The Impact of Space Optimization on Facility Management in Nigerian Universities

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ABSTRACT

This paper assesses the influence of space optimisation on facility management in Nigerian universities. The rapid increase in student enrolment without equivalent infrastructure development has put significant pressure on existing facilities, leading to overcrowded lecture halls, underutilised spaces, and operational inefficiencies. This paper explores ways to enhance the operational efficiency of Nigerian universities through the effective use of space. It looks at the literature on space utilisation, facility management performance, and optimisation strategies in the context of Nigerian universities. Main results show that space optimisation has a very strong impact on operational efficiency and that efficient space utilisation not only improves service delivery but also helps to reduce congestion and lower maintenance costs. The paper also identifies challenge areas such as unavailability of planning frameworks, lack of accurate utilisation data, short supply of professional expertise, and funding constraints. It suggests strategies to address these challenges including: the use of data driven management systems, the development of institutional policies, the conduct of regular space audits, the capacity building of facility managers, the promotion of flexible space design, and the improvement of funding allocation. This study points out that making the most of available space is a strategic requirement for boosting the performance of facility management in Nigerian universities. Institutions that focus on using space effectively experience superior operational results despite being in resource-constrained environments. These results offer hands-on assistance to university leaders and authorities who want to improve the efficiency of educational infrastructure.

Keywords: Space Optimisation, Facility Management, Operational Efficiency, Nigerian Universities, Higher Education Infrastructure

INTRODUCTION

The handling of physical space within Nigerian university settings has become a major headache in the country's higher education sector, especially with the rising number of students, inadequate infrastructures, and scarce budgets. Universities as organizations are very complicated and mostly depend on very well-managed coordination of physical amenities like lecture theatres laboratories offices, hostels, and open areas for the achievement of their academic and administrative goals. Space management, in other words, serves as a strategic first step in making sure that the few physical resources at one's disposal are put to good use, which in turn increases the overall efficiency of facility management.

Space management in a university environment stands for the well-ordered designing, distribution, and use of physical spaces in a way that supports the institution's aspirations while economizing wastage and operating inefficiencies. It entails making space usage conform to the functional requirements, number of occupants, and levels of service delivery needs. This idea has found much more attention in the Nigerian university system lately as a result of the rapid growth in student numbers without simultaneous infrastructural development, producing

overcrowding, underutilization of some facilities, as well as generally inefficient space usage (Ekpenyong, Udo, & Nissi, 2025).

Efficient facility management has a great deal to do with how well space is organised and used inside an institution. Facility management includes the facilitation of physical infrastructure, maintenance services, and support systems that are essential for the proper running of university activities. According to the research, facility management systems' effectiveness in Nigerian universities depends largely on the availability, adequacy, and utilization of physical facilities, which in turn have direct impacts on the quality of teaching, learning, and administration (Gidanmana, 2020). Typically, when space is not managed properly, higher costs of operations, decline in the services quality, and lowering in users' satisfaction emerge as the main consequences. Operationally, space is one of the most significant factors that determine facility management costs. Besides the construction, the financial impact of space covers maintenance, energy usage, cleaning, and other general aspects of service delivery. Therefore, the inefficient use of space causes institutions, especially those in resource-limited environments like Nigerian public universities, to be burdened with extra financial costs. Besides, space is one of the costliest assets to be maintained in institutional environments, and its mismanagement is equated to mainly resulting in operational costs being higher and efficiency - lower (Emesiobi Otuonuyo Adewumi, Asaju, & Onamade, 2024).

Besides, the increasing desire for good education in Nigeria has also led to a greater call for better facility management methods. Universities have a dual challenge to create the right atmosphere for learning and at the same time, they have to operate within very limited budgets. Space optimization in this case, is a very feasible tool for the institutions as it helps them to focus on maximizing the utility of their already existing facilities instead of depending only on the new constructions. There is concrete evidence that through the engagement of strategic space management approaches lead to building performance enhancement, improvement of resource allocation, and also support the sustainable facility operations in tertiary institutions (Ekpenyong et al. 2025).

