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Social Interaction and Users' Satisfaction with Selected Mixed-Use Buildings as Sustainable Urban Design Solution

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Abstract

Nigerian cities are facing intensified urbanisation, straining infrastructural and land resources and living standards. Mixed-use projects, which combine commercial, residential, office, and recreational spaces, are gaining traction as a sustainable urban design solution. While these structures are praised for enhancing social interaction and economic activities, their effectiveness relies on how well they meet the needs of their occupants. Despite their growing prevalence, there is a lack of evidence-based information regarding their efficacy in relation to the occupants' experiences. Emphasising the impact of physical design, functionality, usability, relative safety, comfort, amenities, and management on user experience, this research aims to examine user satisfaction with selected mixed-use developments in Lagos and Abuja. The research applies a quantitative post-occupancy evaluation (POE) approach using structured research questionnaires administered to different user groups, such as office users, residents, commercial users, and tourists. The socioeconomic characteristics of users are analysed to establish a potential link with user satisfaction with different parameters related to the built environment. The data indicate that while mixed-use complexes are beneficial, satisfaction levels vary significantly among user groups. Key satisfaction drivers include functional layout, environmental comfort, security, accessibility, and management quality. Conversely, dissatisfaction stems from noise, inadequate parking, shared space usage, and residential-commercial conflicts. Factors such as building age, location, and management performance significantly shape user perceptions. The study concludes that when user-centric design and efficient management are prioritised, mixed-use developments become effective tools for sustainable development. Users are generally satisfied with physical layouts and environmental conditions, specifically

mobility, air quality, and thermal comfort, though lighting satisfaction remains low due to poor daylight penetration and uneven artificial distribution in deeper plan areas and shared spaces.

Keywords: Built Environment, Mixed-Use Buildings, Nigeria, Post-Occupancy Evaluation (POE), Social Interaction, Sustainable Urban Development, User Satisfaction.

Introduction

The twenty-first century is marked by historically unprecedented levels of urbanisation. The United Nations (2019) estimates that by 2050, over 68% of the world will be living in urban areas, versus the present 55% (see figures 1.1 and 1.2). This accelerated demographic transition creates extreme pressure on housing stock, infrastructure provisions, and land supplies; as such, it is critical for urban planners and policy planners to come up with strategies allowing for compact, efficient, and sustainable urban forms. Mixed-use development is one very popular strategy whereby commercial and recreational, institutional and residential uses are brought into one or even associated buildings or precincts (Hoppenbrouwer & Louw, 2005).

Historically, pre-industrial towns had naturally mixed land uses. Typically, pre-industrial towns had housing, commerce, and bazaars within walking neighbourhoods (Jacobs, 2016). Nowadays, however, we have a clear separation of residential, commercial, and industrial areas due to the nineteenth-century Industrial Revolution and twentieth-century zoning (Grant, 2016). Vibrant community life was discouraged by this separation, and urban sprawl, car dependency, and socio-spatial polarisation were encouraged. As a corrective approach, late 20th-century urban visionaries and planners foresaw a return to mixed-use environments to reverse the evils of single-use zoning and foster dynamic, healthy neighbourhoods (Talen, 2019).

As a uniquely coordinated growth, mixed-use buildings are specifically designed to include an array of land uses, consisting of dwellings, shopkeepers and other stores, office buildings, entertainment areas, and community centres (Rowley, 1996). Jacobs (2016) contended that lively, multi-use streetscapes facilitate diverse social contact and enhance social relations. Although mixed-use facilities have their advantages, a few challenges are related to them. The simultaneous coexistence of varied user groups might bring tension; e.g., residents might be disturbed by noise at night coming from the commercial activities, whereas shopkeepers might be faced with inadequate customer parking or delivery access problems (Balsas, 2017). Congestion, noise pollution and enhanced security needs are other points of concern. Mixed-use facilities are costly to initiate and sustain in the long run because of their planning complexity, funding requirements, and management (Rowley, 1996). The question amongst social commentators on whether mixed-use facilities bring diversity or essentially serve

wealthy groups with sometimes concomitant gentrification and displacement continues to be heated (Talen, 2019).

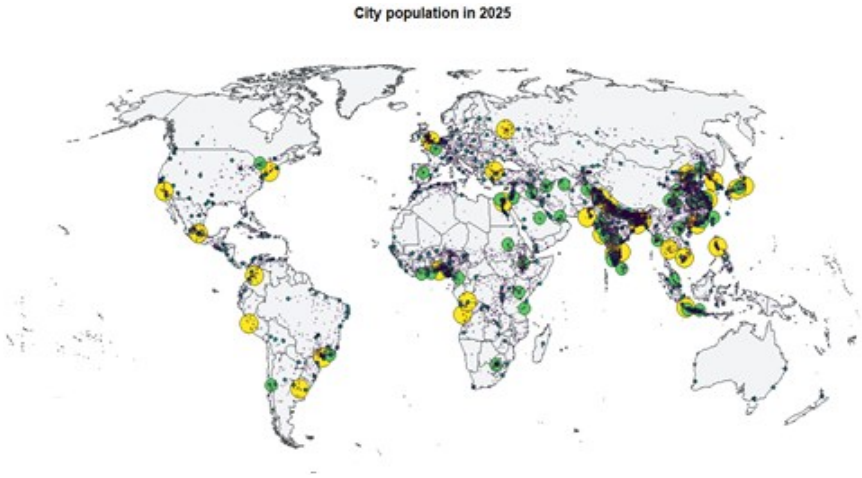


Figure 1. Global Urbanisation Trend. Source: United Nations (2025)

