

# User Satisfaction with Indoor Environmental Quality and Wayfinding in Selected Nigerian Airport Terminals

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## ABSTRACT

Airport terminals are complex public environments where indoor environmental quality (IEQ) and wayfinding performance play important roles in shaping user experience and satisfaction. Despite growing investments in airport infrastructure across Nigeria, empirical evidence on users' perceptions of environmental quality and navigational efficiency within airport terminals remains limited. This study evaluated user satisfaction with IEQ and wayfinding systems in selected Nigerian airport terminals using a quantitative post-occupancy evaluation approach. Data were collected through a structured questionnaire survey administered across seven purposively selected airport terminals comprising three international and four domestic airports. A total of 71 questionnaires were distributed, of which 52 valid responses were analyzed using descriptive statistics. The findings revealed generally positive user perceptions of thermal comfort, indoor air quality, and lighting quality, with mean satisfaction scores of 4.10, 4.05, and 4.15 respectively. In contrast, acoustic comfort (3.10) and wayfinding performance (2.95) recorded comparatively lower satisfaction levels, indicating deficiencies in noise management, signage systems, spatial orientation, and navigational support. The results further suggest that while environmental comfort conditions within the terminals were generally satisfactory, challenges associated with wayfinding and acoustic quality negatively influenced overall user experience. The study contributes empirical evidence on user-centered performance evaluation of airport terminals in Nigeria and highlights the importance of integrating environmental quality and navigational efficiency within airport planning and management. The findings provide practical insights for improving passenger experience through enhanced signage systems, acoustic control measures, and user-oriented terminal design strategies.

**Keywords:** Airport Terminals, Indoor Environmental Quality, Post-Occupancy Evaluation, User Satisfaction, Wayfinding

## INTRODUCTION

The aviation sector is facing increasing scrutiny regarding its environmental impact, necessitating the adoption of sustainable design practices, particularly in airport terminal buildings. As major transportation infrastructures that accommodate large volumes of passengers daily, airport terminals play a significant role in shaping travel experiences while also influencing environmental performance and operational efficiency. Consequently, sustainable airport design has emerged as a critical area of research and practice aimed at balancing environmental responsibility with passenger comfort and functional performance (Duliński, 2015; Han et al., 2020; Papagrigoriou et al., 2023). Similarly, sustainable and user-oriented terminal environments have been associated with improved airport image, operational efficiency, and passenger well-being (Korba et al., 2023; Han et al., 2020).

Beyond conventional IEQ parameters, studies have increasingly recognised the importance of spatial legibility and wayfinding systems in shaping user experiences within complex transportation facilities such as airports (Fewings, 2001). Efficient wayfinding systems, including clear signage, intuitive circulation patterns, and

spatial orientation cues, are essential for reducing user stress, improving navigation, and enhancing overall user satisfaction, particularly in large and high-traffic terminal environments (Churchill et al., 2008; Correia and Wirasinghe, 2007). Poor wayfinding conditions may result in confusion, delays, anxiety, and negative perceptions of terminal functionality and service quality.

In developing countries such as Nigeria, where airport infrastructure is rapidly evolving in response to increasing passenger traffic and modernization initiatives, understanding the relationship between IEQ, wayfinding, and user satisfaction is essential for the development of sustainable and user-centered airport environments (Donnelly, 2021). Despite growing investments in airport development across Nigeria, there remains limited empirical research focusing on user perception of environmental comfort and navigational quality within Nigerian airport terminals. Existing studies within the broader airport sustainability discourse have largely concentrated on energy performance, operational efficiency, and environmental management, with comparatively limited attention given to user-centered environmental satisfaction in tropical African airport contexts (Papagrigoriou et al., 2023). This study therefore evaluated user satisfaction with indoor environmental quality and wayfinding systems in selected Nigerian airport terminals. Specifically, the objectives were to: (i) assess user perceptions of indoor environmental quality within selected airport terminals; (ii) evaluate user perceptions of wayfinding conditions and navigational ease; and (iii) examine overall user satisfaction.

## LITERATURE REVIEW

### IEQ and User Satisfaction in Airport Terminals

IEQ is integral to sustainable airport design, influencing both user satisfaction and health outcomes (Pichatwatana et al., 2017; Huang et al., 2021). Airport terminals are complex public environments that accommodate large volumes of passengers for varying durations, making environmental comfort an essential factor in shaping travel experiences and operational efficiency. As contemporary airport design increasingly shifts toward user-centered and sustainable approaches, the role of IEQ in enhancing passenger experience has become more prominent within airport planning and management discourse (Duliński 2015; Han et al., 2020). Research consistently demonstrates that improved thermal comfort and indoor air quality can positively influence user well-being, perceived comfort, and satisfaction within terminal environments (Niza et al., 2023; Herbig, et al., 2020).