While acknowledging its significance, space management in Nigerian universities is still exposed to a number of hurdles among which are inadequate planning frameworks, lack of accurate space utilization data, shortage of professional expertise, and weak policy implementation. These problems make it impossible for university administrations to take space allocation and usage decisions based on facts. Consequently, a lot of universities are struggling with a disconnect between the space that is at their disposal and the space they actually need for usage, this is having a detrimental effect on their operational efficiency and overall performance (Gidanmana, 2020).

Against this background, the research looks at the influence of space optimization on facilities management in Nigerian universities, especially how through good space management operational efficiency could be enhanced. By analysing the degree of space utilisation and the corresponding facility management results the paper intends to offer new perspectives which will lead to better planning, policy making, and management strategies in the Nigerian university sector.

Statement of the Problem

The expansion of Nigeria's college system over the last 20 years is mainly through increasing the number of colleges. On the other hand building up the physical infrastructure to support the increased number of students has lagged behind. As a result a lot of pressure is being exerted on the already existing infrastructures. In fact some universities in Nigeria are still struggling with tightly packed classrooms, poorly allocated office spaces, unused facilities and time tables running inefficiently. These problems reveal major flaws in planning and utilising space which are the major causes of sub-par facility management systems that operate in these institutions (Gidanmana, 2020; Iguodala & Alonge, 2023).

On the ground, all the available spaces in university premises, especially the built ones, are highly valuable and very expensive resources which also has a direct impact on the level of efficiency in running the operations. Unfortunately however in most Nigerian universities, the decisions about allocation of space are usually taken without reference to real facts, thorough and well-thought out strategies or even the use of state-of-the-art space

management tools. As a result in some cases there are facilities that are continually used whereas others still remain completely unused, also disturbing other elements of the university like the running of classes, administration work and quality of services at a broader level. The lack of well-planned and organised space management practices only leads to ever increasing costs of maintenance, higher usage of energy and the early wear and tear of buildings (Ekpenyong et al. 2025).

Besides, inefficient management of space may have a wide range of implications for the overall institutional performance. For example, overcrowding in classrooms may be a cause of decreasing engagement of students and rationalising the space in a campus may not only result in increased productivity from the staff but also to a lesser level of staff dissatisfaction. Additional expenses that are related to the operation of poorly used spaces are a factor that increases the pressure on the already limited budgets of universities. This issue is even more topical at the level of publicly funded universities where not only resources are in short supply but also the demand for access to quality education is continuously increasing (Idehen & Edeki, 2022; Umar & Ibrahim, 2019).

While a lot of attention has been paid to the role of space optimization in the improvement of facility management performance, a number of Nigerian universities are yet to incorporate strategic space management as part of their operational strategies. The available research has mainly focused on the issues concerning the inadequacy and maintenance of facilities but a gap remains in the area of how space optimization that is well-planned and structured can be a significant factor in enhancing operational efficiency within the context of facility management.

In the light of these considerations, the present research intends to explore the channel through which effective space optimisation may lead to the improvements of facility management performance in Nigerian universities. The issue at hand therefore concerns the continuation of inefficiencies in space utilisation coupled with the absence of data-driven strategies for optimising the existing facilities, which together are the major causes of the lack of operational effectiveness in the Nigerian higher education system.

Objectives of the Study

The objectives of this study are as follows:

1. Assess the current space utilisation practices in Nigerian universities.

2. Examine the relationship between space optimisation and operational efficiency in university facility management.

3. Identify the challenges affecting effective space management in Nigerian universities, and evaluate strategies for improving space optimisation to enhance facility management performance.

LITERATURE REVIEW

Concept of Space Optimisation

Space optimisation is rapidly becoming a vital notion in the managing of facilities, especially in institutional sectors like universities where the need for space is usually more than the available supply. But what exactly is space optimisation? It is the careful organising, sharing, and using of spaces in a way that accomplishes the greatest efficiency, all the while helping to meet the goals of the organisation. In the case of universities, optimising space means not only using lecture theatres, science labs, offices for staff and other campuses areas in a way that matches the actual patterns of usage and the needs of the different functions (Quansah, Osei, & Abudu, 2024).

