

The Effects of Space Planning in General Hospital Building Wards in Nigeria: A Review

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ABSTRACT

Public hospital buildings are among the most complicated constructions, necessitating careful space planning to guarantee that they fulfil their objectives of healing, rehabilitation, and convenience for both patients and carers. The most prevalent issue with hospital space management has been sustainable space utilisation in indoor hospital facilities. It has been observed that there has been an increase of facilities and capacity despite inadequate spatial planning, which has a detrimental influence on users and lessens the healing effect. The study examines the adequacy of space planning in Nigeria hospitals and its effect on the users towards improving hospital user's well-being. This research's objective is to inquire into the various space planning strategies that can be used to help generate environmentally friendly and sustainable hospital planning wards. The research used a secondary data gathering technique, which includes a thorough examination and analysis of scientific literature from Google Scholar, Science Direct, Scopus, and Web of Science. The study identifies many factors that must be addressed in order to create a paradigm shift towards effective space planning and an adequate hospital environment in Nigeria. The study conclude that bad space planning in hospital architecture reflects the hospital system's diminishing improvement of patients and other healthcare users. The study's implication is improved availability and accessibility of facilities by users to satisfy the demands of patients. It recommends the use of effective space planning strategies from the design stage to incorporate the actual spaces required to accommodate the equipment and offer necessary services, as well as to anticipate future development in relation to population growth.

1. Introduction

Globally, the issue of space planning in general hospital wards has been acknowledged by researchers and has been characterised by a gradual growth in both population and hospital capacity (Prugsiganont& Jensen 2019). The issue necessitates paying close attention to how hospital buildings are created and planned to support future growth and facilities in order to avoid insufficient space management, which has a negative impact on users.

Researchers recognise the significance of effective space planning in hospital wards because it provides a foundation of comfort and great beneficial healing to users and they are classified based on the function they perform (Babbu, 2016; Akinluyi, et al., 2020).

Hospital wards are defined by the NHS Data Model and Dictionary as a collection of hospital beds and related treatment facilities that are administered as a single entity for the purposes of staffing and treatment duties. An

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administration desk, office, many patient rooms (PR), nursing stations, secretarial offices, storage and medication rooms for medical equipment, bathrooms, and a living area for patients make up a typical ward. Nigeria Ministry of Health posited that ward size influences the number of beds and must be constructed with adaptability in mind, meaning that a patient of any age can be admitted and treated in a ward without disturbing other patients.

The facilities within a ward space require proper space planning to provide the users' maximum comfort. The concepts of space and function are the cornerstones of spatial layout in architectural design. As a result, their cordial relationship is necessary for an architectural product to be effective and perform well. Several structures fall under this category, particularly hospital ward settings constructed to house a variety of complicated and diverse roles. The rising demand for healthcare services, particularly in government institutions, has contributed to a scenario in which there are too many patients for the resources available. Effective space planning is required for the effective delivery of healthcare services in order to meet human requirements.

Space planning professionals and users have identified the importance of space design in hospital wards. Several authors in the literature have highlighted its relevance, citing numerous aspects of the difficulty in space design and organisation (Pantartziset al., 2017; Babbu, 2016). Lingzhiet al., (2017) posited that space management is a multidisciplinary effort that incorporates locations, people, activities, and technological advancements to design and manage a living and working environment that effectively supports the indicated purposes. Alalouch (2009) and Alkali et al., (2018), stated that wards occupy the majority of the overall area of a hospital in a health care setting.

In a study by NHS Estates (2010) comparing six different wards from six different hospitals in the UK, it was discovered that the total bed area takes up, on average, 53.59% of the entire hospital area. The total bed area ranges from 44.85% to 55.97% of the total hospital area. As stated in the health and design briefs for that particular plan, an inpatient unit's layout is typically decided by the specific requirements of a plan (Alalouch 2009). Although it is governed by generic design principles, it is advised that amenities be placed logically within the unit to maximise worker workflow and travel times, notably between service, storage, and the patient's bedside (IUSS, 2013). There is no inpatient unit design that is widely recognised as being superior, it may be said unequivocally. However, in every situation, the ultimate choice is based on operational guidelines, site limitations, and regional service requirements (Cox & Groves 1990).