Thermal comfort, which relates to users' satisfaction with indoor temperature and humidity conditions, remains one of the most influential dimensions of IEQ in public buildings and transportation facilities. Studies indicate that optimal thermal conditions within airport terminals contribute to improved user experiences, reduced discomfort, and increased passenger satisfaction ratings (Papagrigoriou et al., 2023). Similarly, effective ventilation systems and improved indoor air quality have been associated with healthier indoor conditions and improved passenger perceptions of environmental quality (Herbig, et al., 2020).

Natural lighting is another crucial factor in enhancing IEQ, positively affecting user mood and perception of space. Research has shown that terminals designed with adequate natural light receive higher satisfaction ratings from users, highlighting the importance of integrating natural elements into airport design (Kotopoulos and Nikolopoulou, 2018). Furthermore, acoustic comfort significantly impacts the overall passenger experience; excessive noise can detract from user satisfaction, especially in waiting areas (Yang, et al., 2024). Effective noise control measures have been shown to improve overall satisfaction by creating a more tranquil environment. In the Nigerian context, there is a pressing need to understand how these various dimensions of IEQ affect user satisfaction, especially given the country's growing aviation sector. Addressing this gap, the current research aims to evaluate user perceptions of various dimensions of IEQ and overall satisfaction in selected airports in Nigeria.

### Wayfinding and Spatial Navigation in Airport Terminals

Wayfinding refers to the processes through which individuals orient themselves and navigate within built environments using spatial cues, signage systems, circulation patterns, and environmental information (Arthur

and Passini, 1992). In airport terminals, effective wayfinding systems are essential due to the complexity, scale, and high passenger movement associated with terminal operations. Airports are often characterised by large circulation networks, multiple service zones, security checkpoints, boarding gates, and commercial areas, all of which require clear and intuitive navigation systems to support efficient passenger movement and reduce travel-related stress (Fewings, 2001).

Recent studies have highlighted the growing importance of wayfinding systems in improving passenger satisfaction, operational efficiency, and spatial usability within airport terminals. Wang and Wang, (2025), observed that effective visual guidance systems significantly improve passenger decision-making and reduce cognitive load in complex airport environments, particularly under time-sensitive conditions. Similarly, recent airport accessibility studies have shown that ease of movement, navigational clarity, and terminal legibility strongly influence passenger perceptions of airport service quality and overall travel experience (Mazzulla et al., 2026).

Despite the growing recognition of wayfinding and IEQ as important dimensions of passenger experience, limited empirical studies have examined their combined influence on passenger satisfaction within airport terminals in developing countries, particularly in Sub-Saharan Africa. In Nigeria, existing airport studies have focused primarily on infrastructure development, operational performance, and sustainability initiatives, with comparatively limited attention given to user-centered environmental comfort and navigational efficiency. Addressing this gap, the present study evaluates user satisfaction with IEQ and wayfinding in selected Nigerian airport terminals, contributing empirical insights that may support improved user comfort, terminal usability, operational efficiency, and sustainable airport infrastructure development.

## METHODOLOGY

### Research Design

This study adopted a quantitative post-occupancy evaluation (POE) approach to assess user satisfaction with IEQ and wayfinding systems within selected airport terminal buildings in Nigeria. The POE approach was considered appropriate because it facilitates the systematic evaluation of user perceptions, experiences, and satisfaction within occupied built environments, particularly transportation facilities where environmental comfort and spatial navigation significantly influence user experience and operational effectiveness.

### Study Area and Airport Selection

The study was conducted across seven airport terminals in Nigeria comprising three international airports and four domestic airports. The airports were selected using a purposive sampling strategy to ensure representation of different operational categories, passenger traffic volumes, terminal scales, and circulation characteristics. This approach enabled the capture of diverse user experiences and environmental conditions across the Nigerian aviation sector. The selected sample comprised three international airports and four domestic airports in order to capture variations in terminal scale, passenger density, circulation complexity, and environmental conditions that may influence user satisfaction and wayfinding experiences and are shown in table 1.