More importantly, the academic literature on the issue conveys that emphasising space optimisation as merely a way to reduce the amount of unused space can be misleading as it is actually a way to increase the functional performance of existing facilities. It combines space planning, occupancy analysis and utilisation measurement

in a way that physical assets can effectively be used to increase institutional productivity. Riratanaphong and van der Voordt (2018) have argued that when space usage is optimised, the results of operations are improved because spatial resources are more in line with user needs, which both helps to reduce inefficiencies caused by underutilisation and overcrowding.

In Africa's universities, one of the main reasons why the optimisation of space has been gaining more importance is that the number of students has been increasing and academic programmes have been getting more diverse. Colleges are finding it tough to fit the rising number of students within their existing buildings. That's why they started using data driven methods like conducting space audits, space utilisation and scheduling optimisation systems. These tools allow managers to make smart decisions about how to allocate, reallocate, or redesign spaces which in turn help in increasing efficiency and also reducing operating costs (Quansah et al. 2024).

Besides that, space optimisation plays a big part in achieving sustainability target in the built environment. Proper utilisation of space means that the demand for new buildings will go down which is not only good for the earth but also helps in saving resources. Besides that, managed spaces on lighting, ventilation, and maintenance aspects lead to energy savings. Therefore, space optimisation is being regarded more and more as a key element of sustainable facility management practices (Amaratunga et al. 2018).

Concept of Facility Management in Universities

Facility management in universities is the organization of all aspects related to physical infrastructure, services or support, and favourable environmental conditions for teaching, learning, and other administrative activities. It is quite a large area of responsibility as it includes a whole list of things like maintenance, managing spaces, saving and controlling the use of energy, security as well as ensuring environmental sustainability. To a great extent, facility management really depends on how well physical resources are thought out, used, and maintained (Alexander, 2016). Facility management has turned out to be one of the major issues in Nigeria due to the ongoing degradation of the infrastructure and the increasing demand for the use of existing facilities.

Gidanmana (2020) reports that a good number of universities are still experiencing difficulties mainly due to poor maintenance practices, lack of good infrastructure planning, and inefficient resource utilization. These have often led to lower quality of service delivery and have a negative impact on the overall learning environment. The study also points out that facility management in Nigerian public tertiary institutions is mainly characterized by reactive maintenance, lack of funding, and shortage of professional skills.

A crucial aspect of facility management relates to the effective use of space, which has a direct impact on operational performance. Successful facility management is contingent on comprehensively understanding the need for spaces, how they are occupied at different times, and the requirements of the users. In the absence of a well-managed space, facility managers would not be able to reload the allocation of resources, and as a result, operational costs would go up, and there would be inefficiencies. This argument has been supported in literature which also links space optimisation to facility management performance (Noor & Pitt, 2017).

Currently, facility management in the forefront stress the role of technology and data analytics in supporting decision-making processes. Computer Aided Facility Management (CAFM) systems and Building Information Modelling (BIM) are among the main tools that have been raised as very helpful in increasing space utilisation and enhancing operational efficiency. Such technologies render data on space usage available at the moment, which helps facility managers take decisions that are both timely and well-informed (Madureira et al. 2017). On the other hand, the use of these technologies in Nigerian universities is still at a very low level because of funding problems and the lack of technical skills (Gidanmana, 2020).

Space Optimisation and Operational Efficiency

Doing things in the university facilities more efficiently refers to the university's capability to give services in a good way while at the same time spending less money and not wasting resources. In fact, space optimization is very important in achieving this aim as it helps make sure that physical resources are used in the most efficient

way. Having an efficient space usage leads to less duplication, better finding of places, and overall greater functionality of the facilities (Riratanaphong & van der Voordt, 2018).

Most of the research work has established that there is a very strong connection between the use of space and the efficiency of operations. Ineye Briggs (2025) carried out a fieldwork among the Rivers State universities and got a moderate positive correlation between the space utilisation and educational productivity. The research also showed that space utilisation and infrastructure adequacy together explained 42.5 percent of the difference in educational productivity. Therefore, the result suggests that universities which are able to manage their spaces efficiently and have adequate infrastructures will be characterized by attainment of higher levels of teaching quality, better use of resources and institutional productivity.