NHS Estates (2010) conducted a comprehensive analysis in order to establish unambiguous evidence based on categories of direct activities occurring near the bed. According to their earlier research (NHS Estates, 2004), this was based on categories of direct activities that took

place close to the bed. Based on the study, the activities included individual care, maintenance, and support tasks as well as clinical treatment and care (Alalouch, 2009). The study identified five sectors, including the core bed space, bed-head services, sanitary facilities, clinical support, and family support, within which these activities happen at the bedside, whether in a single-bed room or a multi-bed room (NHS Estates, 2005; Lennerts&Blöchle, 2012).

According to Devon (2023), space planning entails using available space to accommodate consumers' demands. In a hospital, this entails assigning space for medical attention and making the best use of the space for doctors to provide care. The appropriate use of space planning makes healthcare facilities accessible, allowing patients or their family to easily use hospital facilities and to facilitate the healing of the patients (Nur 2020). To ensure that hospital buildings' users can perform to their maximum potential, poor space management and planning must be resolved. Multiple factors such as the number of users, the number of spaces and sizes available, accessibility, and other variables, this purpose is seldom ever fulfilled. Space management practises are centred on making the most use of the existing space to cut down on maintenance expenditures (Ibrahim et al., 2012).

The most popular issue in hospital space management has been sustainable space utilisation in the built environment (Prugsiganont& Jensen 2019). Due to insufficient strategic future planning, hospitals and health systems face significant difficulties in maintaining facility replacement, growth, and refurbishment (Yousefli,et al., 2017). Clark (2015) stated a major factor in the patient experience is how well-designed and maintained the hospital environment is. Due to its special purpose, a healthcare institution cannot ignore the value of space planning or the sustainability of its design. Numerous authors (Pachilova& Sailer, 2020; Reilinget al., 2008) have noted the difficulty of bad space planning in hospital settings, which is a significant problem for healthcare facilities.

It has been noted that government hospitals are experiencing a patient overload. This is due to general consulting work done at a government hospital, where the number of wards available is insufficient to meet the demands. Two questions are posed by Mohd &Syakima (2013) to address the subject of space planning in hospital wards: how are hospitals managing this issue and what techniques are used to manage equipment and allocate ward space when there are too many patients? General hospital buildings around the world frequently experience overcrowding, which results in poor user satisfaction and subpar care, which in turn produces even worse patient outcomes and higher healthcare expenses (Morley et al., 2018).

In Australia and Canada, Guttman et al. (2011) and Dinh et al. (2015) show considerable and unsustainable

increases in emergency department presentations. Numerous researchers (Morley et al., 2018; Dinh et al., 2015; Lowthian et al., 2012) have stated that the increases cannot be attributed to population growth alone. According to the study, waiting rooms can get crowded as a result of the number of people awaiting attention and any delays in diagnosing or handling those previously in queue. Seyun&Hyunsoo (2010), posited that hospitals may make the most of the ward space regardless of the level of demand by including design components that optimise space usage ability and flexibility. This can easily adjust in real-time to variations in need. The study also noted the significance of include way finding components in establishing efficient hospital departmental flow that conserves time and energy.

Hospital management, users, and architects must collaborate well from the start of the planning process until the project is completed for hospital space planning to be successful (Yousefli et al., 2017). Future space planning for the hospital's benefit has been crucial, and doing so significantly improves the hospital's success (Reiling et al., 2008). The current health care system in Nigeria is inefficient in terms of space planning, which has a negative influence on the value of attention given to patients. To enable the hospital building to fulfil its role while being user-friendly for patients and other hospital users, this necessitates sound strategic planning centred on the hospital design's focal point (Becker & Parsons, 2007).

Prugsiganont& Jensen (2019), posited that the best approach to improve hospital clinical results, fiscal health, efficiency, client satisfaction, and cultural indicators is to base design decisions on data from research. The general hospital in Nigeria has experienced an influx of patients, and this has made the available spaces insufficient to accommodate the patients, thereby making the hospital's users ineffective and not responding to their respective functions. The space planning process to accommodate the users in the available spaces and also a sustainable plan for future hospital designs form the gaps in the research.

This study's goal is to investigate the effects of space planning in general hospital buildings in order to integrate and get an enhanced mastery of space management in hospital buildings in order to ensure that patients and other hospital users may operate effectively. This article will look at the essential elements for successful space management in hospital facilities, which will not only improve the individual patient experience but will also better serve the community's health needs. The specific objectives that guided the study include: (i) identifying space planning problems as a result of patient overload in the hospital wards (ii) To identify the possible effects of space planning on the users; (iii) To identify space management techniques that will offer solutions to space planning issues in hospital buildings and wards.

