration

Universities	Returned	Analysed
Abubakar Tafawa Balewa University Bauchi	29	27
Federal University Kashere	34	32
Modibbo Adama University of Technology Yola	46	43
Federal University Wukari	12	10
Federal University Gashua	31	28
University of Maiduguri	50	46
Nigerian Army University Biu	18	14
Total (%)	220	200(90.9)

Source: Field Survey, (2024)

From the Table 3.2 two hundred and twenty 220 copies were administered to works and maintenance department staff across the study area. Total number of (200) copies of the questionnaires were retrieved from the respondents. These indicate a response rate of 90.9% from works and maintenance department staff respectively across the study area. Therefore, total number 200 copies were used in the analysis as indicated in Table 3.2.

Both qualitative and quantitative data were collected and analysed in this study. The quantitative data collected were analysed descriptive mean ranking with the help of statistical package for social sciences (SPSS) version 24, while qualitative analysis was conducted using Nvivo 10 statistical tool. The analyses were conducted using thematic analysis

because of its flexibility and power in analyzing qualitative data, making it well-suited for investigating FM strategies in the study area.

IV. RESULTS AND DISCUSSION

The results are presented under both qualitative (available strategies utilised) and quantitative (effectiveness) of the strategies. The qualitative form was presented first followed by the quantitative. The available strategies utilised and its data sources are presented in Table 4.1 as well as in Figure 4.1. The result was further analysed using thematic analysis based on qualitative data presented in Table 4.1 as well as in the Figure 4.1. The result of the analysis on effectiveness of the strategies was presented using mean ranking analysis in Table 4.2.

Table 4.1: Available Strategies Utilised in FM by Universities in North East Universities, Nigeria

S/N	Available strategies	Source	Frequency	Percentage
1	In-house			
	Upgrading and facilities replacement	ATBU 1 & 2; Kashere; Yola	4	28.5
	Condition-based strategy	Unimaid 1; Unimaid 2; Wukari 2	3	21.4
	Benchmarking comparison	Gashuwa; Wukari; ATBU 2; Biu	4	28.5
	Facilities simulation	Yola 2; ATBU 1 and Unimaid 2	3	21.4
	Remedial approach	Gashuwa 2; Uni Maid 2; Kashere and Gashuwa 1	4	28.5
	Schedule approach	Unimaid 2; Biu; Wukari 1 & 2; Yola	5	35.7
2	Use of out-tasking (Hiring private security firms, contracting cleaning services, and collaborating with waste management companies for collection and disposal)	Yola 2; ATBU 2; Unimaid 2 Gashuwa 2; Uni Maid 1; Kashere 1	6	42.9

3	Hybrid (Use of contract based on non-core FM functions such as cleaning, waste management and landscaping. In-house strategy involving core FM functions such as building operations (HVAC, lighting, plumbing))	ATBU 1, Gashuwa 1, Kashere, Unimaid 1; Yola; Biu 2	6	42.9

Source: Field Survey, (2024)

The interview responses presented in Table 4.1 indicate that strategy utilised in the study area involved the use of in-house, out-tasking and the strategy that combines both in-house and out-tasking called hybrid. The data further revealed that in-house strategy was categorised into upgrading and facilities replacement, benchmarking, condition-based strategy, facilities simulation, remedial and schedule approach. From the responses hybrid and use of out-tasking are the major available strategies covering 42.9% of the response while facilities simulation and condition-based strategy are the least available strategies with only 21.4% of occurrence.

The model in Figure 4.1 shows the nodes that emerged from the interviews indicating how each university revealed the strategies utilised in managing building facilities in the study area. The total arrows pointing a particular university from a particular node (strategy) indicates that those universities adopted that strategy as the obtainable strategy utilised for their FM operations. The Figure was developed based on the data presented in Table 4.1

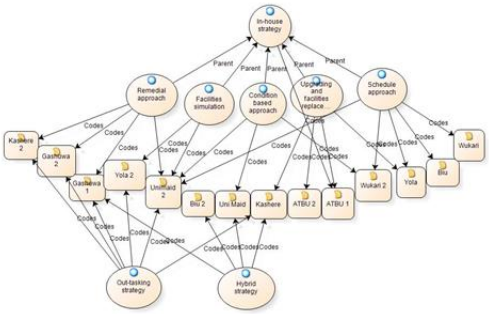

Figure 4.1: Available strategies Utilised in FM by Universities (Field survey, 2024)