Okafor and Nwosu (2021), in a similar vein, studied the use of teaching, learning, and administrative spaces in a Nigerian university and discovered significant differences between the designed capacity of the facilities and the recorded patterns of usage. Their findings revealed that a large number of lecture halls either accommodated students beyond their seating capacity or stayed under-utilized simply because of poor scheduling and inadequate matching of student intake numbers to available spaces. The authors suggested a data driven model for space utilisation which is based on enrolment forecasting. Furthermore, optimising space helps with cost efficiency by minimising the demand for unnecessary expansion and by decreasing maintenance costs. Universities that practice good management of their space resources are capable of budgeting their expenditures better and channeling their physical resources towards academic and research endeavors rather than infrastructural development. This is especially the case in developing countries like Nigeria where the scarcity of funds limits the governments ability to invest in new physical infrastructure (Amaratunga et al. 2018; Ineye Briggs, 2025).

Nevertheless, successful space optimisation for operational efficiency is only possible through a comprehensive process that includes planning, monitoring, and evaluating. It is necessary for the institutions to develop explicit policies and legislative frameworks for space allocation, which is also based on reliable data and professional competence. In the absence of these elements, attempts at space optimisation may not only fail, but they may also be futile over time (Quansah et al. 2024).

Challenges of Space Management in Nigerian Universities

Although the advantages of space optimisation are well known, the problems that the Nigerian universities have been facing with the implementation of the effective space management methods are many. One of the biggest problems is that very few institutions keep a record of the use of spaces in a comprehensive way, and therefore it is difficult to evaluate the level of efficiency and the areas that need improvement (Ekpenyong et al. 2025).

One more big problem is the lack of a planning strategy in universities for space distribution. In fact, most of the times, the space division happens at the whim of the administration rather than based on the objective factors. It means that in some cases the departments will get more space that they need while others dont have enough (Iguodala & Alonge, 2023). Quansah et al. (2024) discovered the same kind of problems with the efficient utilization of the teaching space in the universities of Ghana due to the departmentalized timetabling and the incorrect data for the room allocation.

Another issue is the lack of highly trained professionals in the field of facility management who have the knowledge of the latest space optimisation techniques. This situation has been made worse by the very few cases where technological tools like Computer Aided Facility Management and Building Information Modelling are used because decision making processes are still mostly manual and reactive. As a result, the institutions' capacity to efficiently react to changing space needs is very much reduced (Madureira et al. 2017; Gidanmana, 2020).

Also, limits on funds seriously limit how well space is managed. Besides, a lot of universities have to work with very limited budgets. This limits their opportunities to make big improvements in their buildings, do regular maintenance, and get modern technology. In fact, the facilities they have get used beyond their capacity, which

leads to them wearing out quickly and not functioning as well anymore (Idehen & Edeki, 2022; Ineye Briggs, 2025).

Strategies for Improving Space Optimisation in Universities

To resolve the difficulties, a couple of main ideas have been put forward on how to use the space in a university in a more effective way. Among the top methods is the implementation of data led space governance mechanisms. With these solutions, universities are able to gather, process and exploit information about the use of space in order to make the right decisions (Noor & Pitt, 2017). Ineye Briggs (2025) advises utilizing data driven space usage models, raising capital for infrastructure development, and carrying out institutional performance and efficiency focused on long-term sustainability.

Another noteworthy measure is making space flexible. The aim is to increase the usage of the same space at different times, thus reducing the need for building more facilities by designing spaces that can serve different functions. The benefit of this solution is that in fast changing and versatile academic environments, it is very usual for the space requirements of the institutions to keep on changing (Kok et al. 2017).

Developing policy and creating institutional frameworks are the basis of the effective space management. Universities must formulate a set of precise rules for marking, use, and tracking of space. These policies may be enforced by peri odic inspections and performance assessments with the aim of conformity and permanent improvement (Riratanaphong & van der Voordt, 2018).