1.1. Review on hospital space planning, requirement and its application

The process that produces a space planning is a representation that depicts the requirements with necessary elements of spaces. Space planning is the analysis of how space in structures and rooms will be used. Good space planning takes into account potential uses of space and ensures that they are used efficiently (Calixto, & Celani, 2015; Lennerts&Blöchle, 2012). Effective space planning in hospital wards has been acknowledged as a key factor in assessing the wellbeing of hospital users and management, as it encourages personal sensations of consistency in addition to the features of the physical surroundings (Seyun&Hyunsoo 2010). Andersson et al. (2011), cited in Lingzhiet al. (2017), stated that space planning studies include evaluation of efficiency, procedure design, and usability analysis. Charise et al. (2011) posited that the architecture of hospitals and other healthcare facilities plays a substantial role in defining the standard of excellent medical upkeep.

Mohd & Syakima (2013) posited that the absence of strategically integrating facilities management within the host organisation may lead to a conflict between the organisations and the facility's objectives and goals. Pachilova& Sailer (2014) stated that connectivity determines and measures the size of hospital ward areas, but it doesn't appear to have a significant impact on behaviour. Space utilisation is the idea of optimising the use of available space to attain its level of context-specific space efficiency. The significance of design quality as a trigger for patient well-being is becoming increasingly important, as it also has an impact on building operation (Shariffahet al., 2020). Norwina&Mohd-Nawawi (2006) posited that the Ministry of Health in Malaysia provides standard building criteria for government hospitals. The typical facilities and equipment required in the ward space are described in depth in these standards.

The facilities and equipment are determined by the space available and the kind of services to be used. This unquestionably requires careful consideration throughout the planning stage to guarantee that there are spaces for the patients in all of the facilities needed for their care (Von-Felten et al., 2009). Hospital wards' main problem is the constant influx of patients and amenities, which overwhelms the space that can be used to house them. Mohd & Syakima (2013) offered some recommendations ways to give patients sufficient ward space. Among the strategies mentioned is that hospitals should investigate or review all the necessities required to design a hospital ward, including the amenities and furnishings, such as single rooms that can be converted into double rooms and moveable partitions. Hutton (2010) stated that adolescent patients substitute heterotopic spaces for a hospital ward's dominant area. Every patient uses these places differently for comfort, leisure, work, privacy, and habit. It is acknowledged that heterotopic space can be used to

facilitate interactions between patients and nurses. According to the study, the patient-created areas in the ward setting are crucial for their treatment.

The requirements include a long-term strategy, the kind of services offered, the length of stay, the sizes of the rooms and the capacity of couches in each, the gross surface area, the local demand, and the required cost. Based on the study, the clinic can improve and develop strategies to deal with the difficulty of treating too many patients with these requirements. Derlet & Richards (2008) suggested ten recommendations for reducing hospital ward capacity and relieving emergency room crowding. In Thailand, Prugsiganont & Jensen (2019) reported that the study found three (3) factors responsible for the management of space in public healthcare facilities: a dearth of general practitioners, a limited number of public hospitals with spatial orientation, and little flexibility with space.

As stated in the study, these factors contributed to the alarmingly high patient demand in public hospitals, which was brought on by weak and insufficient strategic planning. The study further explained that these issues are caused by inadequate strategic space planning and a lack of Thai cultural integration into hospital design processes. Due to extreme overpopulation, public hospital buildings in Nigeria lack effective space planning, making the space provided inadequate for the users.

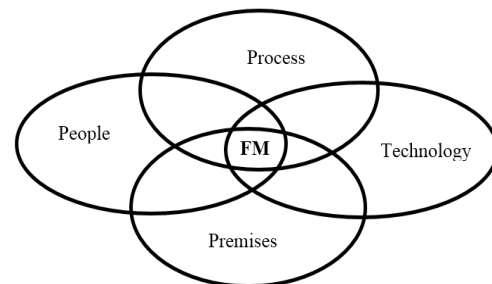
1.2. Space Planning Concept and Organisation Theory

Space planning in hospital wards requires adequate and proper considerations in order for users to cooperate productively. Space management and planning is an important aspect of facility management. According to SMG (2006), space management is a process that evaluates space utilisation, calculates space expenses, assesses space demands, and manages space changes using benchmarking tools. Nevertheless, various studies in hospital facilities have been undertaken that have examined management of space as a method to maximise the plan of the room with utilisation in order to moderate operating and sustaining expenses (Sliteenet al., 2011; Seyun & Hyunsoo, 2010).