As shown in Figure 4.1, the analyses from the interviewed participants were further discuss one after the other in the following sub-sections (4.1 to 4.3)

4.1 In-house strategy

In-house FM strategy is a plan that outlines how universities will manage its own facilities and assets. It normally aligned with the universities overall professional strategy and goals, and it take into account the specific needs of the universities facilities and users. The interviewees from the interview pointed out that in-house FM is a service strategy that is provided by dedicated employees of the university, the employees normally has professional knowledge and technical experience of managing facilities. The result further shows that in-house strategy is categorised under remedial approach, routing strategy, benchmarking, upgrading and facilities replacement, simulation and schedule approach in the study area

4.1.1 Remedial approach

Remedial approach is considered one of the strategies utilised in managing building facilities in the study area. The strategy is normally carried out using in-house technical staff and professionals that have experience with regard to FM within the institution and it normally takes care of already damaged facilities with a view to restoring it to earlier functional stage. The following are some excerpts of the verbatim expressions of the interviewees:

“The institution considers the use of corrective approach using in-house personnel to manage building facilities in most cases, the strategy usually take care of already wounded or harm facilities and reinstate it to earlier functional stage it was” Gashuwa; Uni Maid. “The management normally adopted the practice of

inhouse services, the inhouse usually carried out corrective repairs and replacement of facilities already damage and reinstate it to it functional stage" Kashere; Gashuwa 2. Gbesoevi *et al.* (2024) supported these result by displaying that remedial approach to building FM can be effective in restoring damaged facilities to their earlier functional stage. However, it is important to note that the remedial approach is a reactive approach, which means that it is used to address problems after they have occurred. This can lead to higher costs and disruptions to operations. Molęda *et al.* (2023) also shows a related finding that shows remedial approach as not a substitute for preventive maintenance. Preventive maintenance is a proactive approach that is designed to prevent problems from occurring in the first place. By implementing a preventive maintenance program, institutions can reduce the need for remedial maintenance and save money in the long run.

4.1.2 Upgrading and facilities replacement

The interviewees responded that building facilities are sometimes upgraded from outdated brand to new modern design. They considered the advantages of the modern design over the outdated design to simplify future management in terms of cost and operation. For instance, interviewees from ATBU and Yola statements connote this preposition.

"The university adopted in-house based on corrective upgrade and replacement of facilities. For example, because of high cost of energy from public source and even alternative source such as generator and solar systems, facilities that are energy savers such as lighting and other electronics appliances such air condition are replace with the modern brand that consume low energy and also easier to manage because of the technology attached to it, it consumes low energy and can easily remove and replace (Kashere). "Another result shows that facilities such as plumbing and furniture's are replaced with modern brand to make it easier in terms future management, example is in the case of plumbing, the out-dated pipes used before are normally iron and it has the disadvantage of rusting, so whenever repairs arise, we find it difficult to even untied the nodes, these make it necessary to be replacing it with modern rubber pipes that does not rust (ATBU 2). Wang *et al.* (2022) maintained the finding by displaying that modern buildings are often designed to be more energy-efficient, which can lead to significant savings on energy bills over time. Additionally, modern building materials and construction methods are often more durable and require less maintenance than older materials and methods.

4.1.3 Benchmarking

Responses from the interviewees on this regard revealed that the management of building facilities sometimes involve comparing the performance of a particular brand with an alternative brand to improve the conduciveness of the buildings. This assertion is supported by the view expressed by Biu and Wukari interviewees who mentioned that:

"A comparative approach is considered in our FM, for example if the performance of a particular brand of air condition in building is excellent in terms workability and maintenance such brand will be considered for the alternative buildings where the functionality of such service is less. Also, in the case of printing materials and equipment comparative assessment of brand is considered among different alternative used" (ATBU 2 and Biu). Gajanayake *et al.* (2024) revealed a comparable finding that shows there are a number of reasons why building managers might compare different brands. One reason is to find the most cost-effective products and services. Another reason is to find products and services that are the best fit for the specific needs of the building. For example, a building manager might compare different brands of HVAC systems to find the one that is most efficient and cost-effective for the building's size and climate. Building managers might also compare different brands to improve the sustainability of the building. For example, a building manager might compare different brands of insulation to find the one that is most energy-efficient.