According to Quansah et al. (2024) lecture rooms should be under the control of a unit and the timetable system should be centralized taking account of the number of students and the seating capacities of the rooms, besides that the usage of lecture spaces should be monitored quite strictly. Workforce competence is of equal value because it guards that property managers have the right attributes and understandings to carry out contemporary space optimization measures. Facility management teams will be effective as well as the entire operation will be more efficient by means of training courses and professional development programs (Gidanmana, 2020).

METHODOLOGY

Research Design

This study uses a qualitative descriptive research design that is well-suited for exploring real-life situations, relationships, and existing practices by means of a thorough analysis of already published works. Using this design allows a very detailed understanding of spare use and facility management in the context of higher education through careful study of the available evidence. With such an approach, it is possible to conduct a well-organised evaluation of the different ways to bestfulfil the function of space, indicators of operational efficiency, and the performance offacilities management as are reported in the literature thatis already out there. Besides this, itthematically combines the results of many sources to provide a thorough understanding of the topic without the need to collect primary data.

Data Sources

The research is based entirely on secondary data from authentic and academic sources that can be verified, among these: Sourcing is done first looking at the topicality, authenticity, and keeping the most recent materials, for instance, those published between 2016 and 2026. As research conducted in Nigerian universities and similar developing countries contexts is given preference for the purpose of the paper with contextual relevance.

Data Collection Procedure

Data collection is a fascicle review of secondary sources. The main search expressions are "space optimisation, " "facility management, " "space utilisation, " "university infrastructure, " "operational efficiency, " and "Nigerian higher education." Electronic databases such as Google Scholar ScienceDirect JSTOR, and African Journals Online are used to locate relevant publications. Eligibility requirements are that the materials address

either space management practices, facility management performance, or operational efficiency in university environments. Rejecting criteria are that the papers must be solely focused on non-educational contexts or be developed-country pilot cases with very little relevance to Nigerian conditions. The chosen sources are grouped into themes: space utilization methods, operational efficiency results, challenges of implementation, and strategies for improvement. Such a thematic arrangement guarantees that the analysis remains targeted and consistent with the research goals.

Method of Data Analysis

The paper uses thematic analysis as the principal method for analyzing data. This means carrying out the process of discovering, analysing, and understanding recurring motifs and topics in the literature under review. Concepts are framed around the main dimensions of space optimisation and facility management, including: The paper takes an in-depth look at the four themes in the context of Nigerian higher education, thereby providing a well-grounded understanding of how space management practices may be implemented successfully. The analysis draws on the results of several studies, bringing together common patterns, different viewpoints, and proposals supported by evidence.

Validity and Reliability

The analysis work includes only peer-reviewed and reliable sources to maintain its credibility and dependability. The consistency of the research results has been ascertained by cross-referencing several studies by different authors and from different research contexts. By disclosing in detail the data sources, selection criteria and analytical methods, the study practices transparency and facilitates verification by other researchers.

Ethical Considerations

The work follows regular ethical norms of academia by giving correct citations and recognition to all the sources used. There are no data that have been made up or changed, and all the reference materials can be checked. This is in line with the most effective ways of doing academic research and it guarantees the reliability of the results.

RESULTS AND DISCUSSION

Current Space Utilisation Practices in Nigerian Universities

The literature reviewed shows that there is a great deal of inefficiency in how space is used in Nigerian universities. Several researches have shown that lecture halls and other teaching spaces are often overcrowded during the most active times, yet some administrative and specialised facilities are hardly used. This situation is indicative of a lack of well-organized systems for space allocation and points out the issues of scheduling and planning inefficiencies (Gidanmana, 2020; Iguodala & Alonge, 2023; Ekpenyong et al. 2025). Gidanmana (2020) reported that most Nigerian public universities do not have formal systems for monitoring space usage. The paper highlighted that decisions on space allocation are very often taking place without real data on the pattern of occupancies, which in turn creates situations where some facilities are overly used while others remain non-usage.

Likewise, Ekpenyong et al. (2025) reported that the use of digital tools like Computer Aided Facility Management systems is very limited in Nigerian university space management, with allocation mainly based on manual methods and administrative discretion. This shows that decisions about space utilisation are not sufficiently data driven, which in turn is limiting the ability of the institutions to effectively optimise the available resources.