The user satisfaction concept, acting as an important performance parameter of architectural buildings, features prominently in the measurement of risk and opportunity. User satisfaction determines the degree to which a built environment is meeting the functional, psychological, and social requirements of space occupants (Preiser et al., 2015). For residential users, user satisfaction is determined by comfort, security, aesthetic values, and maintenance quality. For commercial users, however, customer flows, visibility, and accessibility are crucial. The difficulty of this task is magnified in mixed-use facilities since these will have to simultaneously satisfy the differing priorities of the residents, employees in the offices, visitors, and shop space occupants (Luo et al., 2021). User satisfaction correlates directly to long-term success in buildings, as is repeatedly discovered by research. Non-functional buildings tend to have high turnover rates, high vacancy rates, and a decline in value, as mentioned by Nguyen and Altan (2019). Satisfied residents contribute to sustainability and financial success in a development and create a positive feedback loop, influencing subsequent management and design decisions. The determinants of satisfaction are accessibility and interconnectivity (which include walkability, transit accessibility, and internal movements), safety and security (which include lighting, vision, and management-gated entry), physical design elements (such as lighting, ventilation, acoustics, and space planning), amenities and services (which include parking and maintenance and communal spaces), and social opportunity (which include cultural programs and community engagement) (Kim & Kim, 2018; Dittmar & Ohland, 2012; Luo et al., 2021; Talen, 2019). These tend to interact with one another or be in competition. For example, an active business district might conserve the local economy but disrupt the tranquillity of a dwelling precinct. Mixed-use development in North America, Western European and East Asian countries has been thoroughly examined by researchers; on the contrary, quickly urbanising areas such as Africa, South Asia, and Latin America have been addressed with limited coverage to date (Balsas, 2017; Grant, 2016; Luo

et al., 2021). Transplantation of the results of exemplary cases in cities such as Amsterdam or Vancouver is unrealistic in localities characterised by extraordinary socioeconomic conditions. Moreover, local case studies are required in order to extract evidence-based assumptions adapted to the local conditions' characteristic of the localities.

The global environmental agenda is an ideal fit in this regard. The planning of mixed-use spaces as safe, inclusive, resilient, and sustainable urban spaces is a target of Sustainable Development Goal 11 (SDG 11) by the United Nations (United Nations, 2019; Odeyale and Kehinde, 2015). Mixed-use development facilitates the achievement of this target by fostering density and reducing emissions associated with mobility and expanding community life. But social sustainability, if it is contingent on the satisfaction and well-being of the community members who occupy and utilise these spaces, constitutes a real sustainability aspect over and above environmental and economic ones (Dempsey et al., 2011). A building cannot be sustained if it is neither comfortable nor safe nor if it is incapable of facilitating social interconnection. Set against this context, user satisfaction in mixed-use facilities is crucial to investigate. These comparisons are significant evidence of the success of these projects in their aims to achieve greater accessibility, enhanced liveability, and community connection. As part of the means to address knowledge gap this study, through the analysis of collected data suggested that while mixed-use complexes are immensely beneficial, user satisfaction varies drastically among different user groups, and efficiency in functional layout, comfort in the environment, security measures, accessibility, and the quality of facility management, among other aspects, play a significant role as factors in pleasure. Conversely, the sources of user dissatisfaction identified in the study are noise disturbance, inadequate parking, the use of the common areas, and conflict arising out of the integration of residential and commercial activities. The context of building age, localisation, and management performance, among other aspects, plays a crucial role in shaping the perceptions of the users, as indicated in the research. Additionally, it sheds light on inconsistencies in design intentions and actual user experiences and therefore offers significant feedback to policymakers, property builders, and architects. With an intertwining of the urban built environment and the lived experiences of dwellers, this research contributes to broader policy discourses on sustainable urban design. This scholarly exercise will ultimately be a complement to much of the existing literature in print by concentrating on the in situ performance of mixed-use projects within an environment. It observes the everyday life of the residents, visitors, and workforce to offer evidence-based recommendations on eventual design, management, and policy—beyond theory. The findings shall be beneficial to regulatory agencies in formulating guidelines to facilitate socially and environmentally sustainable urbanisation, to property developers in maintaining long-lasting property values, and to architects in refining design basics.