4.1.4 Condition-based strategy

The responses from the interviewees also demonstrated that facilities are managed through monitoring the condition of facilities in the buildings. This is done through physical and visual inspection to identify sign of decreasing facilities performance or failure; then necessary action is put in place. The results on this are summarised as follows:

"Facilities are managed from the report gotten from our technical team (maintenance management team) who are assigned with the responsibility to go round the buildings in the university and monitor the condition of the facilities and identify the facilities that are faulty or those that needs urgent action, based on that, necessary actions are taking to rectify the problem" (Unimaid 2; Wukari 2). "Normally the condition of the facilities is monitored through physical inspection to assess the functionality of the facilities; it is the level of facilities condition that normally warrants the promptness of the action to be taken" Yola. The study of Hou *et al.* (2024) demonstrated a related result by displaying that regularly monitoring the condition of facilities and documenting their findings, facility managers can gain valuable insights that can help them to improve the performance, efficiency, and safety of their facilities.

4.1.5 Scheduled approach

The interviewees also described that the strategy adopted involved planning or scheduling depending on the urgency and nature of the deficiency identified. The risks involved and costs involved are major parameters to determine the planned FM schedule. The narration was revealed by Unimaid 2 interviewee as follows;

"The strategy used is normally based on scheduling and planning of activities, this is normally carried out depending on the emergency and nature of the work identified and the execution of the work is based on the resources budgeted for that particular management, example where an AC or fridge with in the buildings are not providing proper cooling due to refrigerant exustion. The repairs are not normally instantly but through schedule of activities based on the budget at hand (Biu; Wukari). Peiris *et al*. (2024) display a contradictory finding that shows facilities managers adopted a strategy of planning or scheduling FM tasks based on the urgency and nature of the deficiency identified, as well as the risks and costs involved. This strategy can help facilities managers to: ensure that the most important tasks are completed first, avoid costly repairs and downtime, improve safety and security and reduce costs.

4.1.6 Facilities simulation

FM operations are coordinated based on understanding and analysing the impact of interrelated FM alternatives and activities. The alternative is considered based on future forecast that using alternative quality option will reduce the cost expenditure of future management. The position was captured in the responses as stated by ATBU and Yola interviewees:

"The strategy normally involved the consideration of alternatives based on analysis or assessment that will take care of future liabilities. Example the company that is handling cleaning here was recently substituted with alternative because of poor performance, the decision was taken to promote the present and future performance of some facilities especially toilet facilities (Wukari). Hauashdh *et al.* (2022) demonstrated a comparable result shows facilities managers are considering the long-term costs and benefits of different FM alternatives, facilities managers can make decisions that will save money and improve the overall performance of the facility. Also by carefully considering the impact of interrelated FM alternatives and activities, and by making strategic choices about the materials and services they use, facilities managers can save money and improve the efficiency of their operations.

4.2 Out-tasking

The interview result also indicated that FM involving the service of cleaning, gardening and security are usually carried out using out-tasking contract strategy. The strategy ensures that some services are commissioned from an external supply organisation usually under the terms of a formal contractual arrangement based upon terms and conditions derived from a service level agreement. Sample opinions from the interviewees are that:

"The university consider the use of contract for cleaning and gardening. This shows we outsource from outside for our some of our FM service. Normally outsourcing of technical personnel is use for security and cleaning, enhanced managerial goals and objectives and facilities inspection are the major strategies adopted. The participant also demonstrated that the use of outsourcing help to achieve cost reductions expand service and expertise, improves employee productivity and morale, and greater potential toward sharpening corporate image (Yola 2; Uni Maid; Kashere). Adewunmi-Abolarinwa (2024) supported this finding by displaying that out-tasking can provide organisations with access to expertise and

resources that they may not have internally. For example, a specialised cleaning company may have the latest equipment and techniques to ensure that the organisation's facilities are cleaned to a high standard. Also out-tasking can be a more cost-effective way to deliver these services. External providers often have lower overheads and can achieve economies of scale, which can lead to lower costs for the organization

