

Occupants' Preferences for Regenerative Architectural Elements in Enhancing Thermal Comfort in Corporate Headquarters Buildings

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Abstract

Thermal comfort remains a major concern in corporate office buildings located in tropical climates, where high temperatures often increase dependence on energy-intensive cooling systems. Regenerative architecture offers opportunities to improve indoor environmental quality through environmentally responsive design strategies. However, limited attention has been given to occupants' preferences for regenerative architectural elements that enhance thermal comfort. This study assessed occupants' preferences for regenerative architectural elements and their perceived suitability for improving thermal comfort in selected corporate headquarters buildings in Abuja, Nigeria. The study utilized data obtained from a broader mixed-methods investigation of regenerative architecture and thermal comfort. A structured questionnaire was administered to occupants of the selected buildings. Of the 277 questionnaires distributed, 264 valid responses were returned, representing a response rate of 95.3%. Data were analysed using descriptive statistics, including frequencies, percentages, mean scores, and ranking techniques. The findings revealed that natural ventilation systems were the most preferred regenerative architectural element (Mean = 4.71), followed by daylighting strategies (Mean = 4.62) and shading devices (Mean = 4.58). Indoor and outdoor vegetation (Mean = 4.49), courtyards and open-air spaces (Mean = 4.33), vertical green walls (Mean = 4.24), green roofs (Mean = 4.19), and water features (Mean = 4.02) were also positively rated but ranked lower. The results indicate that occupants prioritize passive regenerative design strategies that provide direct and observable thermal comfort benefits. The study concludes that occupant-centred regenerative design in corporate headquarters should prioritize natural ventilation, daylighting, and solar control strategies to enhance thermal comfort and reduce dependence on mechanical cooling systems.

Keywords: Regenerative Architecture; Thermal Comfort; User Preference; Corporate Headquarters; Passive Design Strategies; Tropical Climate; Abuja.

1.0 Introduction

The increasing effects of climate change, urbanization, and energy insecurity have intensified the need for environmentally responsive building designs, particularly in tropical regions where high temperatures and humidity significantly influence indoor environmental quality. Corporate headquarters buildings, which accommodate large numbers of occupants for extended periods, require indoor environments that support productivity, health, and well-being. However, many contemporary office buildings in tropical cities continue to depend heavily on energy-intensive mechanical cooling systems to achieve acceptable thermal

conditions. This dependence contributes to rising energy consumption, increased operational costs, and environmental degradation (International Energy Agency, 2022).

Thermal comfort is widely recognized as one of the most important indicators of indoor environmental quality. According to ASHRAE Standard 55, thermal comfort is the condition of mind that expresses satisfaction with the thermal environment (ASHRAE, 2017). In office environments, thermal comfort influences occupants' concentration, productivity, health, and overall workplace satisfaction. Poor thermal conditions have been associated with reduced cognitive performance, increased stress levels, and diminished employee well-being (Frontczak & Wargocki, 2011). Achieving thermal comfort is particularly challenging in tropical climates where high solar radiation, elevated ambient temperatures, and seasonal humidity increase the cooling demands of buildings. In response to these challenges, architectural discourse has gradually shifted from conventional sustainability approaches toward regenerative architecture. Unlike sustainable design, which primarily seeks to reduce negative environmental impacts, regenerative architecture aims to restore, renew, and enhance ecological and human systems through the built environment (Mang & Reed, 2012). Regenerative architecture views buildings as active participants within broader ecological systems and promotes design strategies that improve environmental performance while simultaneously enhancing occupant well-being. Such strategies include natural ventilation systems, adaptive façades, green roofs, vegetated walls, daylight optimization, landscape integration, and climate-responsive building envelopes (Armstrong, 2023). These interventions contribute to thermal regulation by reducing solar heat gain, improving airflow, and moderating indoor temperatures. The relevance of regenerative architecture is particularly significant in tropical corporate headquarters where occupant comfort and energy performance are closely interconnected. Research indicates that passive and regenerative design strategies can substantially reduce cooling loads while improving indoor environmental quality (Korra, 2021; Kini et al., 2022). Features such as courtyards, shading devices, natural ventilation corridors, and green infrastructure have demonstrated considerable potential for enhancing thermal comfort in warm climates. Beyond their technical performance, these architectural elements contribute to psychological restoration, improved workplace satisfaction, and stronger connections between occupants and natural systems.

