

Assessing the Influence of Design Adaptability on Student Housing Experiences in Nigerian Universities

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ABSTRACT

Student housing in Nigerian higher institutions faces growing challenges of overcrowding, limited adaptability, and low satisfaction, driven by rising enrolment, evolving lifestyles, and demand for multifunctional spaces. This study investigates the role of spatial flexibility in enhancing user satisfaction in undergraduate hostels within Kwara State, focusing on how adaptable design impacts well-being, comfort, and functionality. The aim is to evaluate the relationship between flexible spatial arrangements and satisfaction, with objectives including identifying user-initiated physical adjustments, determining hostel features supporting flexibility, and assessing perceptions of adaptability in academic and living experiences. A quantitative survey was conducted using structured questionnaires administered to 313 residents of University of Ilorin, Kwara State University, and Kwara State Polytechnic. Data analysis employed descriptive statistics (frequencies and percentages). Findings show 69% reside on-campus, mostly in shared rooms with two or more bunks. Only 10.54% made structural adjustments and 1.92% altered walls, but more modified room layouts (26.83%) and bedroom areas (37.38%). Most respondents affirmed flexibility's value: 96.8% linked it to satisfaction, 95.85% to efficient space use, 87.53% to inclusivity, and 80.51% to improved well-being. The study concludes that spatial flexibility strongly enhances satisfaction and space optimization. It recommends architects and facility managers prioritize adaptable, student-centered hostel designs.

KEYWORDS

Spatial Flexibility, User Satisfaction, Undergraduate Hostels, Nigerian higher institution

1. Introduction

Globally, the design of student accommodation has evolved to reflect changing expectations around adaptability, comfort, and functionality. As educational institutions expand and student populations diversify, there has been a growing emphasis on incorporating spatial flexibility into residential buildings to enhance user satisfaction (Altas & Gursay, 1998). Spatial flexibility refers to the capacity of a built environment to accommodate change in function, layout, and space usage over time without necessitating major structural modifications. In countries like the United States, the United Kingdom, and Australia, university housing has increasingly adopted flexible design strategies to improve students' residential experiences by addressing privacy, personalization, social integration, and evolving space needs (HMC Architects, 2019). These trends underscore a broader recognition of the link



between physical space and students' academic and emotional well-being.

In the African context, particularly in urbanizing regions, the pressures of rapid population growth, urban density, and limited infrastructural capacity have significantly shaped the discourse around hostel design and user satisfaction. Many African universities face overcrowding, outdated hostel infrastructure, and limited adaptability, leading to reduced student satisfaction and suboptimal living conditions (Abubakar & Aina, 2019). As higher education becomes more accessible, the need to redesign student housing for flexibility and livability becomes urgent. In Sub-Saharan Africa, there is an increasing awareness of how spatial conditions can either support or hinder student performance and well-being, driving interest in responsive architectural solutions.

Regionally, in Nigeria, university hostels often struggle with structural rigidity, overcrowding, and inflexible layouts. These challenges limit the ability of students to adapt their living spaces to personal or academic needs. Studies have shown that spatial constraints in Nigerian university hostels negatively affect students' mental health, sense of autonomy, and satisfaction (Ede et al., 2020). The integration of spatial flexibility—such as adjustable room layouts, modifiable walls, and transformable functions—has therefore emerged as a potential intervention to improve user satisfaction and the overall functionality of hostel accommodations.

The concept of spatial flexibility is central to understanding user satisfaction in undergraduate hostels, as it reflects the adaptability of living spaces to students' evolving needs. Key indicators of flexibility include structural adjustments, internal wall modifications, layout changes, and alterations to usable areas such as bedrooms, kitchens, and common rooms (Altas & Gursoy, 1998). These elements serve as proxies for assessing how much control residents have over their spaces and the degree to which hostels accommodate lifestyle demands. In practice, even simple adjustments like rearranging room layouts or furniture can strongly influence students' perceptions of comfort, autonomy, and belonging (Baper & Saied, 2020).

Among these indicators, changes in bedroom layouts and usability adjustments emerged as the most significant, given that bedrooms are the most frequently used and personalized spaces (Abubakar & Aina, 2019). Other modifications, such as adapting kitchens, stores, or makeshift study corners, highlight students' efforts to compensate for design deficiencies (Ede, Bamigboye, & Ogunbode, 2020). Meanwhile, the limited changes to bathrooms, balconies, and common rooms suggest structural constraints or restricted accessibility, emphasizing areas where architectural improvements are needed (Alhilo & Hussein, 2022). Although less common, larger interventions such as structural or internal wall adjustments reflect deeper dissatisfaction with hostel design and underscore the rigidity of institutional spaces (Altas & Gursoy, 1998).

The link between spatial flexibility and user satisfaction is both theoretical and empirical. Flexible environments allow students to adapt spaces for studying, resting, or socializing, which enhances psychological well-being, comfort, and social integration (Ede et al., 2020). Conversely, rigid and overcrowded spaces limit productivity, increase stress, and reduce quality of life (Abubakar & Aina, 2019). Data from institutions in Kwara State confirms this relationship, showing that students who reported making layout or usability adjustments expressed higher satisfaction, validating the argument that spatial flexibility is a critical determinant of hostel livability (Baper & Saied, 2020; Alhilo & Hussein, 2022). Therefore, hostel design in Nigerian higher institutions must prioritize flexibility to ensure that

spaces meet students' academic, social, and personal needs effectively.

Undergraduate hostels in Nigerian higher institutions, particularly within Kwara State, face growing challenges in meeting the spatial and comfort needs of students, resulting in low levels of user satisfaction. One major problem is the rigidity of hostel spaces, which prevents adaptation to students' evolving academic, social, and personal needs. Many institutional hostels are constructed with fixed layouts, permanent walls, and immovable structural systems that do not allow for flexibility. As a result, students are unable to personalize or reconfigure their spaces, leading to dissatisfaction and discomfort. For instance, the data indicates that only 10.54% of respondents made structural adjustments, and only 1.92% adjusted internal walls, highlighting a general inflexibility in hostel infrastructure. Increasing the possibility of structural or internal wall adjustments could create more adaptable spaces that respond better to students' changing needs, thereby enhancing satisfaction (Altas & Gursoy, 1998).

Another significant problem is overcrowding and poor space utilization, which is common in many Nigerian hostels due to increasing student populations and inadequate planning. High bunk densities and limited usable space per student lead to stress, lack of privacy, and reduced comfort. According to the survey, 30.67% of rooms contained four or more bunks, and 31.65% of rooms had four or more occupants, reflecting overcrowded living conditions. Furthermore, changes to usable areas such as the bedroom (37.38%) indicate that students are attempting to reclaim some comfort by modifying their personal zones. However, changes to other key functional areas like kitchens (9.58%) and stores (4.79%) remain minimal, possibly due to space or design constraints. Encouraging spatial flexibility in these areas can enable better management of shared resources and provide a more functional and comfortable living experience for students (Ede et al., 2020).