4.3 Hybrid strategy

The hybrid strategy combines both the use of in-house and out-tasking. According to the participants the strategy has the advantage of engaging professionals to carry out repairs and replacement of building facilities damage, contract management of some facilities to achieved cost reductions, and expand service and expertise. This position was captured in the responses as stated below:

"The university normally combine the practice of in-house and out-tasking, that is contract merging for our FM services, the in-house normally carried out corrective repairs and replacement of facilities using in-house staff while the out-tasking takes care cleaning and sometimes procurement of facilities. Another response shows that facilities are manage through preservation and rehabilitation with the help of professional in-house staff that have experience in that aspect, where there is need to engage additional services, we consider contracting for some FM management such as cleaning and security (Kashere; ATBU 1: Biu 2). Durdyev *et al.* (2022) demonstrated a similar finding that shows hybrid strategy allows organisations to scale their FM capabilities up or down as needed. For example, if an organisation is experiencing a period of rapid growth, it can outsource additional tasks to help manage the increased workload, engaging professionals to carry out repairs and replacement of building facilities damage. 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. By outsourcing these tasks to qualified professionals, organizations can ensure that the work is done right to a high standard.

Table 4.2: Effectiveness of Strategies utilised in FM by Universities in in North East Nigeria

Strategies	Mean	Std. Deviation	Rank	Remarks
Use of in-house through corrective FM approach	3.4632	1.00983	1	Effective
Condition based FM approach	3.4263	1.01926	2	Effective
Services and facilities replacement approach	3.4126	1.01310	3	Effective
Use of contracting (out-tasking) FM services	2.9132	1.16923	4	Moderate
Use of in-house and contracting (hybrid)	2.8000	1.15865	5	Moderate
Benchmarking/comparing and measuring one building facility against others	2.6395	1.19763	6	Moderate
Building Simulation/Building forecasting	2.3026	1.19254	7	Less effective
Use of in-house through preventive FM approach	2.2895	1.16111	8	Less effective

Source: Field survey, (2024)

The result in Table 4.2 indicates that the mean value ranged from the highest mean value of 3.4632 to the lowest mean value of 2.2895. It can be perceived from the Table that effectiveness of strategies based on the use of in-house approach through corrective FM approach, use of contracting (outsourcing) FM services and facilities replacement approach are highly

effective with the high mean value of 3.4632, 3.4263 and 3.4126 respectively. condition based FM approach, use of in-house and contracting and benchmarking/comparing and measuring one building facility against others are moderately effective with a mean values of 2.9132, 2.8000 and 2.6395 respectively while building simulation/building forecasting and use of in-house through preventive FM approach effectiveness are less effective with a mean value of 2.3026 and 2.2895. The result shows that using in-house FM services based on corrective FM approach, condition-based FM approach and services and facilities replacement approach are highly effective in the study area, while building simulation/building forecasting use of in-house through preventive FM approach are less effective. The outcome further indicates that facilities are not strategically planned as they are mostly managed when there is obvious sign of defect. This finding is consistent with Marocco and Garofolo (2021) which highlighted the importance of proactive facility planning and management in optimizing performance and reducing costs.

4.3 Discussion

The study reveals that 42.9% of respondents prefer hybrid and out-tasking strategies in facility management, indicating a preference for combining internal expertise with external specialized services. This aligns with contemporary trends in FM, where outsourcing non-core functions allows organizations to focus on their primary activities while leveraging specialized service providers' expertise (Lok *et al.,* 2021). However, the low adoption of facilities simulation and condition-based strategies (21.4%) is intriguing, as they often require substantial upfront investment in technology, data analysis, and skilled personnel. This may be due to limited resources or a lack of awareness of the benefits of these advanced approaches (Javaid *et al.,* 2022). Also, the study reveals a preference for reactive maintenance approaches in FM, indicating a lack of strategic planning. This is in line with Erhueh *et al.* (2024) that highlight the challenges in implementing proactive maintenance strategies due to budget constraints, lack of skilled personnel, and resistance to change. However, proactive maintenance approaches like condition-based and preventive maintenance can lead to significant cost savings and improved equipment reliability. The study suggests a need for a balanced approach to FM, incorporating both reactive and proactive strategies. This could involve investing in training, developing in-house staff, implementing robust condition monitoring systems, and exploring innovative financing options for capital-intensive projects. Strategic planning and a proactive approach are also crucial for identifying risks, optimizing resource allocation, and improving operational efficiency. Therefore, a balanced approach combining reactive and proactive maintenance strategies is essential for long-term sustainability and resource utilization.