Table 1: List of purposively sampled airports

S/N	Airport	Category
1	Murtala Muhammed International Airport, Ikeja, Lagos	International
2	Nnamdi Azikwe International Airport, Federal Capital Territory	International
3	Akanu Ibiam International Airport, Enugu	International
4	Margaret Ekpo International Airport, Calabar	Domestic

5	Kaduna International Airport, Kaduna	Domestic
6	Sam Mbakwe International Cargo airport, Owerri	Domestic
7	Ibadan Airport, Oyo state	Domestic

### Sampling Procedure and Sample Size

A purposive sampling technique was adopted to select respondents within the airport terminals. Users who had spent sufficient time within the terminal environment and were willing to participate were approached during the survey period. Questionnaires were administered directly to users within offices, departure lounges, waiting areas, circulation spaces, and terminal concourses of the selected airports. Data collection was undertaken during operational hours to ensure that respondents had adequate exposure to the environmental and wayfinding conditions being evaluated.

A total of 71 questionnaires were distributed across the selected airports. Fifty-seven questionnaires were retrieved, representing an 80.3% response rate, while 52 questionnaires were found valid and suitable for analysis following screening for completeness and consistency. The sample size was considered adequate for the exploratory nature of the study, which focused on obtaining preliminary insights into user perceptions of IEQ and wayfinding conditions. Similar post-occupancy and environmental satisfaction studies conducted within complex transportation environments have employed comparable sample sizes due to operational and security-related constraints associated with airport-based data collection (Kotopouleas and Nikolopoulou, 2018).

### Research Instrument and Variables Measured

Data were collected using a structured questionnaire designed to assess user perceptions of IEQ and wayfinding performance within airport terminals. The questionnaire comprised four sections: Section A: Demographic characteristics of respondents, Section B: Indoor environmental quality assessment, Section C: Wayfinding and spatial navigation assessment and Section D: Overall user satisfaction. The instrument employed closed-ended questions and a five-point Likert scale ranging from 1 (Very Dissatisfied) to 5 (Very Satisfied).

The questionnaire assessed three principal constructs: IEQ, wayfinding, and overall user satisfaction. IEQ was evaluated through four variables, namely thermal comfort, indoor air quality, lighting quality, and acoustic comfort, which represent key environmental factors influencing user comfort and experience within airport terminals. Wayfinding performance was assessed using variables related to signage visibility, signage adequacy, ease of navigation, spatial orientation, and movement efficiency, reflecting users' ability to understand, interpret, and navigate the terminal environment effectively. Overall user satisfaction served as the outcome variable and captured respondents' general evaluation of their experience within the airport terminals.

### Reliability and Validity of the Instrument

Prior to administration, the questionnaire was reviewed by experts in architecture and built environment research to ensure content validity. The instrument was refined based on expert feedback to improve clarity, relevance, and comprehensiveness of the measurement items. Reliability analysis produced a Cronbach's Alpha coefficient of 0.82, indicating good internal consistency of the questionnaire items.

### Data Analysis

Data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistical techniques including frequencies, percentages, mean scores, and graphical representations were used to summarize respondent perceptions of IEQ, wayfinding systems, and overall satisfaction. Mean score ranking was further employed to identify the most satisfactory and least satisfactory aspects of the airport

terminal environments. The descriptive analytical approach was considered appropriate because the study sought to identify dominant user perceptions, environmental comfort trends, and wayfinding-related concerns within the selected airport terminals.

### Ethical Considerations

Ethical principles governing research involving human participants were observed throughout the study. Participation in the questionnaire survey was entirely voluntary, and all respondents were informed of the purpose of the research before data collection commenced. Informed consent was obtained from participants prior to questionnaire administration, and respondents were assured of their right to decline participation or withdraw from the study at any stage without consequence.

To protect privacy and confidentiality, no personally identifiable information was collected, and all responses were anonymized during data processing and analysis. The study focused solely on respondents' perceptions of indoor environmental quality and wayfinding conditions within airport terminals and did not involve any physical intervention, medical procedures, or collection of sensitive personal data. Data were used exclusively for academic purposes and reported in aggregate form to prevent the identification of individual participants.

## RESULTS

### Demographic Profile

The analysis of the questionnaire distributed to airport users provides insightful demographic data essential for understanding user experiences within the airport environment as presented in table 2.