Ihfasuziella et al. (2011) & Linzhiet al. (2017) stated that space planning effectively controls space to reduce the value of unused space and maximise its utilisation. Ilozor & Ilozor (2006) proposed that numerous variables, such as space utilisation, cost of occupying space, flexibility with space, and accessibility with space, be stable in order to accomplish successful management of space throughout the entire planning procedure and maintain living and working conditions. According to the preceding analysis, space management is a multidisciplinary activity that integrates space, people, activities, and equipment to design and oversee a living or working environment that successfully supports key business objectives.

Space management and organisational theory are concerned with two interconnected issues: first, the focus on processes that emerge through time, the management of these processes, and their criticism (Nadeem et al., 2019). This viewpoint underlines how management is dynamic and flexible as opposed to its apparently more set patterns, which were the discipline's main focus throughout most of the twentieth century. The cognitive path that many organisational theories have taken in recent decades reflects the second emphasis. Organisations are generally seen as cognitive beings capable of acting and thinking in ways similar to humans.

Ihfasuziella et al. (2012), suggested that space management needs to underline three key points. The first step in managing the space is to appoint members of the management committee; the second is to develop a plan or strategy for managing the space; and the third is to ensure that staff members are aware of and understand the management of the space by establishing precise rules for how management is carried out. Effective and efficient space management depends on the three factors mentioned above. Through scheduling and space billing, in addition to space development based on the priorities of the room, a number of approaches for managing space are described. As indicated in Figure 1, the study also highlights four components of facilities: process, technology, people, and places.



Based on the research, space management is crucial for efficiently using available space and reducing waste, both of which have an indirect effect on cost. Office space management is crucial, and since the 1960s, there has been a growing understanding of this fact, which has a direct impact on how much other processes cost (Ihfasuziella et al., 2012). Energy costs, cleaning, and maintenance requirements increase as space is utilised up. Waste of Space can arise if use of the space is not handled consistently (Booyet al., 2009). According to the theory, the main goal of facility management is to make a building's occupants feel welcome and get the most out of the area they occupy. Thus, a holistic facility management approach begins by emphasising people, understanding their desires and goals, and then implementing processes and technology to meet those demands (Bryan, 2022).

1.3. Configuration of a hospital ward

Hospital ward configurations are typically set up as

either single-bed rooms, multi-bed rooms, or both. A multiple-bed hospital ward is a broad term for an undivided space with a number of beds for patients that require related treatment at a healthcare facility. Every facility has a different number of beds per ward. As a result, in many locations, the design of a hospital ward with several beds might vary from 2 to 30 individuals per ward (Yau et al., 2011). The ward may also be divided into many units, each holding four or as many as six patients.

Another widespread practise, especially in the United States, is to allow only one patient per room. For the severe care unit and serious care unit, multiple-bed arrangements are permitted with clear restrictions. Additionally, compared to single-patient rooms, hospital wards with numerous beds require less capital investment, which is why they are more prevalent in developing nations (AIA 2001). Based on healthcare policies and programmes in various countries, different standards have been established. In contrast to the US, where two-bed rooms are more common, Scotland chose a policy of 100% single rooms (NHS Estates, 2005). Until recently, the UK's standard was 4- to 6-bed bays (Chaudhury *et al.*, 2005).

NHS Estates (2005) conducted a thorough analysis with the aim of determining a distinct, scientifically supported minimum space requirement surrounding the bed. This was based on categories of nearby direct activities that were described in their earlier research (NHS Estates, 2004). Alalouch (2009) posited that these actions fall under the categories of hospital treatment and attention, individual attention and upkeep, and encouragement activities. Whether in a single or multi-bed room, there are five zones where these actions occur at the bedside. These include basic bed space, bed-head services, restrooms, clinical care, and household aid (NHS Estates, 2005). However, in Nigerian hospitals, the area around the bed does not take into account or allow for the activities that should be performed therein (Alkali *et al.*, 2014).