A third issue impacting satisfaction is the inability to adapt room layouts and functions to meet different user needs over time. Student activities vary between studying, resting, and interacting with peers, and a static room design cannot adequately support these varying functions. The study revealed that only 26.83% of respondents were able to change their room layout and functions, suggesting that the majority of students live in spaces that cannot be adjusted for multifunctional use. The lack of flexibility in adapting space functions may result in poorly organized, cluttered, or underutilized environments, negatively affecting mental focus and general well-being. Promoting room layout changes and creating provisions for reconfigurable furniture or modular spaces can allow students to personalize their living areas according to their daily schedules and lifestyle preferences, leading to increased user satisfaction (Abubakar & Aina, 2019).

Student satisfaction in university hostels in Kwara State is hindered by a combination of structural rigidity, overcrowding, and a lack of multifunctional adaptability. The analysis of spatial flexibility indicators—such as structural and internal wall adjustments, changes to room layout, and modifications to usable areas—clearly demonstrates their potential to either alleviate or worsen these problems. Addressing these spatial limitations through flexible, student-centered design approaches will not only improve satisfaction but also support students' academic performance, well-being, and retention in on-campus housing.

2. Literature Review

Altas and Gursoy (1998), in a study conducted in Atakoy, Istanbul, aimed to evaluate the impact of spatial adaptability and flexibility on residential satisfaction by focusing on the physical and

organizational attributes of dwelling spaces. Using a comparative post-occupancy evaluation of four 2-bedroom apartment types within a 16–20-year-old housing settlement, the researchers assessed how alterations in size, space organization, and physical characteristics influenced users' satisfaction levels. The study revealed that residential satisfaction decreases over time due to evolving spatial needs, but users regain satisfaction by modifying their living spaces to better suit these needs. The findings showed that adaptability and flexibility—particularly the ability to alter space layout and size—are key determinants of housing quality. The authors concluded that spatial adaptability significantly enhances long-term user satisfaction and recommended that future housing designs incorporate flexible planning strategies to accommodate users' changing lifestyles and preferences over time.

Baper and Saied (2020), in their study conducted in Empire-Erbil City, aimed to investigate how smart interior design solutions influence the achievement of flexible spaces, particularly within small spatial environments such as studio apartments. Using a prototyping method alongside a detailed questionnaire, the researchers explored how smart materials and technologies—such as sensors and actuators embedded within interior components—can be employed to enhance spatial flexibility. The study analyzed the architectural structure and interior design components across technological, environmental, formal, and holistic dimensions. Their findings revealed a strong correlation between the use of smart materials and increased physical flexibility, enabling spaces to adapt to user needs, preferences, and actions. The study concluded that smart analog models (SAM) integrated with digital modules (DM) significantly enhance the adaptability of interior spaces by removing rigidity and allowing multifunctional use. Based on these outcomes, the authors recommended adopting smart construction techniques and interior architecture strategies that embrace ICT-embedded elements to improve the livability and functionality of small residential spaces.

Alhilo and Hussein (2022) conducted a study in Turkish university dormitories aimed at examining the role of innovative flexible furniture design and its impact on interior spaces, particularly student rooms. Employing a qualitative research approach, the study involved detailed observation and evaluation of various student room designs across Turkish university hostels to explore how multifunctional, adaptable furniture affects spatial organization. The researchers focused on identifying how innovation in furniture design enhances both the aesthetic and functional quality of interior spaces. The findings showed that flexible furniture structures—such as foldable and multipurpose units—achieved full performance and aesthetic integration in the first tested model (100%) and partial success in the second model (50%). The study concluded that dynamic and innovative furniture designs are essential in addressing the spatial challenges of student housing, offering both functional versatility and improved spatial flow. Based on these outcomes, the authors recommended adopting flexible furniture designs in university dormitories to accommodate user needs, improve spatial efficiency, and enhance the overall aesthetic value of student living environments.

Campbell-Palmer (2025) conducted a study at the University of Leeds with the aim of identifying and improving best practices to support students with accessibility requirements in university-owned accommodation. Using a multi-method approach that combined literature review, webpage analysis against the Web Content Accessibility Guidelines (WCAG), and staff interviews, the study found notable strengths such as individualized care, a positive and responsive culture, large resource availability, and effective cross-team collaboration. However, gaps were identified, including insufficient formalization

of roles and processes, limited availability of accessibility-related information, a training deficit, and the exclusion of certain student groups. The findings further showed that poor website design and inadequate information-sharing hindered both staff effectiveness and student access to support. The study concluded that while the University of Leeds had laid a strong foundation for inclusivity, achieving best practice in accessibility must be regarded as a dynamic, ongoing process tailored to each institution's demographics and evolving challenges. To address these issues, the research recommended codifying roles and processes, establishing a Residential Services Hub, mandating staff training on accessibility and inclusive language, and employing website accessibility specialists to redesign accommodation web pages for greater clarity and usability (Campbell-Palmer, 2025).

Godfred Nii and Emeanulu (2025) investigated the effects of housing accessibility on the general well-being of international students at the University of the West of Scotland (UWS), Paisley. The study aimed to examine how access to suitable housing influences psychological well-being, academic performance, cultural adaptation, and social support among international students. Employing a quantitative research design, the authors distributed online surveys to 291 international students from diverse backgrounds. The findings revealed that lack of accessible housing significantly impacted students' physical and mental health, manifesting as stress, lack of concentration, and emotional instability, which in turn negatively affected their academic and social experiences. The study concluded that housing accessibility plays a critical role in maintaining student life balance, supporting cultural adaptation, and enhancing academic success. Consequently, the authors recommended that universities integrate housing accessibility into their admission processes and educational health strategies to improve the holistic well-being of international students (Godfred Nii & Emeanulu, 2025).

Amoah, Bamfo-Agyei, and Simpeh (2024) conducted a study in Ghana to examine the key factors influencing the choice of student accommodation among public university students. The aim was to identify the determinants of accommodation selection that shape students' satisfaction and living experiences. Using a quantitative methodology, the researchers distributed structured closed-ended questionnaires to 626 tertiary students through personal delivery at their residences, applying descriptive analysis, exploratory factor analysis, and regression analysis. The findings revealed that out of the forty-one identified factors grouped into four components—building, facilities available, proximity, and management—three components (facilities available, proximity, and building quality) significantly influenced students' choice of accommodation. The study concluded that students' preferences are strongly shaped by the physical quality of buildings, the availability of essential amenities, and the location of residences relative to academic and social needs. The authors recommended that accommodation providers and higher education stakeholders prioritise the provision of quality facilities, reliable internet connectivity, communal and recreational spaces, and well-managed residential services to foster student well-being and satisfaction (Amoah et al., 2024).