Table 2: Demographic Characteristics and Questionnaire Distribution of Respondents

Variable	Frequency (n)	Percentage (%)
Questionnaire Distribution		
Questionnaires Issued	71	100.0
Questionnaires Retrieved	57	80.3
Valid Responses	52	73.2
Respondent Category		
Passenger	15	28.8
Cargo Forwarder	13	25.0
Waiting for Family/Friend	9	17.3
Commercial Retailer	14	26.9
Taxi Service	1	1.9
Total	52	100.0
Gender		
Male	30	57.7

Female	22	42.3
Total	52	100.0
Age Range (Years)		
Below 18	2	3.8
19–30	10	19.2
31–40	16	30.8
41–50	12	23.1
51 and above	12	23.1
Total	52	100.0
Marital Status		
Single	28	53.8
Married	24	46.2
Total	52	100.0
Educational Qualification		
WAEC/SSCE	4	7.7
ND/NCE	10	19.2
B.Sc./HND	19	36.5
MSc/MBA	15	28.8
Ph.D.	4	7.7
Total	52	100.0

Among the respondents, passengers comprised the largest group, accounting for 28.8%, while taxi service users represented the smallest segment at just 1.9%. This distribution reflects the diversity of airport users represented in the study, including passengers, retailers, cargo operators, visitors, and transport service providers. It further elucidates the social demographic characteristics of the respondents. A notable finding is that 57.7% of respondents are male, indicating a higher representation of men among airport users. The age distribution reveals that the 31-40 age range is the most populated category, constituting 30.8% of respondents, which may reflect the demographic most likely to travel for both leisure and business purposes. Additionally, the marital status data shows that a majority (53.8%) of respondents are single, which might correlate with increased travel frequency among younger, unmarried individuals. Educational qualifications among the respondents show a significant level of higher education, with 36.5% holding a B. Sc or HND and 28.8% possessing an MSc or MBA.

### User Perception on IEQ and Wayfinding

The assessment utilized closed-ended questions, enabling respondents to express their opinions succinctly through yes or no answers with the results presented in Figure 1.

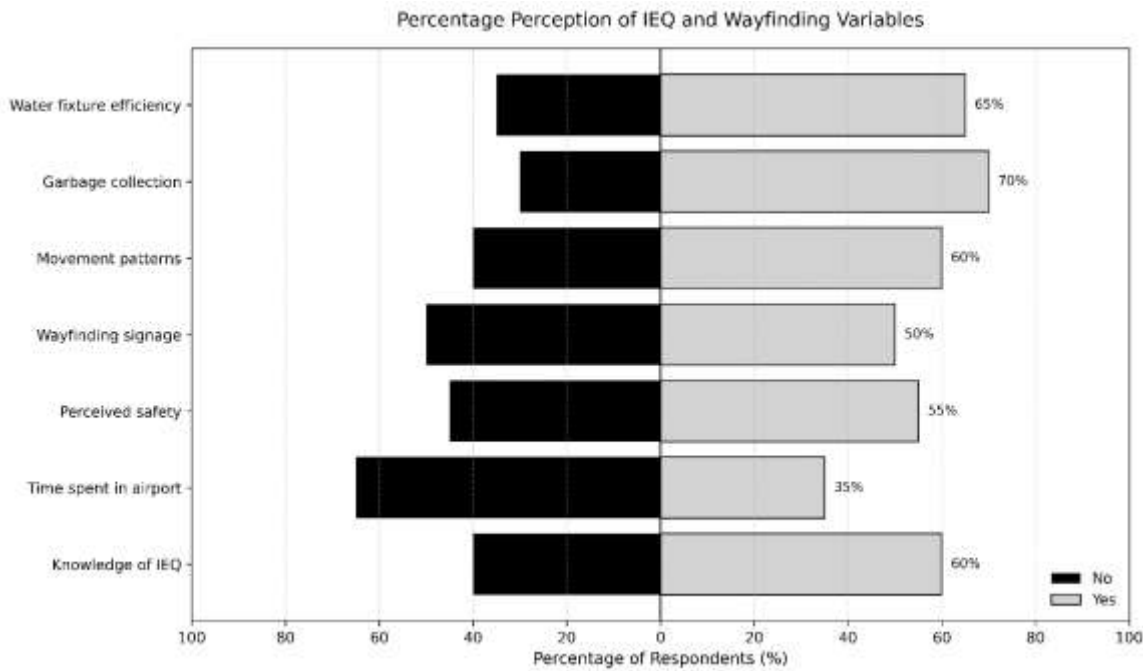


Figure 1: IEQ and wayfinding perception

Findings indicate several areas of concern. Notably, 45% of respondents expressed feelings of insecurity within the terminal buildings, highlighting a significant gap in perceived safety that may impact user confidence and comfort. Furthermore, 50% of respondents indicated dissatisfaction with the signage systems, reporting they were inadequate for effective wayfinding. Additionally, 40% of respondents reported a lack of awareness regarding indoor environmental quality metrics.