Recent studies increasingly emphasize that thermal comfort is not solely determined by measurable environmental parameters but is also influenced by occupant perception, adaptation, and preference. The adaptive comfort model suggests that users can tolerate wider thermal ranges when they have opportunities to interact with and control their environment through operable windows, shading systems, and other passive features (de Dear & Brager, 2002; Nicol & Humphreys, 2010). Consequently, occupant preference has become an important consideration in evaluating the effectiveness of climate-responsive architectural interventions. Features that are technically efficient may fail to achieve desired outcomes if occupants perceive them as inconvenient, ineffective, or incompatible with their needs.

Despite growing global interest in regenerative architecture, its application within Nigeria remains relatively limited. Contemporary corporate buildings in cities such as Abuja continue to rely heavily on sealed façades, reinforced concrete construction, and mechanical air-conditioning systems that often disregard local climatic conditions (Alegbe et al., 2023; Ukoba et al., 2024). While several studies have examined sustainable and passive design strategies in tropical buildings, limited empirical attention has been given to understanding occupants' preferences for regenerative architectural elements and how these preferences influence thermal comfort outcomes. Existing research has largely focused on technical performance indicators, leaving a significant gap regarding the human-centered dimensions of regenerative design.

This gap is particularly important within corporate headquarters environments where occupants spend prolonged periods performing cognitively demanding tasks. Understanding which regenerative architectural elements occupants perceive as most effective for enhancing thermal comfort can provide valuable insights for architects, developers, and policymakers seeking to create more responsive office environments. User-centered evidence can help ensure that regenerative interventions are not only environmentally effective but also socially accepted and actively utilized by building occupants. Therefore, this study investigates occupants' preferences for regenerative architectural elements and their perceived suitability for enhancing thermal comfort in selected corporate headquarters buildings in Abuja, Nigeria. Specifically, the study examines occupants' awareness of regenerative architectural features, evaluates preferences for different regenerative design interventions, and identifies the elements perceived to be most effective in improving thermal comfort within tropical office environments.

1.1. Regenerative Architecture: Concept and Evolution

The growing concerns surrounding climate change, environmental degradation, resource depletion, and declining human well-being have necessitated a shift in architectural thinking beyond conventional sustainability. For several decades, sustainable architecture has focused on reducing the negative impacts of buildings through improved energy efficiency, waste reduction, and responsible resource utilization. While these approaches have contributed significantly to environmental conservation, scholars argue that merely reducing harm is insufficient to address the scale of contemporary ecological challenges. Consequently, regenerative architecture has emerged as a more transformative design paradigm that seeks not only to minimize environmental damage but also to restore and enhance ecological and social systems (Mang & Reed, 2012). Regenerative architecture is founded on the principle that buildings should function as active contributors to the health of their surrounding ecosystems. Rather than viewing buildings as isolated structures, regenerative design recognizes the interconnected relationship between humans, buildings, and natural systems. According to Lyle (1994), regenerative design involves replacing linear patterns of resource consumption with cyclical processes that mimic natural ecosystems. This perspective encourages buildings to generate positive environmental, social, and economic outcomes throughout their life cycle. The concept has evolved from ecological design theories, bioclimatic architecture, and systems thinking. Early proponents such as John Tillman Lyle emphasized the need for built environments capable of renewing the ecological systems upon which they depend. Later scholars expanded the concept by integrating human well-being, social resilience, and community development into regenerative frameworks (Cole, 2012). Consequently, regenerative architecture has become increasingly associated with climate-responsive design, biodiversity enhancement, ecosystem restoration, and occupant well-being.