The fundamental concepts of ward design concentrate around lighting, ventilation, and cleanliness (Noor *et al.*, 2022). This concepts revolves with good space planning requirements and consideration. The requirements of patients and staffs should be prioritised in the ward space planning environment (Joseph & Rashid 2007). Recent studies have indicated the significance of significant and diverse stimuli (odourless and pleasant experience) in a ward environment, revealing connections between physical settings and patients' health outcomes. These results provide credence to the idea that poorly constructed, insufficiently planned, poorly maintained, and poorly spaced hospital wards may aggravate patients and worsen sickness rather than promote healing (Zimring *et al.*, 2004).

The following list includes the four styles of hospital ward planning that are most frequently used worldwide. Yau et al., (2011) and Cox & Groves (1990) stated that the planning can be categorised into four groups: hub and

spoke units, nightingale wards, racecourse wards, and bay wards. The nightingale wards, which have beds lining the exterior of the room, are designed with the nurses' station in the centre. This enables the nurses to effectively supervise patients. This type of ward, which may house up to 30 individuals or 24 children, is still often used in many developing countries. Bay wards have numerous patient cubicle rooms in addition to a central nurses' station. The arrangement of the nurses' station and beds in racecourse wards is distinct from that in bay wards. Large rooms serve as the radiating spokes of the hub and spoke units, with the central nurses' station acting as the hub.

1.4. Hospital equipment and critical features for good hospital ward planning

Bali & Dwivedi (2007), cited in Mercy (2017), posited that hospital equipment management is an onset management sequence that begins with space planning, procurement, acquisition, and installation of hospital equipment. Hospital equipment is a component of a medical device or facility used for anticipated medical purposes. These pieces of equipment necessitate space in the wards for users to carry out their duties. This entails careful planning that takes into account both the facilities and the users so as to create a user-friendly environment. To meet the needs of patients and staff, adequate planning is required.

(Mohd & Syakima (2013) explored different hospital ward space planning strategies. Data for the study, which used a qualitative method, were gathered by conducting interviews with those in charge of managing ward spaces. The research used content analysis. The research assists in identifying the primary techniques utilised in hospital ward space and equipment management, such as knowing the activities to be conducted in the ward, having appropriate circulation, and being flexible. Hospitals are a basic human need for human care, and hospital wards take up the majority of the total clinic space, which necessitates the most significant component of a hospital setting and the subject of the maximum study (Alkali *et al.*, 2018). Because of patient safety and health standards, new technology, and stringent laws that must be supported, hospital space planning necessitates extensive planning. There are proposed various techniques for efficient hospital planning and design. The suggested strategies are:

i. Create a functional space

The hospital's plan should improve staff efficiency, which can be accomplished by reducing travel distance between commonly used spaces and establishing an efficient logistics system for food supply. Consider multi-purpose areas to save time on travels (ASTRON 2021).

ii. Conformity and flexibility

In hospitals, treatment styles and medical needs change on a regular basis; hence, modular space planning

and layout would be an excellent choice. Using general room sizes with conveniently accessible mechanical and electrical systems, as well as planned extension directions. According to Babbu (2016), the ability of spaces to adapt to future demands without significant physical modification is also seen as a component of the hospital project's flexibility. Future growth in terms of beds and services should be considered in a flexible hospital design in order to accommodate the changing scenario and hospital users. Flexibility in hospital design begins even before the hospital's physical planning. The hospital infrastructure resources required for a specific number of patients in a specific period are examined.

iii. **Security Concern**

Mentally ill patients are treated at medical facilities, but occasionally, such patients might become hostile and attack the physicians or employees. A secure area in the hospital is required to treat such a patient in order to address the problem. Therefore, safety should be your top priority if you permit the treatment of mentally ill people (Yasushi, 2019)

iv. **System of Waste Management**

Medical institutions generate a lot of waste and require a lot of energy. The waste could have an impact on medical facilities and people' health. To avoid such a situation, the facilities must have a waste management system (Awodele 2016).

Zhao et al. (2009) identified various issues that affect space planning in healthcare buildings. The research includes an extensive investigation of some variables influencing healthcare facility design. Figure 2 depicts five characteristics associated with adequate health care planning advancements identified by the study. According to the study, the basic criteria that must be considered to accomplish optimal healthcare planning are user happiness, health and safety, energy use, the environment, and organisational space arrangement. This suggests that while designing a medical ward, the highlighted features should be taken into consideration in order to achieve appropriate ward space and user comfort.