### Indoor Environmental Satisfaction

The evaluation of indoor environmental satisfaction through a five-point Likert scale provides a nuanced understanding of user satisfaction levels concerning various environmental factors within airport terminals with the results presented in Figure 2.

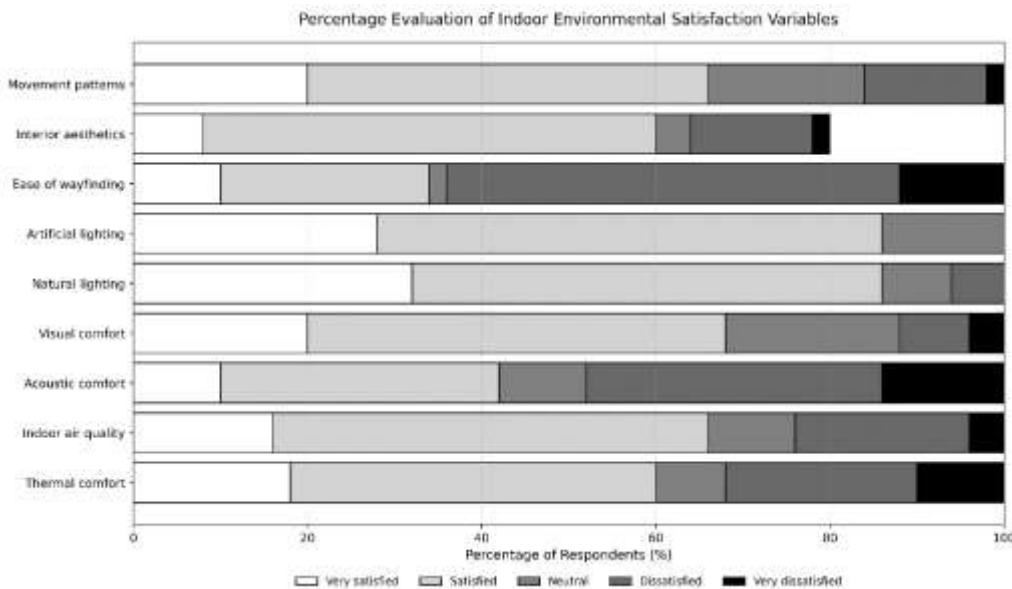


Figure 2: Indoor environmental satisfaction evaluation

The findings indicate that most respondents, over 50% expressed satisfaction with critical aspects of the airport environment, including thermal comfort, air quality, visual comfort, lighting, movement patterns, and overall

aesthetics. However, the analysis reveals notable dissatisfaction among respondents regarding wayfinding directives. Additionally, the quality of acoustic comfort often influenced by factors such as noise levels and sound insulation emerges as another critical concern. Poor acoustic conditions can adversely affect passenger experience, creating an uncomfortable and distracting environment.

### Impact of Natural Lighting and Ventilation

This section examines the perceived impacts of natural ventilation and lighting on occupant performance using a five-point Likert scale and the results are illustrated in Figure 3.