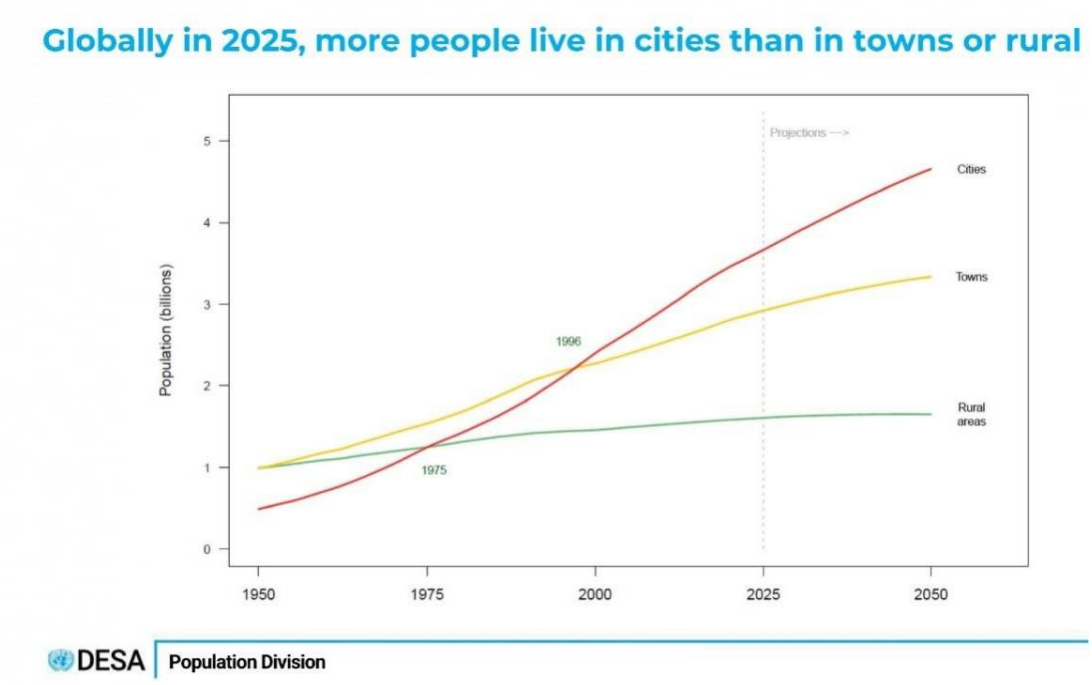


Figure 2: World Urbanisation Prospects, 2019/2025. Source: United Nations Department of Economic and Social Affairs (UN DESA)

The phenomenon of mixed-use urban form derived its spatial generation from the natural evolution of urban life. The terminology started as a mix of uses in human habitat, which especially materialized in building scale. Only after the Industrial era was the natural evolution accompanied by the participation of architects and planners aimed to provide a planned future for the salvation of cities. This utopian approach concurrently opens a new stage for the spatial urban organisation by validating the mixed urban fabric of the Industrial city as a problem and abandoning the individualistic stance of the mix of uses and promoting the functional separation.1 This critical ground expanded the spatial organisation from building scale to the regional. By the 70s, the notion of mixed-use had already matured and transformed the phenomenon into a spatial context that would further encompass the creation of the contemporary metropolis and new century's city-regions (Soja, 2000). This section presents a historical overview of the notion of mixed-use, as known today, by definition, evolution and spatial practice (see Table 1). Although it is difficult to identify clear-cut dates for historical periods, according to the major spatio-temporal developments, four periods would provide the relevant framework to conceive a better understanding of the phenomenon and associated settlement patterns. The first period is the era of Industrialisation and the Industrial city, the second period is the era of Modernity, the third is a transitional era towards the Global city, and the last era is the Contemporary Metropolis.

Table 1: Historical Evolution of Mixed-Use Development (1800s–Present)

Historical Period	Dominant Urban Form	Land-Use Characteristics	Implication for Mixed-Use Development	Key Scholars / References
Pre-Industrial Era (Before 1800s)	Compact towns and cities	Naturally mixed residential, commercial, and civic uses within walkable distances	High level of organic mixed-use integration driven by daily life necessities	Jacobs (2016); Ottensmann (1975)
Industrial Era (1800s–1920s)	Industrial city with emerging CBDs	Increasing functional specialisation; industry, housing, and commerce begin to separate	Gradual decline of traditional mixed-use patterns due to pollution and overcrowding	Grant (2020); Dennis (2008)
Modernist Era (1920s–1970s)	Zoned modern metropolis	Strict functional separation promoted by zoning and modernist planning principles	Mixed-use discouraged; mono-functional districts dominate urban planning	Le Corbusier (1933); CIAM; Fishman (1977)
Post-Modern / Transitional Era (1970s–1990s)	Decentralised metropolitan regions	Reintroduction of residential and commercial proximity; early planned mixed-use projects	Revival of mixed-use as a response to urban decline and suburban sprawl	Jacobs (1961); Talen (2019)
Contemporary Era (1990s–Present)	Global cities and high-density urban centres	Vertically and horizontally integrated residential, commercial, office, and recreational uses	Mixed-use is adopted as a strategic planning tool for sustainability and urban vitality.	Dittmar & Ohland (2012); UN (2019); Grant (2016; 2020)

Source: Author's compilation from literature review (2026)

Methodology

This study examines user satisfaction in Abuja and Lagos's selected mixed-use structures (see figures 3 and 4). It will specifically examine the developments that have residential, commercial, office, and recreational spaces. Satisfaction levels among different categories of users, such as residents, workers, and visitors, will be assessed through factors such as building design, functionality, accessibility, safety, and comfort by the study. The study will be limited to user experience measurement within the buildings themselves and will not include broader urban-scale issues such as traffic control or economic performance of the surrounding areas.