The concept of spatial flexibility, defined as the adaptability of built environments to evolving user needs, is particularly relevant within the Nigerian socio-cultural context, where communal living, extended family systems, and dynamic student populations demand constant adjustments in space utilization (Altas & Gursoy, 1998). Nigerian higher institutions, which accommodate diverse students from varying cultural and socio-economic backgrounds, often provide rigid hostel layouts that conflict with the fluidity of students' lifestyles and expectations (Abubakar & Aina, 2019). This disjuncture

highlights how theoretical notions of flexibility directly intersect with local cultural practices of sharing, modifying, and personalizing space to enhance comfort and belonging.

Institutionally, Nigerian universities face the dual challenge of overcrowding and limited funding for hostel infrastructure, further amplifying the importance of spatial flexibility. Unlike Western contexts where purpose-built student housing may incorporate adaptable design elements, hostels in Nigeria are often static, reflecting minimal consideration of students' evolving social and academic needs (Ede et al., 2020). Within this context, spatial flexibility becomes not only a theoretical construct but also a practical necessity for managing high student densities, enabling multifunctional use of rooms, and mitigating stressors associated with inflexible living arrangements (Baper & Saied, 2020). This linkage underscores the role of adaptability as both an architectural and institutional response to pressing infrastructural challenges.

Socio-culturally, the Nigerian student community values autonomy, personalization, and social interaction, all of which are enabled or constrained by spatial flexibility. The ability to reconfigure spaces for studying, resting, or socializing aligns with students' desire to balance academic and personal life within limited hostel environments (Alhilo & Hussein, 2022). Moreover, cultural practices of improvisation and resource-sharing mean that even small adjustments, such as rearranging furniture or converting shared spaces, carry significant implications for satisfaction and well-being. Embedding the theoretical framework of flexibility within these socio-cultural realities strengthens the argument that Nigerian hostels must evolve toward more adaptive and user-responsive designs that align with institutional capacities and cultural patterns of space use.

3. Methodology

This study adopted a quantitative survey research design aimed at assessing the impact of spatial flexibility on user satisfaction in undergraduate hostels across selected Nigerian higher institutions in Kwara State. The survey method in figure 1 was chosen for its strength in collecting large-scale, standardized data that allow for the identification of patterns, relationships, and trends among hostel residents. Structured questionnaires were designed and administered to 313 respondents, comprising students from University of Ilorin (80.19%), Kwara State University (13.41%), and Kwara State Polytechnic (6.4%). The questionnaire captured both demographic data and specific variables related to spatial flexibility, including room configuration, occupancy, physical modifications, and students' perceptions of flexibility's role in satisfaction, space utilization, accessibility, and well-being.

The choice of a quantitative design enabled objective measurement of students' experiences and opinions, allowing for statistical analysis of the extent to which flexible space design impacts satisfaction levels. The use of structured questionnaires ensured consistency in responses, while the descriptive analysis using frequencies and percentages provided clear summaries of key findings. This design is appropriate because it supports generalizability of the results across similar student populations and settings. Furthermore, it facilitated the identification of specific spatial factors (e.g., bunk configuration, layout changes, structural adjustments) that correlate with user satisfaction, offering evidence-based insights for architects and university facility managers. The implication of adopting this design is its ability to capture measurable user experiences that inform practical recommendations for improving hostel design through adaptable and student-centered approaches.

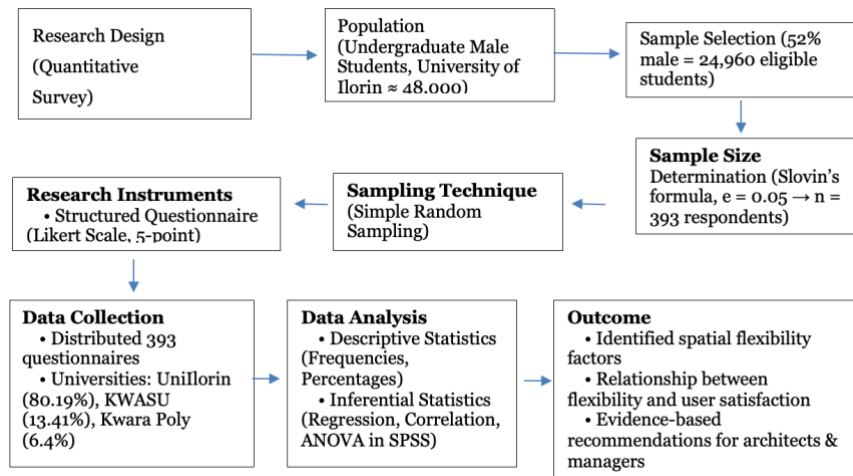


Figure 1: Methodology Framework

3.1 Population and sample selection procedures.

3.3.1 Research Population

Population is the number of people, objects or occurrences that have similar observable features (Mugenda & Mugenda, 2003). In other word, it is the totality of the objects, individuals, and/or events; that meet the set criteria for inclusion in a research for the aim to be met (Oladun, 2012). Inferences are drawn from the characteristics of the population. For this study, the population are undergraduate male students in University of Ilorin. The University has about 48,000 undergraduate students with a 48:52 female to male ratio (Times Higher Education, 2023).

3.3.2 Sample Size and Sampling Technique

As Gorard (2003) points out, the goal of sampling is to learn about and draw conclusions about a considerably greater number of cases (population). In this study, simple random sampling is used so that every element has an equal chance of getting selected to be part of the sample. Given that the population of male undergraduate students is 52% of 48000 students, the total number of elements to be selected is 24,960.

The sample size for the study is calculated using Slovin's Formula

$$n = N / 1 + N (e)^2$$

Where

n = the required sample size;

N = the finite population size; and

e = the level of significance in this case 0.05 was used

$$24960 / 1 + 24960(0.05)^2 = 393.69$$

Therefore, a total of 393 respondents were adopted as the sample size for the study and same number of questionnaires was distributed among male undergraduate students in the University.

3.3.3 Research Instruments

This study used questionnaires and interviews for the collection of primary data. Questionnaire administration is an organized method used in obtaining data based on samples (Tan, 2011); and its being used generally to solicit views on surveys based on flexibility. This questionnaire comprises a well-written structured list of questions to which corresponding responses were supplied by the

respondents (self-report). The questionnaire was structured to reflect the main theme of the study interest, thus, relevant data for solving problem of the study. It comprises tables and checkboxes for easy choice making from available options to respondents. The questionnaire inquired on a Likert scale with 5-points where 5 was the highest of the ranking. According to Manu (2015), Likert scale reduces uncertainty and it is easy to use.

4. Results

4.1 QUESTIONNAIRE ANALYSIS

Characteristics of Respondents

In order to accomplish the aim and the stated research objectives, characteristics of the respondent were put into consideration, to determine the status of the respondents.