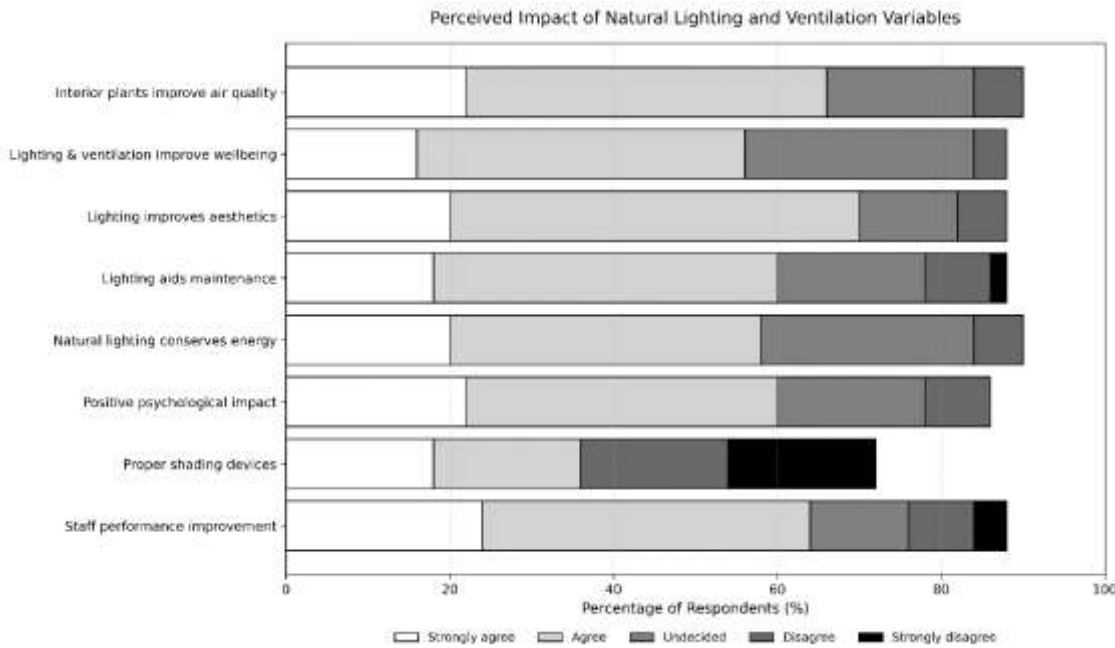


Figure 3: Impact of natural lighting and ventilation

Most respondents expressed a strong consensus that both natural lighting and ventilation significantly enhance staff performance. The agreement on the energy conservation benefits of natural ventilation and lighting highlights their role in reducing reliance on artificial systems. Respondents also noted improvements in the quality and aesthetics of interior spaces when natural elements are incorporated. Furthermore, well-ventilated spaces contribute to better indoor air quality, which is crucial for the health and well-being of both staff and travellers.

### Comparative Ranking of IEQ and Wayfinding Satisfaction

To provide a comparative overview of user perceptions across the evaluated environmental attributes, the satisfaction responses were synthesized and ranked according to the overall level of positive user perception. The ranking highlights the relative strengths and weaknesses of the airport terminal environments from the users' perspective and is shown in table 3.

Table 3: Comparative Ranking of User Satisfaction with IEQ and Wayfinding Attributes

Rank	Variable	Mean Score	Satisfaction Level
1	Lighting Quality	4.15	High Satisfaction
2	Thermal Comfort	4.10	High Satisfaction
3	Indoor Air Quality	4.05	High Satisfaction

4	Acoustic Comfort	3.10	Moderate Satisfaction
5	Wayfinding Performance	2.95	Moderate Satisfaction

**Scale:** 1.00–1.80 = Very Low; 1.81–2.60 = Low; 2.61–3.40 = Moderate; 3.41–4.20 = High; 4.21–5.00 = Very High

Table 3 presents the comparative ranking of user satisfaction across the assessed indoor environmental quality and wayfinding attributes. Lighting quality recorded the highest mean score ( $M = 4.15$ ), followed by thermal comfort ( $M = 4.10$ ) and indoor air quality ( $M = 4.05$ ), indicating generally high levels of satisfaction with the environmental conditions within the selected airport terminals. In contrast, acoustic comfort achieved a moderate satisfaction rating ( $M = 3.10$ ), while wayfinding performance recorded the lowest mean score ( $M = 2.95$ ). The results suggest that users were generally satisfied with the environmental quality of the terminals but expressed comparatively lower satisfaction with acoustic conditions and navigational support systems.

## DISCUSSION

The findings of this study reinforce the growing body of evidence that IEQ and wayfinding systems are critical determinants of user satisfaction within airport terminal environments. The relatively high ratings recorded for thermal comfort, indoor air quality, and lighting suggest that environmental comfort was not the primary source of dissatisfaction within the sampled airport terminals. Rather, users appeared to evaluate their overall airport experience through a combination of environmental and spatial factors. These findings are consistent with previous studies which indicate that acceptable thermal conditions and good air quality contribute positively to user satisfaction, perceived comfort, and psychological well-being in transportation facilities (Papagrighoriou et al., 2023; Niza et al., 2023). Airports are unique built environments where users often experience varying levels of stress, anxiety, and time pressure. Consequently, maintaining satisfactory environmental conditions is particularly important because environmental discomfort can amplify travel-related stress and negatively influence overall perceptions of service quality.