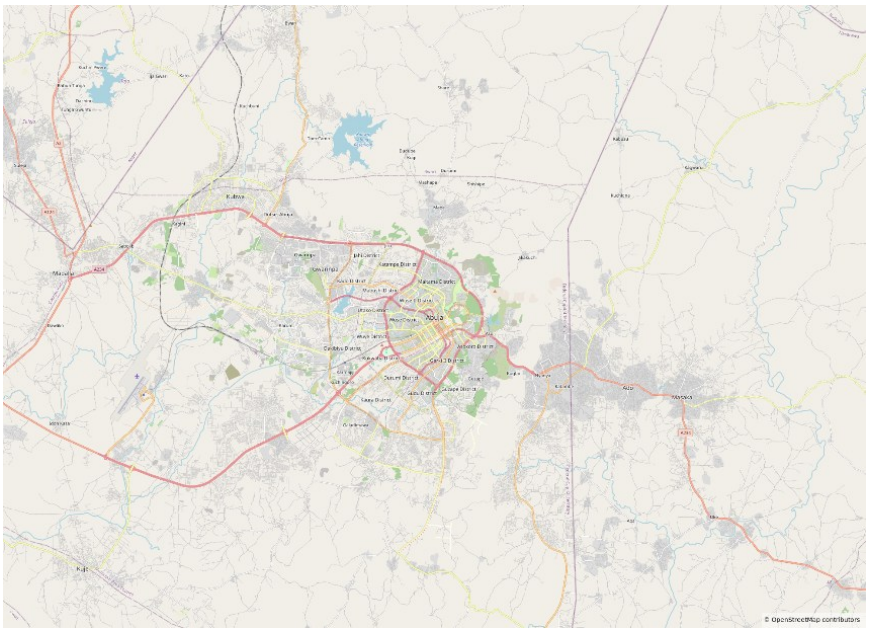


Figure 3: Abuja map. Source: National Bureau of Statistics (NBS) (2022)

One of the most critical variables in determining the long-run sustainability and success of mixed-use developments is user satisfaction. Occupation, community acceptance, and city life all depend on providing great user experiences, even though developers are financially oriented (Grant, 2016; 2020). Because it gives empirical data to guide architects, urban planners, and legislators to design mixed-use spaces that truly cater to consumer demands, the current research is justified. The study improves the urban ability of cities and creates improved design standards through analysing the advantages and constraints of past developments.

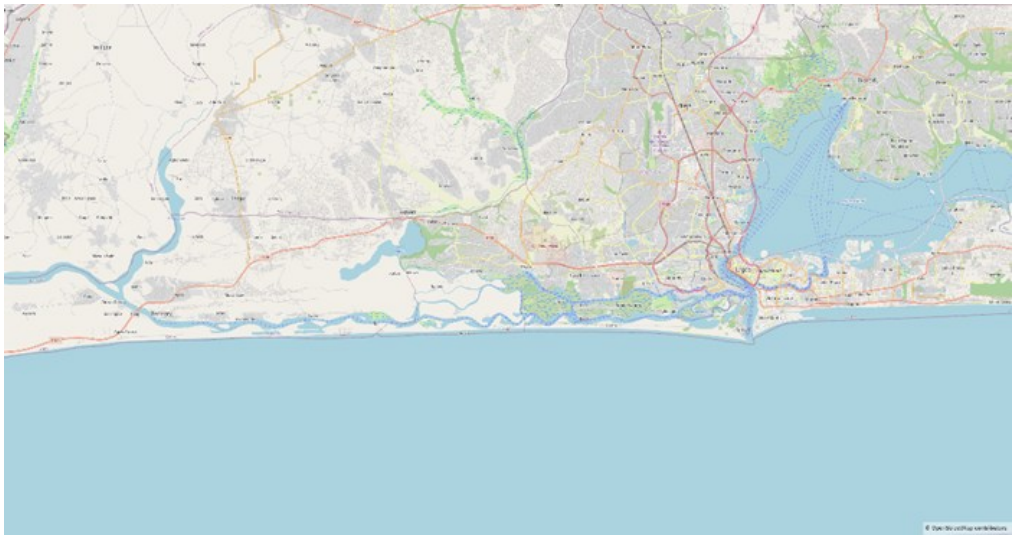


Figure 4: Lagos map. Source: National Bureau of Statistics (NBS) (2022)

Study Area

The study is located in Nigeria, a West African country between latitudes 4° and 14° North and longitudes 3° and 15° East. Nigeria is the most populous country in Africa with an estimated population of over 200 million residents (National Bureau of Statistics [NBS], 2022). It is characterised by diverse cultural, climatic, and socio-economic conditions that dictate trends of urbanisation and architectural development. The past few decades have witnessed huge urban growth in Nigeria, particularly in the nation's major cities such as Lagos, Abuja, and Port Harcourt. This growth has been accompanied by the demand for efficient land use and sustainable urban planning, which has led to the emergence of mixed-use developments with residential, commercial, and recreational activity in compact spaces. Lagos, located in the south-west, is the business and financial capital of Nigeria, with high land value and dense urban settlement promoting vertically and multifunctional building development. Abuja, the federal capital city in the central region, is a planned city with a growing tendency towards mixed-use complexes that are consistent with modern planning and sustainability standards. These two cities offer contrasting but complementary settings to explore user satisfaction within mixed-use developments, Lagos to learn about naturally developed, high-density urban forms and Abuja to reflect on planned, policy-driven urban development.