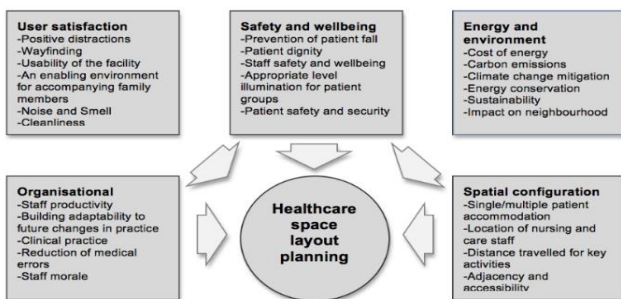


Figure 2: Factors influencing healthcare facility space layout design. Source: Zhao et al., (2009)

2. Methodology

The primary focus of the investigation is general hospital wards in Nigeria, which includes six geopolitical areas. A comprehensive assessment of the literature on the topic of the research was carried out using the online databases Web of Science, PubMed, Compendex, AIRBASE, and Cambridge Scientific Abstracts (including these sub-databases: Environmental Sciences and Architectural Journals). A thorough review and systematic analysis of the space planning literature was done in addition to analysing policy tools. This literature comprised articles from peer-reviewed journals, study summaries, regulations, guidelines, and grey literature. References to other papers were found in the reviews that were discussed in this study as well as other recoverable resources. From the papers that were identified, the ones that qualified for first screening and publishing in peer-reviewed scientific journals were selected. Overall, a large number of papers were examined, and those that did not address space planning were excluded from further examination. This is followed by space management strategies suitable to encourage adequate services for patients and caregivers. Finally, recommendations and suggestions are proffered for possible realisations of adequate space management in the hospital building.

2.1. Space planning techniques for prevailing spaces in public hospitals

Hospital architectural space planning has gained importance in the view of healthcare architects as part of the total patient experience (Akinluyi, 2021). As a result, improvements are being made to the architecture of hospitals. By giving direction, fostering pride, boosting assurance, and aiding the recovery procedure. The architectural space planning of a hospital can provide a memorable and rewarding experience. One of the most crucial aspects of the job of interior designers and architects is space planning, which is a multi-step process. The effective use of floor space without waste is ensured through space planning. Healthcare facilities have some of the most exacting and particular space requirements of any commercial building, necessitating extensive space planning approaches. Healthcare space management is one of the most complicated types of facility management because of the interaction between patients, workers, visitors, assets, and the facility itself. So many factors need to be taken into consideration in order to have an adequate space management system in public hospitals.

Effective healthcare space management entails going above and beyond in examining the space's requirements as well as its surroundings across the range of care. Studies posited nine recommendations for better hospital space planning in order to maximise space accessibility, utilisation, and effectiveness.

a. Distinguishing space from function

This involves identifying static and the building's changing environments, including coordinating about these considerations. This will enable us to know the facilities to be integrated and the active spaces. A space requires a particular purpose and the intended users in order to have effective planning (Devon 2022).

b. Outpatient and inpatient care

Make the distinction between inpatient and outpatient in the same way that you would between static and dynamic space at a facility. Both of these titles have an effect on how much space is used. A simple plan can be made once the two spaces have been located (WHO 2018).

c. Think of the guests

Larger healthcare institutions might appear to be confusing to guests and professional nurses who have operated for several years due to security checks and restricted access sections. Make the fundamental tenet of inclusive facilities management visible through labelling and way-finding installations (Molina-Mula & Gallo-Estrada 2020).

d. Process correlation

Controlling how, when, and what space appears like at any given time requires sound facility utilisation strategies. To control how space responds to needs, FMs must develop procedures with checks and balances (Mohd *et al.*, 2022).

Furthermore, HubStar (2023) outlined certain advantages and actions for successful space planning. Effective space planning has several advantages, including: (i) lower costs from avoiding facilities management waste on unused spaces; (ii) improved employee performance; (iii) increased energy efficiency due to better space utilisation; (iv) a workplace that adapts to work habits and preferences; and (v) it encourages a workplace that scales dynamically. The report also listed the following procedures to achieve efficient space planning: (i) Measure the use and occupancy of each workspace. (ii) Recognise your workplace strategy and how it will influence how you design the environment. (iii) Create an occupancy strategy and define occupancy profiles. (iv) Use a space planning programme designed for hybrid work. (v) Evaluate the space plan's effectiveness on a regular basis and tweak the plan as needed.