The strong rating accorded to lighting quality highlights the role of visual comfort in supporting positive user experiences within airport terminals. Beyond enhancing visibility, well-designed lighting environments contribute to spatial legibility, psychological comfort, and the overall perception of service quality. Previous studies have shown that adequate daylighting and well-designed lighting systems contribute to improved spatial perception, reduced visual fatigue, enhanced psychological well-being, and increased user satisfaction (Pichatwatana et al., 2017; Kotopouleas and Nikolopoulou, 2018). The high satisfaction levels recorded in this study suggest that the selected airport terminals have largely succeeded in providing visually comfortable environments that facilitate passenger activities such as waiting, circulation, information processing, and orientation. In addition to improving comfort, effective lighting can enhance the legibility of spaces and support wayfinding, thereby contributing to a more seamless passenger experience. The findings therefore support Eze et al., (2025), that lighting should be considered not only as an environmental quality parameter but also as an important design element influencing user behaviour and spatial perception within airport terminals.

The comparatively lower rating for acoustic comfort suggests that environmental quality improvements within airport terminals have not been matched by corresponding improvements in acoustic performance. User dissatisfaction with noise conditions suggests that airport terminals remain challenging acoustic environments due to the combination of passenger activities, public announcement systems, mechanical equipment, and operational processes. While some degree of noise is unavoidable in transportation facilities, excessive or poorly controlled noise can negatively affect comfort, concentration, communication, and overall environmental perception. This finding is consistent with previous research identifying noise as one of the most significant environmental stressors in public buildings and transportation hubs (Yang et al., 2024). The findings suggest that airport authorities should place greater emphasis on acoustic design strategies, including sound-absorbing materials, spatial separation of noisy activities, and improved public announcement systems, to enhance passenger comfort and satisfaction.

Perhaps the most significant finding of the study relates to wayfinding performance. The prominence of wayfinding deficiencies suggests that navigational performance may exert a stronger influence on terminal usability than environmental comfort variables alone. This suggests that users encounter difficulties navigating terminal environments, which may increase stress levels, reduce operational efficiency, and negatively affect overall satisfaction. Effective wayfinding is particularly important in airport environments because users often operate under strict time constraints and may be unfamiliar with terminal layouts. Difficulties in locating check-in counters, security screening areas, boarding gates, baggage claim facilities, and other services can contribute to frustration and anxiety. These findings suggest that deficiencies in navigational support systems may undermine overall terminal usability despite generally satisfactory environmental conditions which is consistent with findings by Bawa et al., (2025) on wayfinding in Nigerian Airports. The findings therefore support recent studies which emphasize that wayfinding efficiency, navigational clarity, and spatial legibility are critical determinants of airport service quality and passenger experience (Wang & Wang, 2025; Mazzulla et al., 2026).

Wayfinding challenges within the findings may also reflect broader issues associated with airport planning and management in developing countries. Unlike environmental parameters such as temperature and lighting, which are often incorporated into facility management practices, wayfinding systems frequently receive less attention during terminal operation and renovation. Consequently, signage systems may become outdated, inconsistent, or insufficient as passenger volumes increase and terminal functions evolve. The findings therefore highlight the need for airport operators to adopt a more user-centered approach to terminal planning by regularly evaluating passenger navigation experiences and incorporating user feedback into wayfinding improvements. Such interventions could include clearer directional signage, multilingual information systems, digital navigation tools, colour-coded circulation routes, and more intuitive spatial layouts.

The findings also contribute to the broader discourse on sustainable airport design. Contemporary sustainability frameworks increasingly recognised that sustainability extends beyond energy efficiency and environmental performance to include social and human-centered dimensions of building performance (Han et al., 2020). From this perspective, sustainable airport terminals should not only minimize resource consumption but also provide environments that support comfort, accessibility, well-being, and positive user experiences. The results of this study demonstrate that satisfactory environmental conditions alone do not guarantee high levels of passenger satisfaction. While respondents generally reported positive perceptions of thermal comfort, air quality, and lighting, dissatisfaction with acoustics and wayfinding reduced the overall passenger experience. This suggests that airport sustainability should be evaluated through a more holistic framework that integrates environmental quality, operational functionality, and user satisfaction.