The selection of Nigeria as the field of study is therefore justified through its rapid urbanisation, architectural sophistication, and rising prominence of mixed-use developments in addressing the challenge of urban sprawl, infrastructure productivity, and liveability. Lagos and Abuja were chosen to capture Nigeria's functional and geographical urban diversity. Abuja exemplifies a policy-led planned model, while Lagos represents a market-led metropolitan form. Both cities provide detailed backdrops for investigating how design, management, infrastructure, and socioeconomic factors influence user satisfaction in mixed-use projects. The inclusion of notable developments such as Nestoil Tower, The Wings Towers, and AWTC ensures that the study is grounded in real-life examples, enabling evidence-based recommendations for sustainable, inclusive, and functional mixed-use building designs across Nigeria.

Method of Sampling

Sampling is a process of deriving a representative group from the target population (Story & Tait, 2019). This representational group must have the distinctive characteristics of the target population (Story and Tait, 2019). To create a sample, several sampling methods can be employed, such as simple random sampling, purposive sampling, cluster sampling, convenience sampling and so on (Joseph and Eleojo, 2019). A purposive sampling method was adopted to select six (5) local case studies for the sample size. Purposive sampling is a type of non-probability sampling technique in which a researcher selects the representative sample based on their relevance and criteria for inclusion (Joseph and Eleojo, 2019). The criteria for selection are based on the multi-functionality of the building as well as the geographical location.

Sample Size

Having discovered that the total population of users in mixed-use buildings across Abuja and Lagos cannot be precisely estimated, this study adopts Cochran's (1977) formula for an infinite population, which provides a reliable method for determining sample size when the population is large or unknown. The formula is expressed as:

$$n_0 = \frac{Z^2 . p(1-p)}{e^2} \quad [3.1]$$

Where

- n_0 =required sample size
- Z = z-value (the number of standard deviations corresponding to the desired confidence level)
- p = estimated proportion of the population possessing the attribute (assumed to be 0.5 for maximum variability
- e = margin of error (set at 0.05 for ±5%)

Step-by-Step Calculation

1. **Set the Parameters**
    - Confidence level = 90%
    - Corresponding Z-value = 1.645
    - Estimated proportion (p) = 0.5
    - Margin of error (e) = 0.05
2. **Substitute the Values into the Formula**

$$n_0 = \frac{(1.645)^2 \times 0.5 \times (1-0.5)}{(0.05)^2}$$

3. **Simplify Step-by-Step**

$$n_0 = \frac{(2.706) \times 0.25}{0.0025}$$

$$n_0 = \frac{0.6765}{0.0025}$$

$$n_0 = 270.6$$

Final Sample Size

The calculated sample size (n_0) is 270.6, which is rounded up to 271 respondents to ensure adequacy. To allow for non-response or incomplete questionnaires, and to achieve balanced representation across both study locations (Abuja and Lagos), the sample size is adjusted to 300 respondents in total.

- Abuja: 100 respondents
- Lagos: 200 respondents

This distribution ensures adequate coverage across user groups, including residents, commercial tenants, office workers, and visitors within selected mixed-use buildings in both cities. As earlier stated, this study adopts Cochran's (1977) formula for an infinite population

$$\boldsymbol{n_0 = \frac{Z^2 . p(1-p)}{e^2}}$$

This gave a total of 271 respondents; to allow for non-respondents, a total of 300 questionnaires were shared, and a total of 278 respondents gave feedback on the questionnaire.

Discussion of Findings

User Satisfaction in the Built Environment

User satisfaction is one of the key performance indicators in the built environment that defines how well a building or a space can respond to the needs and expectations of its users. User satisfaction, according to Preiser et al. (2015), is the degree to which users' expectations are met by their experience in a built environment. It is a critical feedback instrument in architectural and urban planning design that guides decision-making on how to enhance comfort, functionality, and social well-being. In built environments, user satisfaction comprises a list of tangible and intangible factors. They include spatial quality, accessibility, environmental comfort, safety, and social interaction (Vischer, 2008). Functionally sufficient buildings that fail to meet emotional or psychological requirements will not score high in satisfaction (Zimring & Reizenstein, 1980). Successful environments, therefore, are those that unify usability, comfort, and aesthetics in an integrated manner.

For mixed-use developments, satisfaction is multiplied because users engage with the same physical environment in different roles. Residents require privacy and comfort, workers need efficiency and accessibility, while visitors like convenience and appeal (Luo et al., 2021; Lu & Lange, 2021). Thus, measurement of user satisfaction in such environments entails a multidimensional approach that acknowledges heterogeneity in user expectations and potential conflicts between user groups. Researchers point out that user satisfaction is not a static phenomenon but evolves with the passage of time, with building ageing and the evolving needs of users (Nguyen & Altan, 2019). Therefore, continued evaluation in the form of Post-Occupancy Evaluation (POE) indicates how a building is performing from the user's perspective and prescribes the changes necessary to improve its habitability and function (Preiser & Vischer, 2005).