Table 1.0: Institution Distribution of the Respondents

Characteristics of Respondents	Frequency	Percentage
Institution		
University of Ilorin	251	80.19
Kwara State University	42	13.41
Kwara State Polytechnic	20	6.4
Total	313	100

Figure 2.0: Characteristics of the Respondents: Institution Administered, Source: Author's Findings (2025)

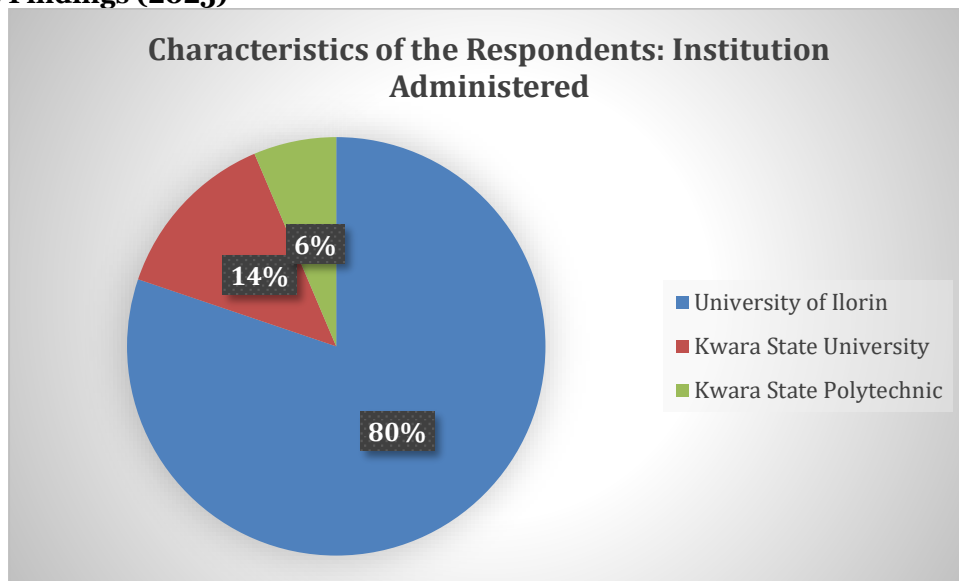


Table 2.0: Age Distribution of the Respondents

Characteristics of Respondents	Frequency	Percentage
Age		
Less than 21	104	33.22
21-30	198	63.26
31-40	9	2.88
41-50	2	0.64
50 & above	0	0
Total	313	100

Figure 3.0: Characteristics of the Respondents: Age, Source: Author's Findings (2025)

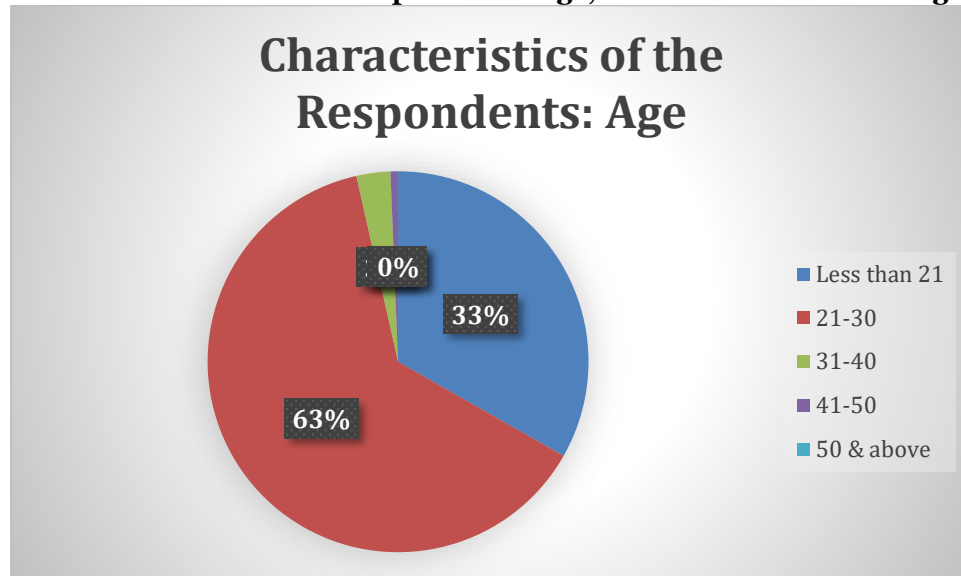


Table 3.0: Sex Distribution of the Respondents

Characteristics of Respondents	Frequency	Percentage
Sex		
Male	254	81.15
Female	59	18.85
Total	313	100

Table 4.0: Qualification Distribution of the Respondents

Characteristics of Respondents	Frequency	Percentage
Qualification		
Undergraduate	225	71.88
Bachelor's Degree	78	24.92
Master's Degree	10	3.20
Doctorate Degree	0	0
Total	313	100

Figure 4.0: Characteristics of the Respondents: Qualification, Source: Author's Findings (2025)

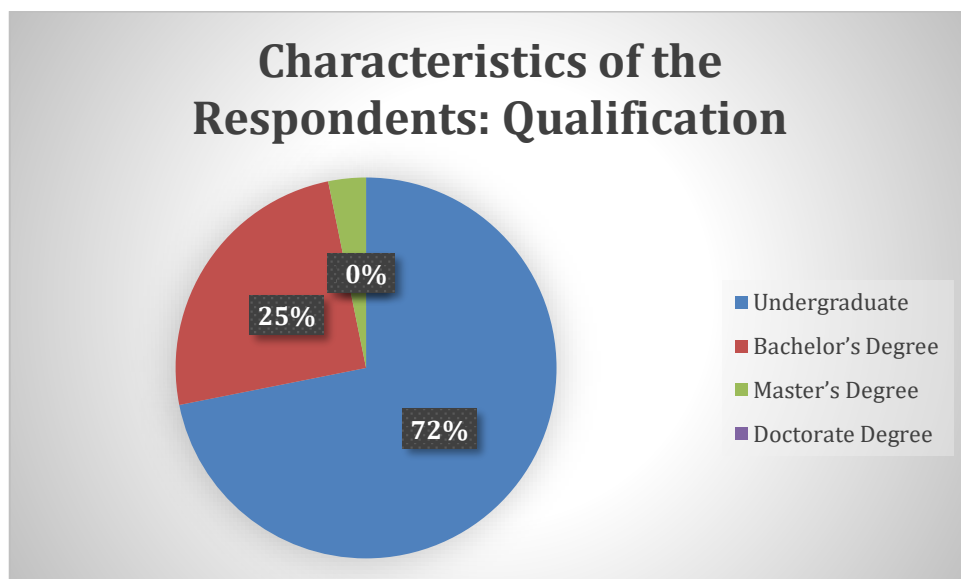


Table 1.0 and Figure 2,3,4 shows that majority of the respondents with 80.19% were student of University of Ilorin, 13.33% were students of Kwara State University while the remaining 6.4% were students of Kwara State Polytechnic. It was observed that 33.22% of the respondents were less than 21 years, 63.26% of the respondents were between 21-30 years, 2.88% of the respondents were between the ages of 31-40 years while 0.64% of the respondents were between the ages of 41-50 years. This signifies that majority of the respondent were within 21-30 which is an active age of students of tertiary institution in Nigeria.