Overall, the study demonstrates that user satisfaction within airport terminals is shaped by the interaction of multiple environmental and spatial factors rather than by any single aspect of building performance. The findings highlight the importance of adopting integrated post-occupancy evaluation approaches that simultaneously assess IEQ and wayfinding performance in order to provide a more comprehensive understanding of user experiences. Such evidence is particularly valuable in the Nigerian context, where empirical studies examining user-centered performance evaluation of airport terminals remain limited. By identifying both strengths and deficiencies within existing airport environments, the study provides practical insights that can inform future airport design, renovation, and management strategies aimed at enhancing user well-being, service quality, and overall terminal performance.

### **Limitations of the Study**

The study adopted an exploratory post-occupancy evaluation approach based primarily on user perceptions and subjective assessments of IEQ and wayfinding within the terminal buildings. As such, the findings reflect user experiences and satisfaction levels rather than objective environmental performance measurements. The relatively modest sample size and purposive selection of airport terminals may also limit the broader generalizability of the findings across all airport terminals in Nigeria.

Data collection within airport environments presented certain operational and security-related constraints, including restricted access to some terminal areas, limited passenger interaction time, and varying passenger

movement patterns, which affected response retrieval. Previous perception-based airport studies have shown that differences in terminal design, passenger flow, operational activities, and environmental conditions can influence user satisfaction and response pattern (Huang et al., 2021; Kotopouleas and Nikolopoulou, 2018). Future research may incorporate larger sample populations, comparative regional assessments, and broader user categories to enhance the generalizability and analytical depth of the findings.

## CONCLUSION

The findings demonstrate that satisfactory environmental conditions alone are insufficient to guarantee positive overall user experiences where navigational and acoustic challenges persist. Difficulties associated with navigation within terminal spaces suggest that existing wayfinding systems may not adequately support passenger movement, particularly for first-time users and visitors unfamiliar with airport layouts. The findings provide guidance for airport authorities, facility managers, and designers by highlighting the need to improve signage systems, acoustic comfort, and user-centered terminal planning. Incorporating these considerations into future airport upgrades may enhance passenger experience while supporting sustainable airport development.

## RECOMMENDATIONS

Based on the findings, recommendations have been proposed to address specific issues identified by users as follows.

### Enhance Signage and Wayfinding Systems

Clear and intuitive signage is essential for guiding passengers through airport terminals efficiently and safely. Nigerian airports should prioritize the improvement of existing signage systems to ensure that passengers can easily find key areas such as gates, baggage claim, and amenities. Additionally, multilingual signage should be implemented to cater to the diverse international traveller base. Digital or interactive wayfinding solutions can further enhance navigation by offering real-time information about flight updates, gate changes, and terminal amenities. By making the navigation process simpler, airports can reduce confusion, improve safety, and create a smoother travel experience.

### Implement Noise Reduction Strategies

Acoustic comfort is a critical factor in improving passenger experience, especially in busy airport environments where noise levels can be high. Airports should invest in noise reduction strategies such as installing sound-absorbing materials in areas like seating zones, waiting areas, and high-traffic zones. Acoustic treatments such as carpets, ceiling panels, and acoustic partitions can significantly reduce ambient noise. Additionally, areas with excessive noise such as baggage claim or food courts should be designed in a way that minimizes sound spill into quieter zones, like lounges and seating areas.

### Promote Natural Lighting and Ventilation

Natural lighting and ventilation play a key role in creating a pleasant and healthy indoor environment. Airports should design terminals with larger windows, skylights, or light wells to allow more daylight to filter into interior spaces, improving both passenger mood and energy efficiency by reducing reliance on artificial lighting. Natural light has been shown to have positive effects on well-being, making airport terminals more comfortable places to spend time. Additionally, improving ventilation systems to ensure the continuous flow of fresh air in offices within the airport is essential. This could involve using natural ventilation strategies, such as operable windows or improved air filtration systems, to enhance air quality and provide a more refreshing atmosphere for passengers.

### Regular Evaluation of IEQ

To maintain high levels of user satisfaction, regular assessments of Indoor Environmental Quality (IEQ) should be conducted. Thermal comfort, air quality, lighting, and acoustics should be continuously monitored to

ensure they align with passenger needs and expectations. Airports should develop systematic methods for evaluating these factors, such as periodic surveys, real-time environmental monitoring, and focus groups with travellers. Feedback from users can provide valuable insights into areas where improvements are needed and help airports stay proactive in addressing any emerging concerns regarding comfort or safety.

### Consent to Participate

Voluntary consent was obtained prior to participation in questionnaire surveys.

### Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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