2.2. Space planning effects and sustainability in hospital buildings

Planning the use of space properly increases patient comfort, facilitates patient recovery, and increases accessibility to healthcare institutions. Hospital wards have space design issues that lead to poor accessibility, little spatial flexibility, and poor spatial orientation (Fani, 2019; Akinluyi, 2020). Prugsiganont & Waroonk (2021)

stated that these issues are caused by inadequate strategic space planning and a failure to take into account certain cultural norms during the construction of hospitals. The study stated that the issues is linked with lack of hospital architecture and planning policies. The study suggested lack of coordination between management, designers, and users.

Seyun & Hyunsoo (2010), indicated that user-physical environment interactions improve the possibility of environmental sustainability. The report claims that by using software for effective space planning, healthcare facilities may maximise their sustainability. The initiative of the Organisation for Economic Co-operation and Development (OECD) established five objectives for sustainable buildings (Ebtisam & Amjad 2022). The five objectives are: thermal comfort, auditory comfort, visual comfort, and practical convenience. The first goal is to ensure that indoor air quality is comfortable.

Poor space planning has had a significant impact on hospital patients as a whole. It makes it challenging for patients, their families, and healthcare professionals to navigate because there aren't enough facilities to meet patients' needs. The facilities that improve patient care while lowering safety, security, and privacy in carefully planned places are difficult for doctors to access. These negative effects agitate patients and hinder healing.

2.3. The Impact on the Body of Knowledge

The literature study revealed that there was minimal previous research on space design in hospital wards in Nigeria. This study provides an accurate review of the potential integration of suitable space management and planning provision in Nigerian hospital buildings and clarifies why it hasn't been taken into account in any attempts to provide adequate space planning in hospital building wards. The study will assist in the planning of hospital wards that will be conducive for the users and promote a sustainable healing environment, which is the main function of hospital wards.

2.4. Practice implications

The challenges and limits mentioned in this article, as well as the related methods of optimisation provided, are highly helpful information for practitioners and policymakers in order to support the delivery of suitable space planning in hospital buildings wards in Nigeria. The following suggestions are made:

i. Design teams, contractors, and customers should work together more closely from the beginning of a project ahead and include the users to determine the real spaces needed and the anticipated capacity.

ii. To tackle excesses brought on by congestion, hospital planners should take future development into consideration.

iii. In order to produce and promote an appropriate delivery of healthcare, researchers should give priority to educating the public about the benefits of the requirement for adequate space planning in hospital design.

iv. To ensure that the hospital's users have a functional, well-designed facility, hospital designers should also take flexibility into account for the places and equipment given.

3. Recommendation

The most significant phase in developing a suitable hospital plan for hospital users is a comfortable integration of facilities that will support positive user environments. Therefore, the following can be done to guarantee sufficient and top-notch space planning for hospital buildings:

- i. The key factor in a good hospital project outcome throughout the design phase is user interaction. Various users, stakeholders, and experts ought to be involved at various stages of the design process.
- ii. It is significant to establish clear project plans and processes for (a) strategic planning, (b) creating a design brief, and (c) concept, development, technical, and construction design. (d) delivery and use (building assessment, hospital master plan update)
- iii. To accommodate any surplus that might come from overcrowding, suitable measures should be taken to explore incorporating more spaces during the design stage.
- iv. Create a flexible design framework that will increase patient efficiency.
- v. Take into account every method of space planning mentioned in the literature.

4. Conclusions

This study evaluated the effects of space planning in hospital building wards and identified certain factors that continue to be major difficulties in hospital space planning. The success and sustainability of any design is determined by the way the functions interact with the accommodating space and with one another. A number of space planning techniques identified in this study can aid in the supply of proper space planning and its consideration in Nigerian public hospitals. This study reveals the significant challenges that many Nigerian public hospital customers have when attempting to seek medical attention in separate facilities due to insufficient space design. These are the key difficulties that influence hospital ward users. These include:

- i. Having poor accessibility and way finding in some strategic places in the hospital.
- ii. Excessive overcrowding.
- iii. Possessing a limited range of spatial flexibility.

- iv. Poorly oriented in space.
- v. Lack of strategic planning.
- vi. Non-integration of user's participation.
- vii. Inability to plan for future.

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Conflict of interest

The authors claim to have no conflicts of interest.

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