V. CONCLUSION AND RECOMMENDATIONS

The study findings demonstrate a preference for hybrid and out-tasking approaches in facility management (42.9%), indicating a desire for flexibility and access to specialized expertise. However, the limited adoption of advanced strategies like facilities simulation and condition-based maintenance suggests a reluctance to embrace technologies that require significant initial investment and specialized knowledge. Also, the study findings indicate that in-house corrective FM, outsourcing FM services, and facilities replacement strategies are the most effective, with mean values exceeding 3.40, suggesting a reliance on reactive maintenance. Conversely, building simulation/forecasting and in-house preventive FM strategies were found to be less effective. To enhance FM, prioritizing strategies such as in-house corrective FM, outsourcing FM services, and facilities replacement, while exploring more proactive approaches like condition-based maintenance, is recommended. Also, to encourage the adoption of more advanced FM strategies, university stakeholders should focus on increasing awareness of the long-term benefits of technologies like facilities simulation and condition-based maintenance. This could involve providing educational resources, developing case studies showcasing successful implementations, and offering incentives to encourage initial investments in these technologies.

REFERENCES

[1] Abdullahi, I. (2017). *Evaluation of facilities performance on students' satisfaction in northern Nigerian Universities* (Doctoral dissertation, Universiti Tun Hussein Onn Malaysia).

[2] Abubakar, I. R., Maniruzzaman, K. M., Dano, U. L., AlShihri, F. S., AlShammari, M. S., Ahmed, S. M. S. & Alrawaf, T. I. (2022). Environmental sustainability impacts of solid waste management practices in the global South. *International Journal of Environmental Research and Public Health*, *19*(19), 12-17.

[3] Adegoriola, M. I. (2023). An integrated framework for heritage building maintenance management: the facility management perspective.

[4] Adewunmi-Abolarinwa, Y. (2024). *Strategic and Sustainable Management of Workplace Facilities*. Taylor & Francis.

[5] Adeyemi, K. A. (2023). Assessment of Facilities Management Practice in Joseph Ayo Babalola University (JABU), Ikeji, Osun State, Nigeria. *Tropical Journal of the Built Environment (TJOBE)*, *4*(1).

[6] Aka, A., Awuzie, B. O., Umar, S. Y., & Monyane, T. (2022). Assessing the Underlying Strategies for Facilities Management Practice in a Nigerian Polytechnic. *Journal of Facilities Management*, *29*(2). 1-13.

[7] Akinwusi, D. (2024). Comparative Analysis of Sustainable Facility Management Strategies: Insights from Facility Managers in Germany and a Developing Country.

[8] Amos, D. (2022). A practical framework for performance measurement of facilities management services in developing countries' public hospitals. *Journal of Facilities Management*, *20*(5), 713-731.

[9] Amos, D., Au-Yong, C. P., & Musa, Z. N. (2021). The mediating effects of finance on the performance of hospital facilities management services. *Journal of Building Engineering*, *34*, 101-899.

[10] Antony, J., Sony, M., & McDermott, O. (2023). Conceptualizing Industry 4.0 readiness model dimensions: An exploratory sequential mixed-method study. *The TQM Journal*, *35*(2), 577-596.

[11] Cai, B., & Wang, X. (2024). Estimation of the Smallest Acceptable Sample Size in Bilateral Approaches to Coefficient Estimation and Accuracy Prediction. *Transportation Research Record*, 03611981231220632.