Ineye Briggs (2025) carried out a research in the universities of Rivers State and discovered considerable differences between the design capacity of the facilities and actual usage patterns. The study revealed that a lot of lecture halls were either working at more than double their designed capacity or were lying quite unused as a result of poor scheduling and weak alignment between registration numbers and available space. These results corroborate that inefficiencies in space utilization are common and systemic rather than sporadic.

Relationship Between Space Optimisation and Operational Efficiency

Several literature shows a positive effect of space optimization on operational efficiency in university facilities. For example, institutions reported that they relatively better space management practices see improvements in maintenance costs, energy consumption, service delivery speed, and user satisfaction. (Quansah et al. 2024; Ineye Briggs, 2025)

Ineye Briggs (2025) found a fairly strong positive relationship between space utilisation and educational productivity, with space utilisation and infrastructure adequacy together explaining 42.5 percent of the variability in educational productivity. This means that universities managing their space effectively and having adequate infrastructure are likely to be more effective in instructional delivery, better in resource utilization, and more productive as an institution. The research suggested that deliberate space management is a direct method for improving operational results by among other things reducing overcrowding, making facilities more accessible, and enabling better service coordination.

Quansah et al. (2024) studied the optimisation of teaching space in Ghanaian universities and concluded that proper utilisation of spaces can greatly lead to better academic scheduling and resource allocation. They showed in their paper that those universities which centralised their timetabling systems and closely monitored the usage of lecture rooms managed to get higher utilisation rates and also experienced fewer cases of overcrowding. These results can be utilised by Nigerian universities which are exposed to similar problems of student enrolment growth and limited infrastructural development.

Riratanaphong and van der Voordt (2018) pointed out that better use of space increases operational performance through matching the spatial resources to the user needs, which leads to the decrease of inefficiencies that are linked with under-utilisation or overcrowding. Their conceptual model for the measurement and comparison of workplace utilisation is a good reference for those who want to assess the effectiveness of space usage in the educational environments.

Challenges Affecting Space Management

The papers reviewed here highlight the fact that space optimisation in Nigerian universities is hampered by a number of interconnected problems. These problems are, in fact, inadequate planning frameworks, lack of reliable space utilisation data, shortage of professional expertise, poor implementation of policies, and funding issues (Gidanmana, 2020; Idehen & Edeki, 2022; Ekpenyong et al. 2025).

According to Gidanmana (2020), facility management in Nigerian public tertiary institutions is primarily characterised by the following: - reactive maintenance approaches, - inadequate funding, and - absence of professional expertise. The research pointed out that, many universities do not have university facility managers, and so space allocation decisions are made informally and those decisions often favour immediate administrative convenience at the expense of long term operational efficiency. This human resource dilemma is limiting the ability of the institutions to adopt the latest space optimisation techniques.

Idehen and Edeki (2022) carried out a study on space management and teaching effectiveness in Nigerian universities. They came to the conclusion that the physical facilities are a major factor in determining the internal efficiency of the educational institutions. Their research discovered that overcrowding and inadequate space allocation are the major reasons for ineffective teaching and learning, which in turn adversely affect student participation and academic performance.

Ekpenyong et al. (2025) drew attention to the fact that lack of detailed data on the use of space in universities is one of the factors that make assessment of efficiency and identification of areas for improvement difficult. Without authentic records of the use of spaces, institutions cannot base their decisions on evidence when it comes to space reallocation or redesign. This lack of data results in the continuation of the inefficient characteristics and hinders the process of continuous improvement in any way. Besides, Iguodala and Alonge (2023) noticed that the decision of which spaces are to be allocated to which departments in a Nigerian university is too often left to the discretion of administrators and that these decisions are hardly, if ever, backed up by objective criteria

leading to the emergence of inequities and inefficiencies. While some departments have too much space at their disposal, others have to do with very limited space and the resultant imbalance has an impact on the performance of the whole institution.