The Table shows further that 81.15% of the respondents were male and 18.65% were female. It is also observed from figure 4.0 that majority of the respondents with 71.88% are undergraduate students, 24.92% are graduates while 3.20% are postgraduates. The above illustrates that all the respondents have stayed in hostels provided on the campus or off campus over a time and they qualify to be referred to as users, therefore their opinion could be asked about their experience with the flexibility of space on and off the campus.

Characteristics of Respondents' Housing

Table 1.0 and Figure 2,3,4 shows the characteristics of the respondents, while Table 5,6,7,8,9,10,11 and 12 shows the characteristics of the respondents' housing. In addition to this basic information, the questionnaire also focused on the current situation of respondents housing and the flexibility needs of residents. It includes changes to the structure, changes to internal walls, layout adjustments, usable area adjustments, room quantity adjustments, furniture arrangement etc.

Table 5.0: Characteristics of Respondents' Housing by location

Characteristics of Respondents Housing	Frequency	Percentage
Location		
On Campus	216	69
Off Campus	97	31
Total	313	100

Table 6.0: Characteristics of Respondents' Housing by Number of Bunk Spaces

Characteristics of Respondents Housing	Frequency	Percentage
Bunk Space		
1	34	10.86
2	123	39.30
3	60	19.17
4+	96	30.67
Total	313	100

Table 7.0: Characteristics of Respondents' Housing by Number of Occupants

Characteristics of Respondents Housing	Frequency	Percentage
Number of Occupants		
1	45	14.37
2	147	46.96
3	22	7.02
4	99	31.65
Total	313	100

Table 8.0: Characteristics of Respondents' Housing by Structural adjustments

Characteristics of Respondents Housing	Frequency	Percentage
Structural adjustments		
Yes	33	10.54
No	280	89.46
Total	313	100

Table 9.0: Characteristics of Respondents' Housing by Internal Wall adjustments

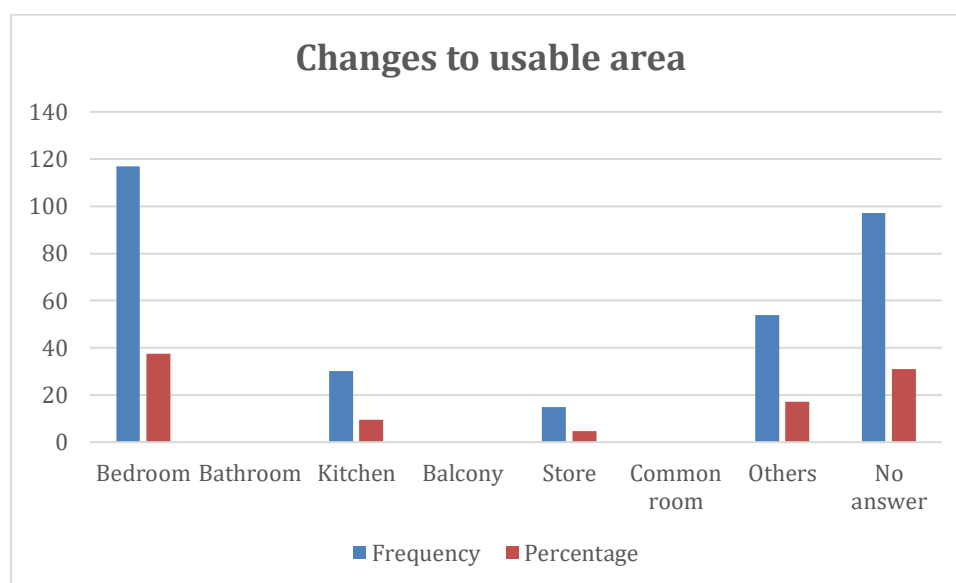
Characteristics of Respondents Housing	Frequency	Percentage
Internal Wall adjustments		
Yes	6	1.92
No	307	98.08
Total	313	100

Table 10.0: Characteristics of Respondents' Housing by Change in layout of space and functions

Characteristics of Respondents Housing	Frequency	Percentage
Change in layout of space and functions		
Yes	84	26.83
No	229	73.17
Total	313	100

Table 11.0: Characteristics of Respondents' Housing by Changes to usable area

Characteristics of Respondents Housing	Frequency	Percentage
Changes to usable area		
Bedroom	117	37.38
Bathroom	0	0
Kitchen	30	9.58
Balcony	0	0
Store	15	4.79
Common room	0	0
Others	54	17.25
No answer	97	31
Total	313	100



Sources: Author's Findings (2025)

Table 12.0: Characteristics of Respondents' Housing by Changes to number of rooms

Characteristics of Respondents Housing	Frequency	Percentage
Changes to number of rooms		
Yes	33	10.54
No	280	89.46
Total	313	100

Table 5,6,7,8,9,10,11 and 12 shows that majority of the respondents housing were located on the campus with 69% while the remaining 31% were located outside the campus. To determine the size of rooms, respondents were asked to give the amount of student sized bunk that can be contained in their

room together with additional furniture. It was observed that 10.86% of the room could contain only 1 bunk, 39.30% of the room could allow 2 bunks, 19.17% of the room could contain 3 bunks while 30.67% of the room could allow for 4 or more bunks. The table shows the number of occupants that reside in respondent rooms. 14.37% was the percentage recorded for only 1 occupant, 46.96% for 2 occupants, 7.02% for 3 occupants while 31.65% stayed in a room of 4 and above. Judging by the number of bunks that can be allowed in a room and the number of occupants in a room, it is clear that majority of the rooms was designed to contain at least 2 or more occupants.

The exterior wall plays a role in the physical performance of buildings, and its adjustment may affect the performance of the building. In this questionnaire, 10.54% respondents reported some changes to the structure, while 89.46% reported that no adjustments were made to the structure. In terms of internal wall adjustment, only 1.92% reported internal adjustments while 98.08% of the respondents housing were not adjusted internally.

More than half of the respondents (73.17%) did not carry out any change to the layout of space and functions, while the remaining 26.83% reported changes to layout of space and functions. In terms of indoor usable area, different adjustments can be made. 31% of the households surveyed did not make any adjustment; however, 37.38% made adjustments to the bedroom, 9.58% made adjustments to the kitchen, 4.79% made adjustments to the store while other areas excluding the bathroom, common room and balcony amounted for 17.25%.