[12] Durdyev, S., Ashour, M., Connelly, S., & Mahdiyar, A. (2022). Barriers to the implementation of Building Information Modelling (BIM) for facility management. *Journal of Building Engineering*, *46*, 103-736.

[13] Durdyev, S., Ashour, M., Connelly, S., & Mahdiyar, A. (2022). Barriers to the implementation of Building Information Modelling (BIM) for facility management. *Journal of Building Engineering*, *46*, 103-736.

[14] Erhueh, O. V., Nwakile, C., Akano, O. A., Aderamo, A. T., & Hanson, E. (2024). Advanced maintenance strategies for energy infrastructure: Lessons for optimizing rotating machinery. *Global Journal of Research in Science and Technology*, *2*(2), 65-93.

[15] Fialho, B. C., Codinhoto, R., Fabricio, M. M., Estrella, J. C., Ribeiro, C. M. N., Bueno, J. M. D. S., & Torrezan, J. P. D. (2022). Development of a BIM and IoT-based smart lighting maintenance system prototype for universities' FM sector. *Buildings*, *12*(2), 99.

[16] Gajanayake, A., Ho, O. T. K., & Iyer-Raniga, U. (2024). Motivations and drivers for adopting sustainability and circular business strategies in businesses in V ictoria. *Corporate Social Responsibility and Environmental Management*, *31*(1), 169-179.

[17] Gbadegesin, S. J. O. J. T. (2015). Facilities management practices in the Nigerian public universities. *Journal of Facilities Management*, 1(3), 5-26.

[18] Gbesoevi, E. S., Akinyemi, I. A., Oluwatunbi, E. A., & Ashogbon, A. S. O. (2024). School Facilities Maintenance Strategies and Quality Education Delivery in Public Junior Secondary Schools, Lagos State. *Indonesian Journal of Economics, Social, and Humanities*, *6*(1), 71-81.

[19] Gunduz, M., Naji, K. K., & Maki, O. (2024). Evaluating the Performance of Campus Facility Management through Structural Equation Modeling Based on Key Performance Indicators. *Journal of Management in Engineering*, *40*(1), 04023056.

[20] Hamasha, M. M., Bani-Irshid, A. H., Al Mashaqbeh, S., Shwaheen, G., Al Qadri, L., Shbool, M., & Al-Bashir, A. (2023). Strategical selection of maintenance type under different conditions. *Scientific Reports*, *13*(1), 15-60.

[21] Hauashdh, A., Jailani, J., & Rahman, I. A. (2022). Strategic approaches towards achieving sustainable and effective building maintenance practices in maintenance-managed buildings: A combination of expert interviews and a literature review. *Journal of Building Engineering*, *4*(5), 103-490.

[22] Heo, C. Y., Kim, B., Park, K., & Back, R. M. (2022). A comparison of Best-Worst Scaling and Likert Scale methods on peer-to-peer accommodation attributes. *Journal of business research*, *14*(8), 368-377.

[23] Hou, H., Ho, D. C., & Yau, Y. (2024). Smart tools to facilitate digitalisation of facilities management service delivery: stakeholders' perspectives. *Facilities*, *42*(1/2), 27-50.

[24] Ikediashi, D. I. (2014). *A framework for outsourcing facilities management services in Nigeria's public hospitals* (Doctoral dissertation).

[25] Ikediashi, D. I. (2023). Facilities management strategic roles and services quality performance in Nigeria's banking sector. *Journal of Engineering, Design and Technology*. *1* (3), 59-25

[26] Islam, R., Nazifa, T. H., & Mohamed, S. F. (2021). Evaluation of facilities management sustainable parameters for improving operational efficiency. *International Journal of Construction Management*, *21*(5), 538-554.

[27] Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Gonzalez, E. S. (2022). Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. *Sustainable Operations and Computers*, *3*, 203-217.

[28] Jenkins, S. P. (2020). Comparing distributions of ordinal data. *The Stata Journal*, *20*(3), 505-531.

[29] Jensen, P. A. (2017). Strategic sourcing and procurement of facilities management services. *Journal of Global Operations and Strategic Sourcing*, *10*(2), 138-158.