Definition and Dimensions of User Satisfaction

The concept of user satisfaction has been defined and measured variously depending on the disciplinary context, such as facility management, environmental psychology, or architecture. Generally, however, it can be defined as "a subjective assessment of the extent to which a built environment meets the functional, aesthetic, and psychological needs of its users" (Vischer, 2008, p. 231). It encompasses both cognitive judgments and affective responses (how good the environment's performance is and how the users feel in the environment).

Several other user satisfaction dimensions in the built environment have been identified by researchers:

- Functional Satisfaction – This refers to usability, layout, accessibility, and efficiency of spatial organisation (Kim & Kim, 2018).
- Environmental Satisfaction – This includes thermal comfort, lighting, ventilation, and acoustics (Vischer, 2008).

- Aesthetic Satisfaction – This reflects visual attractiveness, design coherence, and congruence with user identity (Carmona, 2021).
- Social Satisfaction – Pertains to interaction opportunity, privacy, and belonging to the community (Talen, 2019).
- Safety and Security Satisfaction – Linked with users' perception of personal and property security, which is affected by environmental design strategies.

Each dimension contributes to overall satisfaction variably by building type and user profile. For instance, in residential buildings, privacy and comfort may dominate satisfaction scores, while in commercial buildings, functionality and accessibility figure more highly (Nguyen & Altan, 2019). In mixed-use buildings, the balance of these dimensions is particularly important because the success of one user group's satisfaction (e.g., commercial tenants) cannot be at the expense of another's (e.g., residents). Also, cultural and contextual conditions dictate how satisfaction is felt and prioritised. In developing contexts such as Nigeria, infra-structural performance, such as water supply, presence of power, and maintenance quality, has a significant influence on user satisfaction, even more than social or aesthetic ones (Adebayo, 2021; 2024; Odeyale, 2023).

User Satisfaction and User Experience in Architecture

In architectural theory, user satisfaction is linked to the concept of user experience (UX), which addresses the emotional, cognitive, and behavioural responses of building users. For Hassenzahl (2010), user experience is more than performance and utility; it is how users feel, act, and give meaning to spaces. In architecture, UX directs our attention to sensory and affective qualities of spatial experience, such as light, texture, sound, and spatial rhythm. Architectural user experience integrates functional effectiveness and experiential quality. Buildings are not inert containers for activity but active participants in regulating human behaviour and emotion (Pallasmaa, 2007; 2014). As such, architectural satisfaction is achieved when users find congruence between design intent, usability, and lived experience. For example, a mixed-use development may offer spatial efficiency and access but attain low satisfaction if it fails to offer warmth, comfort, or social connection.

Post-Occupancy Evaluation (POE) is the most important link between user experience and user satisfaction because it translates subjective experience into measurable feedback (Preiser & Vischer, 2005). Through surveys, interviews, and observation, architects and planners can find out how users use spaces and where designers need to make design alterations. This user-centred emphasis is critical in fostering human well-being, environmental sustainability, and social inclusivity in cities (Dempsey et al., 2011). User experience studies in Nigeria and other developing countries become increasingly relevant as these nations experience accelerated urbanisation and heterogeneous cultural expectations. Mixed-use environments in Lagos or Abuja, for example, reveal the impact of sensory comfort, cultural identity, and accessibility on users' perception and appreciation of built spaces (Nwaka, 2015). The recognition of such experiences ensures that architectural design evolves from aesthetic ideals towards a more responsive, inclusive, and satisfactory built environment.

Socio-Demographic Characteristics of Respondents

This section presents the socio-demographic characteristics of respondents using frequency and percentage distribution.

Table 1: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	150	54.0
Female	128	46.0
Total	**278**	**100.0**

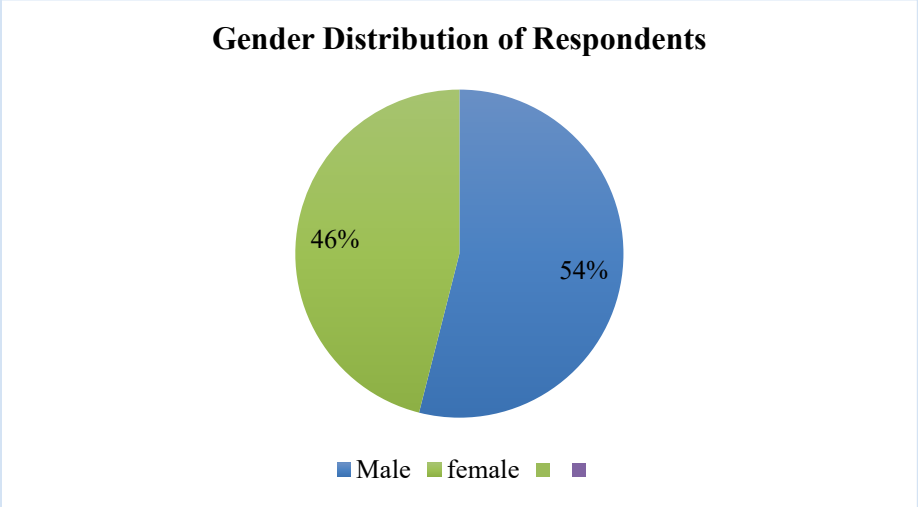


Figure 5: Respondent Gender Information

Table 2: Age Group of Respondents

Age Group	Frequency	Percentage (%)
Below 20 years	6	2.2
21–30 years	70	25.2
31–40 years	113	40.7
41–50 years	49	17.6
51 years and above	40	14.4
Total	278	100.0

Source: Author's Field Survey (2026).