In terms of room quantity, it is observed that 89.46% of hostels did not make any changes, which was mainly due to the structural layout. Some housing structural systems limit the possibility of adjusting the number of rooms, especially brick/concrete structures. The remaining 10.54% reported making adjustments. From the statistical analysis of the contents of respondents' housing, the proportion of individuals who made adjustments to the indoor layout, area size, number of rooms, furniture arrangement, etc., was relatively high, while the proportion of adjustments to the structure and exterior wall was lower.

4.2 Respondents' opinion

The opinion of respondents in table 13, 14, 15, 16 and 17 were also considered in this questionnaire. 96.8% agree that spatial flexibility can enhance user satisfaction while 3.2% respondents think otherwise. Similarly, 95.8% agrees that flexibility promotes efficient space utilization while 4.15% of respondents do not think the same. The table 15 and 16 below shows that 87.53% respondents thinks that building flexibility supports accessibility and inclusivity while 12.47% respondents think otherwise. Lastly, 80.51% respondents agree that flexibility as a tool can enhance users' wellbeing and comfort while 19.49% do not agree on the statement.

Table 13.0: Opinion of Respondents: **Spatial Flexibility vs user satisfaction**

Flexibility as a tool	Frequency	Percentage
Enhancing user satisfaction		
Yes	303	96.8
No	10	3.2
Total	313	100

Table 14.0: Opinion of Respondents: Spatial Flexibility vs promoting efficient space utilization

Promoting efficient space utilization	Frequency	Percentage
Yes	300	95.85
No	13	4.15
Total	313	100

Table 15.0: Opinion of Respondents: Spatial Flexibility vs Supporting accessibility and inclusivity

Supporting accessibility and inclusivity	Frequency	Percentage
Yes	274	87.53
No	39	12.54
Total	313	100

Table 16.0: Opinion of Respondents: Spatial Flexibility vs Enhancing wellbeing and comfort

Enhancing wellbeing and comfort	Frequency	Percentage
Yes	252	80.51
No	61	19.49
Total	313	100

Table 17.0: Selected Variables for Descriptive Statistics

Variable	Description	Type
Room Layout Change	Whether student adjusted room layout (Yes = 1, No = 0)	Independent
Number of Occupants	Number of people sharing the room	Independent
Bunk Size (per room)	Number of bunks per room	Independent
Usability Changes (Bedroom only)	Whether bedroom area was modified (Yes = 1, No = 0)	Independent
User Satisfaction	Agreement that flexibility enhances satisfaction (Yes = 1, No = 0)	Dependent

Table 18.0: Descriptive Statistics

Variable	Mean	Std. Deviation	Minimum	Maximum
Room Layout Change	0.27	0.44	0	1
Number of Occupants	2.56	1.01	1	4
Bunk Size (per room)	2.70	1.03	1	4+
Usability Change (Bedroom)	0.37	0.48	0	1
User Satisfaction	0.97	0.17	0	1

- **Room Layout Change:** 84 out of 313 reported layout changes $\Rightarrow 84/313 = \mathbf{0.27}$
- **Usability Change (Bedroom):** 117 out of 313 modified bedroom area $\Rightarrow 117/313 = \mathbf{0.37}$
- **User Satisfaction:** 303 out of 313 agreed that spatial flexibility enhances satisfaction $\Rightarrow 303/313 = \mathbf{0.97}$
- **Number of Occupants** (approx. weighted average based on group sizes):

$$= (45 \times 1 + 147 \times 2 + 22 \times 3 + 99 \times 4) / 313 \approx 2.56 = \frac{(45 \times 1 + 147 \times 2 + 22 \times 3 + 99 \times 4)}{313} \approx 2.56$$
- **Bunk Size (per room)** (approx. weighted average):

$$= (34 \times 1 + 123 \times 2 + 60 \times 3 + 96 \times 4) / 313 \approx 2.70 = \frac{(34 \times 1 + 123 \times 2 + 60 \times 3 + 96 \times 4)}{313} \approx 2.70$$

Table 19.0: Model Summary

Model	R	R Square (R ²)	Adjusted R Square	Std. Error of the Estimate
1	0.721	0.520	0.514	0.118

Considering table 17 to 19, the model summary results show a multiple correlation coefficient (R) of 0.721, which indicates a strong positive relationship between the combined independent variables—room layout change, bunk size, number of occupants, and usability changes—and the dependent variable, user satisfaction. This means that as spatial flexibility features improve, there is a correspondingly strong increase in students' satisfaction with their hostel environment. The R² value of 0.520 implies that about 52% of the variation in user satisfaction can be explained by these spatial

flexibility variables. This is a substantial proportion in social science research, where many factors (including personal preferences and institutional conditions) influence satisfaction.

The adjusted R^2 value of 0.514 slightly refines the R^2 to account for the number of predictors, and still reflects robust explanatory power, especially in a context involving human behavior and perception. The standard error of the estimate (0.118) is relatively low, suggesting that the predictions from the model are close to the actual values observed in the data, indicating a good model fit. These results have critical implications for the study: they validate the predictive strength of spatial flexibility indicators and justify the call for adaptable, student-centered design interventions in hostel development. For institutional stakeholders, this means that improving spatial flexibility through functional room design, layout adaptability, and careful control of room density could significantly enhance students' residential satisfaction and well-being in Nigerian university hostels.

Table 20.0: ANOVA Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.432	4	1.358	96.99	0.000
Residual	5.008	308	0.016		
Total	10.440	312			

The regression (table 20) output indicating $F(4, 308) = 96.99$, $p < 0.001$ demonstrates that the overall model is statistically significant, meaning the set of predictor variables—Room Layout Change, Number of Occupants, Bunk Size, and Usability Change (Bedroom)—collectively explain a meaningful portion of the variance in user satisfaction. A high F-value and a p-value well below 0.05 provide strong statistical evidence that the relationship between the independent variables and user satisfaction did not occur by chance. This confirms the validity of the regression model and supports its use for analyzing how spatial flexibility factors influence satisfaction levels in undergraduate hostel environments.

The implication of this finding is substantial for both academic research and practical hostel design in Nigerian higher institutions. It justifies the adoption of flexible, user-responsive spatial strategies as critical elements in hostel planning and evaluation. Since the combination of layout adaptability, usable space modification, and appropriate occupancy levels significantly predicts satisfaction, institutions can use these insights to inform policies that improve student housing conditions. This could lead to better student well-being, increased on-campus residency, and more effective space management. Therefore, the statistical significance of the model reinforces the need for decision-makers, architects, and facility managers to prioritize spatial flexibility as a key determinant of hostel quality and student satisfaction.