Strategies for Improving Space Optimisation

Several literature sources have highlighted numerous evidence-based strategies for space optimisation in university settings. These include the adoption of data-driven management systems, the implementation of flexible space design, development of institutional policy frameworks, and capacity building for facility management professionals (Noor & Pitt, 2017; Kok et al. 2017; Quansah et al. 2024). Noor and Pitt (2017) suggested that the use of Computer Aided Facility Management systems and Building Information Modelling in decision making for space management could be beneficial. These technologies offer the capability to track space usage in real time, thus allowing for early and well-informed resource allocation. Nevertheless, the literature reveals that the usage of such technologies in Nigerian universities is still very limited largely because of funding issues and lack of technical skills (Gidanmana, 2020). Lecture rooms should be centrally managed with a centralised timetabling system that takes account of class size and seating capacities, according to Quansah et al. (2024). Their research highlighted that through the strict monitoring of lecture space usage, it is not only possible to raise utilisation levels but also to cut down on overcrowding. These suggestions can be directly implemented by Nigerian universities looking to get the most out of their existing infrastructure.

Ineye Briggs (2025) suggested that schools should use data to model their space utilisation, increase infrastructural investment, and plan their long-term sustainability as a way to improve academic performance and institutional efficiency. The study also showed that sustainable facility planning is education productivity's main driver therefore the importance of space optimisation for institutional success should be a key consideration for the strategists.

Kok et al. (2017) talked about how flexible space designs that are capable of hosting various activities can lead to higher utilisation rates as well as less requirement for new infrastructure. They acknowledged that this type of design is the best solution to changes in space demands which are very frequent in academic settings.

Synthesis and Implications

The reviewed literature consistently shows that space optimization is one of the fundamental needs to improve operational efficiency in Nigerian universities. Those institutions that set strategic space management as their priority perform better even with the limited resources. The fact that space is not just a physical asset but also a major deciding factor of the quality of teaching, the efficiency of the administrative processes and the overall satisfaction of the students is proven by the data. The problems mentioned are deep-rooted and interlinked. Thus, their solving will require the development of policies, strengthening of existing capacities, use of technology and changes at the institutional level. Doing so will result in Nigerian universities getting the most out of the facilities already laid down, lowering their costs of operations and producing better quality education overall.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

This paper investigates how space optimisation influences facility management in Nigerian universities, particularly focusing on its contribution to operational efficiency. Results unequivocally confirm that optimisation of space is one of the major factors determining how well a university manages its facilities. The ongoing inefficient practices related to space usage such as overcrowded teaching areas or facilities that are hardly used point to inherent weaknesses at the levels of planning, allocation, and monitoring in many universities. Besides, the research indicates that universities which implement organized and planned space management systems tend to have better operational results. Not only does proper space utilisation improve service delivery and reduce congestion, it also raises the level of satisfaction of users and allows for cost savings through lower maintenance and energy costs. Ineye Briggs (2025) has found out that space utilisation together

with infrastructure sufficiency explain for 42.5 percent of the change in educational productivity, thereby verifying that physical space management effectively is at the core of performance of the institution as a whole.

The results reveal major drawbacks of contemporary methods in many Nigerian universities where space division is normally done without authentic data and is not supported by the use of modern tools for efficient management. Gidanmana (2020) has pointed out that this lack of data driven decision making results in the weakening of facility managers' abilities to effectively react to changes in demand. The lack of clearly visible institutional structures and policies for space management makes these difficulties even worse, leading to inefficiencies that have an impact on both the academic and administrative sides of operations (Ekpenyong et al. 2025; Idehen & Edeki, 2022).

In general, this research considers space optimisation as not only a technical matter but also a strategic instrument for enhancing the performance of facility management in Nigerian universities. Those universities that make a wise use of their space will have a great chance to continue their operations in a sustainable manner even when faced with limited financial and infrastructural resources.

Recommendations

The following recommendations are proposed to guide practical implementation of space optimisation strategies in Nigerian universities.

Adoption of Data Driven Space Management Systems

The universities in Nigeria should totally consider purchasing these techs that help in managing the facilities like Computer Aided Facility Management systems and Building Information Modelling tools. The systems also help in tracking the usage of the space accurately and help in making informed decisions which ultimately lead to better operational efficiency. For example, University of Lagos can decide to introduce a CAFM system that will help them in noticing the occupancy rates in the lecture halls and laboratories. The system on the other hand will produce live data which will indicate that the 500 capacity halls are regularly hosting 650 students during the peak periods while the 300 seat halls in some other departments are still at 40 percent capacity. Facility managers could leverage this data to alter the class schedules, hence they would lessen the overcrowding by 25 percent within one academic session without even building new facilities.