Table 2 shows that the majority of respondents (65.9%) fall within the 21–40 years age bracket. This indicates that the selected mixed-use buildings are predominantly used by economically active individuals, which has implications for design considerations such as circulation efficiency, vertical transportation, and service demand (See also figure 5).

Users' Satisfaction with Physical and Environmental Factors

This section examines users' level of satisfaction with the physical and environmental characteristics of the selected mixed-use buildings. The variables assessed include building layout, lighting conditions, thermal comfort, noise control, and indoor air quality. Mean scores and standard deviations were used to determine the level of satisfaction.

The decision rule adopted is as follows:

- Mean ≥ 3.50 – Satisfied
- Mean < 3.50 – Not Satisfied

Table 3: Users' Satisfaction with Physical and Environmental Factors

Physical & Environmental Factors	Mean	Std. Deviation	Remark
The building layout is easy to understand and move around in	3.59	1.08	Satisfied
There is enough natural/artificial lighting	3.49	1.13	Not Satisfied
Indoor temperature is comfortable	3.53	1.11	Satisfied
Noise levels inside the building are acceptable	3.60	1.09	Satisfied
Indoor air feels fresh and healthy	3.55	1.05	Satisfied
Grand Mean	**3.55**	—	**Satisfied**

Source: Author's Field Survey (2026).

Table 3 shows users' level of satisfaction with the physical and environmental conditions of the selected mixed-use buildings. The results indicate that respondents were generally satisfied with most of the physical and environmental variables assessed.

Ease of movement within the buildings recorded a mean score of 3.59, indicating that the spatial layout supports effective circulation and user navigation. Indoor thermal comfort (Mean = 3.53) and acceptable noise levels (Mean = 3.60) were also rated satisfactory, suggesting that the buildings provide a comfortable internal environment for users.

However, the adequacy of natural and artificial lighting recorded a mean score of 3.49, which falls slightly below the satisfaction threshold. This indicates that users are not fully satisfied with lighting conditions in some parts of the buildings, possibly due to inadequate daylight penetration or poor artificial lighting distribution.

The grand mean score of 3.55 confirms that users are satisfied overall with the physical and environmental characteristics of the selected mixed-use buildings.

Design Implication

The findings underscore the importance of: Clear circulation patterns, effective spatial organisation and adequate environmental control strategies.

Users' Satisfaction with Accessibility and Circulation

This section examines users' level of satisfaction with accessibility and circulation within the selected mixed-use buildings. The variables assessed include ease of entry and exit,

wayfinding clarity, effectiveness of vertical circulation systems, external accessibility, and ease of movement between different functional zones. Mean scores and standard deviations were used for analysis.

The decision rule applied remains:

- Mean ≥ 3.50 – Satisfied
- Mean < 3.50 – Not Satisfied

Table 4: Users' Satisfaction with Accessibility and Circulation

Accessibility and Circulation Factors	Mean	Std. Deviation	Remark
Ease of entry and exit	3.62	1.04	Satisfied
Wayfinding clarity	3.56	1.06	Satisfied
Vertical circulation (lifts, stairs, corridors)	3.58	1.02	Satisfied
External accessibility to the building	3.51	1.09	Satisfied
Movement between different building uses	3.47	1.10	Not Satisfied
Grand Mean	3.55	—	Satisfied

Source: Author's Field Survey (2026).

Table 4 presents users' assessment of accessibility and circulation within the selected mixed-use buildings. The results indicate that respondents were generally satisfied with most accessibility-related features. Ease of entry and exit recorded the highest mean score (3.62), suggesting that building entrances and exits are conveniently designed. Wayfinding clarity (Mean = 3.56) and vertical circulation systems (Mean = 3.58) were also rated satisfactory, indicating that lifts, staircases, and internal circulation routes adequately support user movement. However, ease of movement between different functional components of the buildings recorded a mean score of 3.47, falling below the satisfaction threshold. This suggests that users experience some difficulty transitioning between residential, commercial, and recreational zones within the buildings. The grand mean of 3.55 indicates that, overall, users are satisfied with accessibility and circulation, although some functional conflicts remain.

Design Implication

The findings highlight the need for: Clear functional zoning, dedicated circulation cores, and separation of residential and commercial movement systems.

Users' Satisfaction with Amenities, Safety and Comfort

This section examines users' level of satisfaction with amenities, safety, and comfort conditions within the selected mixed-use buildings. The variables assessed include adequacy of facilities, cleanliness of shared spaces, perceived safety during the day and at night, and clarity of emergency exits and safety signage.