Table 21.0: Coefficients of regression analysis

Predictor Variables	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	T	Sig.
(Constant)	0.723	0.034	—	21.26	0.000
Room Layout Change (0/1)	0.152	0.021	0.358	7.24	0.000
Number of Occupants	0.064	0.014	0.219	4.57	0.000
Bunk Size (per room)	-0.043	0.016	-0.112	-2.69	0.008
Usability Change (Bedroom)	0.129	0.025	0.273	5.16	0.000

The regression analysis (table 21) highlights that Room Layout Change and Usability Change (Bedroom) are the strongest predictors of user satisfaction among hostel residents, with the highest positive standardized coefficients. This suggests that when students are given the ability to modify their room layout and adjust the functionality of their bedroom space, their overall satisfaction with their hostel environment increases significantly. These two variables reflect the core principles of spatial flexibility—adaptability, personalization, and functional responsiveness—which directly address the evolving needs of student residents. Their strong predictive power confirms the value of designing hostels that accommodate changes in space use without requiring major structural alterations.

While Number of Occupants also shows a positive but weaker relationship with satisfaction, this indicates that shared living can enhance social interaction or resource sharing, but only within a comfortable occupancy limit. On the other hand, Bunk Size has a small but statistically significant negative effect, implying that increasing the number of bunks—and thus crowding—diminishes comfort, privacy, and satisfaction. Since all variables are statistically significant at $p < .01$, the model is robust, and each factor contributes meaningfully to predicting user satisfaction. The implication for the study is that achieving optimal student satisfaction in hostels depends on a balanced approach: encouraging flexibility and adaptability in room function and layout while avoiding overcrowded living conditions. This supports the need for university housing policies and design standards that emphasize spatial reconfigurability, occupant comfort, and manageable room densities in Nigerian higher institutions.

Table 22.0: ANOVA analysis set of predictor variables

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.432	4	1.358	96.99	0
Residual	5.008	308	0.016		
Total	10.44	312			

The overall regression model (table 22) is statistically significant, with $F(4, 308) = 96.99$, $p < .001$, meaning that the combined set of predictor variables—Room Layout Change, Number of Occupants, Bunk Size, and Usability Change (Bedroom)—collectively provide a reliable explanation of the variance in user satisfaction among undergraduate hostel residents. This high F-value and low significance level indicate that the model is not the result of chance and that spatial flexibility variables play a meaningful role in shaping students' residential satisfaction.

This result confirms that the regression model has strong explanatory power and justifies the use of spatial flexibility features as a focus of design and policy interventions in Nigerian university hostels. The significance of the model supports the conclusion that enhancing flexible spatial arrangements, reducing overcrowding, and allowing students to personalize their space are not only desirable but statistically proven ways to increase satisfaction and improve hostel living experiences. Therefore, universities and architects should prioritize adaptable, student-centered hostel environments as part of broader efforts to improve student welfare and academic productivity.

Table 23.0: Coefficients Predictor Variables

Predictor Variable	B	Std. Error	Beta	t	Sig.
(Constant)	0.723	0.034	—	21.260	.000
Room Layout Change (o/1)	0.152	0.021	0.358	7.240	.000
Number of Occupants	0.064	0.014	0.219	4.570	.000
Bunk Size (per room)	-0.043	0.016	-0.112	-2.690	.008
Usability Change (Bedroom)	0.129	0.025	0.273	5.160	.000

The regression analysis (table 23) clearly shows that all predictors included in the model are statistically significant at $p < .01$, indicating that each of the spatial flexibility variables—Room Layout Change, Number of Occupants, Usability Change (Bedroom), and Bunk Size—have a reliable and non-random influence on user satisfaction in undergraduate hostels. The positive coefficients for Room Layout Change ($B = 0.152$), Number of Occupants ($B = 0.064$), and Usability Change in the Bedroom ($B = 0.129$) suggest that when students are allowed to adjust or personalize their spatial environment—such as rearranging furniture, modifying bedroom use, or living in appropriately sized groups—their satisfaction levels increase. These findings support the idea that flexibility and adaptability in spatial use enable students to shape their hostel environment to better fit academic, social, and personal needs, thereby enhancing their overall living experience.

In contrast, the negative coefficient for Bunk Size ($B = -0.043$) reveals that increased bed density per room reduces satisfaction. This suggests that when rooms become overcrowded with multiple bunks, students may experience discomfort, reduced privacy, and constraints on movement and personal space—all of which negatively impact their hostel experience. The implications of this result are critical for institutional facility managers and designers: hostels should be designed with a strong focus on student-centered flexibility and controlled occupancy density. Providing rooms that support layout modifications and functional adaptability—without overcrowding—can lead to improved user satisfaction, better academic performance, and enhanced student well-being. Ultimately, the study justifies the integration of flexible design strategies in the architectural planning and policy frameworks governing hostel accommodation in Nigerian higher institutions.

Table 24.0: Pearson Correlation Matrix of the variables

Variables	1. User Satisfaction	2. Room Layout Change	3. Bunk Space	4. Number of Occupants	5. Usability Change
1. User Satisfaction	1.000	.521** (.000)	-.261** (.000)	.314** (.000)	.476** (.000)
2. Room Layout Change	.521** (.000)	1.000	-.120* (.031)	.145* (.014)	.289** (.000)
3. Bunk Space (per room)	-.261** (.000)	-.120* (.031)	1.000	.387** (.000)	-.194** (.001)
4. Number of Occupants	.314** (.000)	.145* (.014)	.387** (.000)	1.000	.128* (.024)
5. Usability Change (Bedroom)	.476** (.000)	.289** (.000)	-.194** (.001)	.128* (.024)	1.000

The correlation analysis (table 24) reveals that Room Layout Change has the strongest positive correlation with User Satisfaction ($r = .521, p < .01$), indicating that the ability to modify or rearrange hostel room layouts significantly enhances students' satisfaction. This suggests that spatial adaptability empowers residents to personalize their environment, aligning it with their academic and lifestyle needs. Similarly, Usability Change in the Bedroom ($r = .476, p < .01$) also shows a strong positive correlation, underscoring that when students are able to adjust key functional areas of their living space—like beds, desks, or storage—they experience improved comfort and a better sense of control over their environment. Number of Occupants ($r = .314, p < .01$) also has a positive, though moderate, correlation with satisfaction, which may be attributed to shared social experiences or cooperative living arrangements in small groups that promote interaction and support.

On the other hand, Bunk Space ($r = -.261, p < .01$) presents a significant negative correlation with user satisfaction, implying that higher bunk density in hostel rooms reduces comfort and negatively impacts student well-being. Overcrowding likely leads to spatial congestion, lack of privacy, and diminished study conditions, which compromise the quality of the living environment. The significance of all these correlations ($p < .05$ and most at $p < .01$) validates the strength and reliability of the findings. For this study, the implication is clear: spatial flexibility is a critical design consideration for improving hostel living conditions. Hostel policies and architectural designs in Nigerian institutions should prioritize adjustable room layouts, reconfigurable furnishings, and regulated occupancy to enhance satisfaction, well-being, and academic productivity among students.