[30] Lindkvist, C., Temeljotov Salaj, A., Collins, D., Bjørberg, S., & Haugen, T. B. (2021). Exploring urban facilities management approaches to increase connectivity in smart cities. *Facilities*, *39*(1/2), 96-112.

[31] Löhr, K., Weinhardt, M., & Sieber, S. (2020). The "World Café" as a participatory method for collecting qualitative data. *International journal of qualitative methods*, *19*, 16-76.

[32] Lok, K. L., Opoku, A., Smith, A. J., & Cheung, K. L. (2024). Sustainable facility management practices and the sustainable development goals. In *The Elgar Companion to the Built Environment and the Sustainable Development Goals* (pp. 439-455). Edward Elgar Publishing.

[33] Marocco, M., & Garofolo, I. (2021). Integrating disruptive technologies with facilities management: A literature review and future research directions. *Automation in Construction*, *13*(1), 103-917.

[34] Mewomo, M. C., Ndlovu, P. M., & Iyiola, C. O. (2022). Factors affecting effective facilities management practices in South Africa: a case study of Kwazulu Natal Province. *Facilities*, *40*(15/16), 107-124.

[35] Moghayedi, A., Michell, K., Le Jeune, K., & Massyn, M. (2024). Assessing the influence of technological innovations and community-based facilities management on the safety and security of universities. A case study of an open campus. *Facilities*. *4*(2), 16-25

[36] Molęda, M., Małysiak-Mrozek, B., Ding, W., Sunderam, V., & Mrozek, D. (2023). From corrective to predictive maintenance—A review of maintenance approaches for the power industry. *Sensors*, *23*(13), 59-70.

[37] Njoku, N. N., & oluwuo, S. (2018). Challenges and strategies of facilities management for knowledge delivery in Universities in Rivers and Bayelsa States. *African Journal of Educational Research and Development (AJERD)*, *11*, 1.

[38] Odediran, S. J., Gbadegesin, J. T., & Babalola, M. O. (2015). Facilities management practices in the Nigerian public universities. *Journal of Facilities Management*, *13*(1), 5-26.

[39] Oladokun, S. O., & Ajayi, C. A. (2018). Assessing users' perception of Facilities Management services in a Public University: A case study approach. *Journal of Facility Management Education and Research*, *2*(2), 62-73.

[40] Olaniyi, O. O. (2017). *Development of a facilities management framework for sustainable building practices in Nigeria* (Doctoral dissertation, University of Central Lancashire).

[41] Opoku, A., & Lee, J. Y. (2022). The future of facilities management: Managing facilities for sustainable development. *Sustainability*, *14*(3), 17-05.

[42] Peiris, S., Sridarran, P., De Silva, N., Jayakodi, S., Lai, J. H., Rathnayake, U., & Dissanayake, P. (2024). Facilities management competencies in developing and developed regions: comparative study on Sri Lanka and Hong Kong. *Journal of Facilities Management*.

[43] Samuel, J. (2023). *Student's satisfaction level of building facilities maintenance in Federal University of Technology, Minna* (Doctoral dissertation).

[44] Segubiense Fernandez, J. R., & Dalistan Rada, M. V. (2021, March). Proposed application of an iot-based predictive maintenance to improve O&M of university project by FM company: a six sigma approach. In *2021 the 5th International Conference on Robotics, Control and Automation* (pp. 107-113).

[45] Wang, C., Zhang, F., Wang, J., Doyle, J. K., Hancock, P. A., Mak, C. M., & Liu, S. (2021). How indoor environmental quality affects occupants' cognitive functions: A systematic review. *Building and environment*, *193*, 107-647.

[46] Yusuf, M., Yusuf, M., & Abdullah Mohd Asmoni, M. N. (2022). A review and compilation of critical success factors for the implementation of maintenance at Nigerian public universities. *Journal of Facilities Management*, *20*(4), 538-557.

[47] Yusuf, S., & Ibrahim, M. A. (2024). Educational Services in Nigerian Universities: Prospect, Challenges and Way Forward. *Fuoye Journal of Educational Management*, *1*(1).

[48] Zimba, F. (2023). Investigating the Implementation of Facilities Management Strategies Within The Namibian Government.