Table 5: Users' Satisfaction with Amenities, Safety and Comfort

Amenities, Safety and Comfort Factors	Mean	Std. Deviation	Remark
Adequacy of services and facilities	3.52	1.07	Satisfied
Cleanliness of shared facilities	3.55	1.03	Satisfied
Feeling of safety during the day	3.69	0.98	Satisfied
Feeling of safety at night	3.42	1.12	Not Satisfied
Clarity of emergency exits and safety signs	3.60	1.01	Satisfied
Grand Mean	3.56	—	Satisfied

Source: Author's Field Survey (2026).

Table 5 presents users' satisfaction with amenities, safety, and comfort within the selected mixed-use buildings. The results show that respondents were generally satisfied with the amenities and safety provisions available.

Adequacy of services and facilities recorded a mean score of 3.52, indicating that most users consider the facilities provided sufficient for their needs. Cleanliness of shared facilities also recorded a satisfactory mean score of 3.55, suggesting effective maintenance practices within the buildings. Perceived safety during the daytime recorded the highest mean score of 3.69, indicating that users feel secure while using the buildings during the day. However, safety at night recorded a mean score of 3.42, which falls below the satisfaction threshold. This suggests that users are not fully satisfied with nighttime security conditions, possibly due to inadequate lighting, reduced security presence, or limited surveillance after business hours. Clarity of emergency exits and safety signage recorded a satisfactory mean score of 3.60, indicating that safety information is generally visible and understandable to users.

The grand mean score of 3.56 indicates that users are overall satisfied with amenities, safety, and comfort in the selected mixed-use buildings.

The findings highlight the need for: improved nighttime lighting strategies, enhanced security surveillance systems, active ground-floor uses to promote natural surveillance, and clearly defined and illuminated emergency routes. Findings relating to physical and environmental conditions indicate that users are generally satisfied with spatial layout, thermal comfort, noise control, and indoor air quality. These results suggest that effective spatial organisation, environmental design strategies, and building services play a significant role in enhancing comfort within mixed-use environments. However, the relatively lower satisfaction with lighting conditions highlights the need for improved daylighting strategies and better integration of artificial lighting, particularly in deeper floor plates and internal spaces.

Accessibility and circulation were rated positively overall, especially with respect to ease of entry, wayfinding, and vertical movement. Nonetheless, movement between different functional zones recorded comparatively lower satisfaction, suggesting that while access into the buildings is adequate, internal functional integration may require clearer zoning and circulation hierarchy. This finding reinforces the importance of deliberate vertical and horizontal zoning in mixed-use architectural design. Safety and comfort indicators show high satisfaction during daytime use, while nighttime safety perception was moderate. This

suggests that although basic security measures are in place, users perceive a decline in safety after hours. This perception underscores the importance of lighting design, active ground floors, and surveillance strategies in sustaining a sense of safety throughout the day and night. Social interaction and community-related factors recorded moderate satisfaction levels. While users acknowledged the positive mix of different user groups, the findings suggest limited opportunities for social interaction and a moderate sense of belonging. This implies that mixed-use buildings may successfully combine functions but may not automatically foster social cohesion without intentionally designed communal and semi-private spaces. Management and operational performance were generally rated as satisfactory, particularly in terms of maintenance and cleanliness. However, responsiveness to complaints recorded moderate satisfaction, indicating that management efficiency has a noticeable impact on user perception and overall building performance.

Finally, findings on challenges associated with mixed-use integration reveal moderate concerns relating to noise transmission, crowding, and disturbances from other uses. Despite these challenges, users generally agreed that the different functions within the buildings work well together. This suggests that mixed-use developments are viable and effective when supported by appropriate spatial separation, acoustic treatment, and access control measures.

Recommendations and Conclusions

Based on the findings of the study, the following recommendations are proposed:

1. Enhanced Functional Zoning: Mixed-use buildings should adopt clearer vertical and horizontal zoning strategies to minimise conflicts between residential, commercial, and recreational uses.
2. Improved Daylighting Strategies: Designers should incorporate atria, light wells, and fa-çade optimisation to enhance natural lighting, especially in shared spaces and circulation areas.
3. Acoustic Control Measures: Adequate sound insulation, buffer zones, and separation floors should be introduced to reduce noise transmission between incompatible uses.
4. Active Ground Floors and Night-Time Safety: Ground-floor activation through retail, lighting, and transparent façades should be prioritised to improve natural surveillance and perceived safety at night.
5. Provision of Social and Semi-Private Spaces: Courtyards, sky terraces, and shared lounges should be deliberately designed to encourage social interaction while maintaining user privacy.

Management and Operational Recommendations

1. Responsive Facility Management Systems: Building management should adopt digital complaint-tracking and maintenance scheduling systems to improve response time and user satisfaction.
2. Enhanced Security Strategies: Improved lighting, CCTV coverage, and visible security personnel should be provided, particularly during off-peak hours.

3. Clear Wayfinding and Signage Updates: Regular review and upgrading of signage systems should be carried out to improve user navigation across multiple building functions.

The study concludes that user satisfaction in mixed-use buildings is largely influenced by spatial organisation, environmental comfort, accessibility, safety, and management efficiency. The findings demonstrate that well-planned mixed-use buildings can successfully accommodate diverse user groups and activities while enhancing urban vitality.

However, the study also establishes that challenges such as inter-use disturbances, insufficient lighting, limited social integration, and night-time safety concerns persist. These issues are largely design and management-related and can be mitigated through more responsive architectural solutions.

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