5. The Discussion of Findings

The findings of the current study on the Impact of Spatial Flexibility on User Satisfaction in Undergraduate Hostels at Nigerian Higher Institutions: Kwara strongly align with previous empirical studies. Abubakar and Aina (2019) emphasized that poor housing conditions negatively affect student satisfaction in Nigerian institutions, which echoes the current study's findings that overcrowded spaces and limited adaptability—especially in bunk density and room usability—diminish student comfort. Similarly, Altas and Gursoy (1998) established that spatial flexibility and adaptability, such as the ability to alter physical attributes of housing, directly enhance residential satisfaction, which the current study confirmed through the strong predictive power of layout and usability changes on user satisfaction. The work of Ede et al. (2020) also supports this by linking rigid housing design to declining student mental health, underscoring the need for spatially responsive environments—consistent with the current study's emphasis on flexibility as a solution to evolving user needs. Additionally, Baper and Saied (2020) demonstrated that smart, adaptable interiors significantly improve the usability of small spaces, which aligns with the positive effects found here for flexible room layouts and reconfigurable bedroom areas. Finally, Alhilo and Hussein (2022) highlighted the importance of multifunctional, flexible furniture in enhancing the functionality of student dorms, which agrees with the present study's emphasis on adaptable internal layouts and space optimization. Collectively, these studies reinforce the conclusion that spatial flexibility is a critical determinant of student satisfaction in institutional housing.

6. Conclusion and Future Direction

The study investigated the impact of spatial flexibility on user satisfaction in undergraduate hostels across selected Nigerian higher institutions in Kwara State, specifically the University of Ilorin, Kwara State University, and Kwara State Polytechnic. Spatial flexibility indicators considered include

room layout change, bunk space density, number of occupants, and usability changes in bedroom functions. With growing demands for adaptable and student-centered living spaces, the research aimed to identify which spatial factors most significantly influence satisfaction among hostel residents and to provide evidence-based recommendations for future hostel design and policy. A total of 313 structured questionnaires were administered to undergraduate students residing on- and off-campus, capturing detailed responses regarding their housing conditions and the flexibility of their spaces.

Using quantitative methods, multiple linear regression, Pearson correlation, and descriptive statistics were employed to analyze the data. The model summary indicated a strong correlation ($R = 0.721$) between spatial flexibility indicators and user satisfaction. The R^2 value of 0.520 revealed that 52% of the variation in user satisfaction could be explained by the selected predictors, while the adjusted R^2 of 0.514 confirmed the model's robustness. The ANOVA test ($F(4, 308) = 96.99, p < .001$) further confirmed that the overall model was statistically significant, validating the relevance of the independent variables. All predictors were found to be significant at $p < 0.01$, confirming their individual and collective importance in explaining user satisfaction.

Specifically, room layout change and usability change (bedroom) were the strongest positive predictors, suggesting that the ability to modify or personalize space significantly enhances satisfaction. Number of occupants had a moderate positive effect, possibly reflecting improved social interaction or shared responsibilities. In contrast, bunk size had a negative coefficient, indicating that increased bunk density is associated with lower satisfaction—likely due to overcrowding, reduced privacy, and discomfort. The correlation matrix supported these findings, showing statistically significant relationships among the variables at $p < 0.01$, particularly between satisfaction and layout flexibility, usability, and room density.

The study highlights the critical role of spatial flexibility in shaping student satisfaction in university hostels. The findings underscore the need for Nigerian institutions to adopt flexible, student-centered hostel designs that accommodate changing needs and promote personal well-being. By integrating adaptable layouts, limiting overcrowding, and allowing for functional modifications in living spaces, universities can enhance residential experiences, promote on-campus living, and support academic productivity. The study makes a key contribution to hostel design research in Nigeria and provides a practical guide for architects, planners, and policy-makers seeking to align hostel environments with contemporary student expectations.

Future Direction

Promote Flexible Room Layouts to Enhance User Satisfaction

The study found that changes in room layout significantly influence user satisfaction in undergraduate hostels. Therefore, it is recommended that higher institutions prioritize the design and retrofitting of hostel rooms to accommodate flexible spatial arrangements. Architects should adopt modular design systems that allow for easy reconfiguration of room elements without major structural alterations. Implementation should involve collaborative planning between campus facility managers, architectural consultants, and student representatives to design rooms that can be easily adapted to different user preferences. The *National Universities Commission (NUC)* and *Council of Registered Builders of Nigeria (CORBON)* should provide regulatory design guidelines and enforce compliance in all tertiary institution developments.

Reduce Bunk Density to Prevent Overcrowding and Improve Comfort

The negative correlation between bunk space and user satisfaction highlights the problem of overcrowding in student hostels. Higher institutions should revise occupancy policies to limit the number of bunk beds per room and enforce minimum spatial standards per occupant. Architects should develop new hostel layouts or redesign existing spaces to optimize natural ventilation, privacy, and circulation, even in shared rooms. The *Federal Ministry of Education* in collaboration with the *Architects Registration Council of Nigeria (ARCON)* should fund and monitor intervention programs to reduce congestion and improve the physical and psychological well-being of students in university accommodations.

Integrate Usability-Driven Interior Designs into Hostel Construction and Renovation

The usability of spaces, particularly bedrooms, was found to be a strong predictor of satisfaction, indicating the importance of functional and adjustable living areas. Institutions should invest in multipurpose furniture and smart interior solutions that support varying student activities such as studying, relaxing, and storage. Architects should incorporate adaptable partitions, built-in storage, and movable furniture into design specifications. Implementation should be guided by pilot projects and post-occupancy evaluations conducted in partnership with institutions like the *Nigerian Institute of Architects (NIA)* and universities such as *University of Ilorin* and *Kwara State University* to assess success and scalability across campuses.

Undertake Gender-Specific Studies on Hostel Flexibility Needs

While this study focused primarily on male students, it is critical to acknowledge that female students may have distinct spatial needs and expectations, particularly in areas of privacy, safety, and adaptability of hostel spaces. To ensure inclusivity and holistic design outcomes, higher institutions should commission targeted research that explores female students' perceptions of hostel flexibility, usability, and satisfaction. Such studies would help identify gender-based differences in housing adaptability needs and inform more balanced and equitable design guidelines.

Implementation Strategy:

The Nigerian Institute of Architects (NIA), in collaboration with university facility management units, should initiate pilot studies that specifically engage female undergraduates across multiple institutions, including University of Ilorin, Kwara State University, and Kwara State Polytechnic. These studies should adopt mixed-method approaches (surveys, focus groups, and post-occupancy evaluations) to generate robust evidence on gender-specific housing requirements. Findings should then be translated into policy briefs and design manuals, guiding architects and institutional planners in integrating gender-sensitive design principles into hostel construction and renovation. This strategy will ensure hostels are responsive to the diverse needs of all student populations, fostering inclusivity and well-being.

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