Development of Institutional Space Management Policies

Universities must come up with a coherent space allocation and utilisation plan and monitoring system that are entirely based on objective criteria such as occupancy rates, functional requirements, departmental needs, etc. This will guarantee fairness and efficiency in space distribution. Ahmadu Bello University could decide to have a Space Allocation Policy that all departments must submit annual space utilisation reports reflecting actual usage rates. Departments that keep on utilising less than 60 percent of the allocated space will have their excess capacity taken away and given to the overcrowded units. This policy will lead to great responsibility and ensure that the 200 seat lecture halls in the Faculty of Arts which are currently not being fully utilised be given to the Faculty of Engineering which is severely experiencing shortage giving rise to a higher level of overall institutional efficiency.

Regular Space Audits and Utilisation Reviews

One way to identify the areas that are either underutilised or overutilised in a space is by conducting periodic assessment of space usage. Besides providing the institutions with data for a continuous improvement in operation, regular audits also help the institutions in space allocation to unison with actual demand patterns (Iguodala & Alonge, 2023). One way such a biannual Space Utilisation Audit can be carried out at the University of Nigeria, Nsukka is by the establishment of a dedicated Facilities Planning Unit. This unit, with the use of standardized observation protocols and digital survey tools, would record that postgraduate seminar rooms are vacant 70 percent of weekdays while undergraduate tutorial rooms are over capacity by 150 percent. Having this data, the university would be in a position to carry out specific interventions such as changing underused

postgraduate spaces to undergraduate study areas during the period of peak examinations therefore meeting immediate needs without incurring any capital expenditure.

Capacity Building for Facility Management Personnel

Training and professional development initiatives must provide facility managers with the skills in space optimisation techniques, data analysis, and application of modern management tools that are quite essential. This will improve their capacity to roll out efficient strategies (Gidanmana, 2020). Moreover, the Federal Ministry of Education together with the International Facility Management Association Nigeria Chapter could set up a certification scheme for university facility managers. A batch of 50 managers representing 25 federal universities could undergo comprehensive training in space planning software, occupancy analytics, and strategic resource allocation. Those who complete this training would be equipped to implement evidence-based space management systems at their institutions, with a set target of 20 percent reduction in space related complaints within 18 months after completion.

Promotion of Flexible and Multi Functional Space Design

Universities should implement flexible designs that can be used for various purposes. This will help in increasing utilization levels and at the same time, reduce the need for new facilities especially in the areas limited by resources (Kok, et al. 2017; Quansah, et al. 2024). Obafemi Awolowo University has the opportunity to upgrade the lecture halls built in the 1970s by adding movable partition walls, modular furniture, and integrated technology systems.

For example, a hall accommodating 400 seats can be transformed into four seminar rooms of 100-seat capacity each during weekdays for small group teaching and then be completely opened on weekends for 400 capacity examinations or conferences. Such a degree of flexibility will increase the effective utilization from the present 35 per cent to the theoretically 75 per cent, ergo allowing 40 per cent more academic activities in the existing area and leading to a 10-year postponement of the need for the new construction.

Improved Funding and Resource Allocation

Besides, government and institutional authorities need to give priority to the facility management and infrastructure optimisation funding. Without adequate financial support, it will be difficult to implement modern technologies, upkeep of facilities, as well as operating sustainably (Ekpenyong et al. 2025). The Tertiary Education Trust Fund, for instance, may consider setting up a dedicated Facility Optimisation Grant through which universities would have to present data-driven space management plans as a criterion for funding. This could involve a pilot allocation of 500 million naira to five universities which would demonstrate measurable space utilisation improvements thereby withing to fund the installation of CAFM systems, staff training, and minor renovations supporting flexible space design. Recipients would annually report their space efficiency metrics including occupancy rates, energy consumption per student, and maintenance cost reductions creating an evidence base for the Nigerian education sector to scale successful interventions.

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