Within the built environment, regenerative architecture is characterized by strategies such as passive ventilation systems, adaptive building envelopes, green roofs, living walls, daylight optimization, rainwater harvesting, renewable energy integration, landscape regeneration, and biophilic design interventions. These elements collectively contribute to improved environmental performance while enhancing the quality of indoor spaces. In tropical climates, where thermal comfort remains a major challenge, regenerative architectural strategies provide opportunities to reduce dependence on mechanical cooling systems while improving occupant satisfaction. The relevance of regenerative architecture has increased significantly in tropical urban environments due to rapid urbanization and rising temperatures. Corporate headquarters buildings are particularly important because of their substantial energy demands and prolonged occupancy periods. The integration of regenerative design principles within such buildings

offers opportunities to improve thermal performance, reduce operational energy consumption, and create healthier workplaces. However, the effectiveness of these interventions depends not only on technical performance but also on how occupants perceive and interact with them.

1.2 Thermal Comfort in Tropical Corporate Buildings

Thermal comfort is one of the most extensively studied aspects of indoor environmental quality. It represents a critical determinant of occupant satisfaction, productivity, health, and overall building performance. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) defines thermal comfort as “the condition of mind that expresses satisfaction with the thermal environment” (ASHRAE, 2017). This definition highlights the subjective nature of thermal comfort, emphasizing that comfort perceptions vary among individuals. The traditional understanding of thermal comfort has been guided by Fanger’s Predicted Mean Vote (PMV) model, which evaluates comfort based on environmental variables such as air temperature, relative humidity, air velocity, mean radiant temperature, clothing insulation, and metabolic rate (Fanger, 1970). Although widely adopted, the PMV model has been criticized for its limited applicability in naturally ventilated buildings and tropical climates where occupants often adapt to prevailing environmental conditions.

To address these limitations, researchers developed the Adaptive Comfort Theory, which suggests that occupants can tolerate broader temperature ranges when they are able to interact with their environment through behavioral, physiological, and psychological adaptations (de Dear & Brager, 2002). The adaptive model is particularly relevant in tropical climates because occupants frequently adjust their clothing, modify window openings, utilize shading devices, and alter their activities in response to thermal conditions. Consequently, thermal comfort becomes a dynamic process influenced by both environmental conditions and user behavior.

In tropical regions, thermal comfort is significantly influenced by climatic characteristics such as high temperatures, intense solar radiation, seasonal humidity, and limited wind movement. These factors increase cooling demands and often result in substantial energy consumption in office buildings. Corporate headquarters frequently rely on centralized air-conditioning systems to maintain indoor comfort conditions. While such systems can achieve stable thermal environments, they are often associated with high operational costs, energy inefficiency, and increased greenhouse gas emissions. Research has demonstrated that passive and climate-responsive design strategies can substantially improve thermal comfort while reducing cooling loads. Architectural features such as shading devices, thermal mass, courtyards, natural ventilation systems, and vegetation can moderate indoor temperatures and improve airflow within buildings. These interventions are particularly valuable in tropical climates where outdoor environmental conditions strongly influence indoor thermal performance. Consequently, regenerative architectural approaches have gained increasing attention as viable solutions for improving thermal comfort in office environments. Thermal comfort is especially important in corporate headquarters because occupants spend prolonged periods engaged in cognitive and administrative tasks. Studies have shown that uncomfortable thermal conditions can negatively affect concentration, decision-making, productivity, and workplace satisfaction (Frontczak & Wargocki, 2011). Therefore, improving thermal comfort through regenerative architectural interventions can contribute not only to environmental sustainability but also to organizational performance and employee well-being.

1.3 Regenerative Architectural Elements for Thermal Comfort Enhancement

Regenerative architecture employs numerous design strategies capable of influencing thermal comfort. These strategies function by reducing heat gain, promoting natural ventilation, enhancing evaporative cooling, and improving occupants’ interaction with the built

environment. Among the most frequently cited regenerative architectural elements are natural ventilation systems, adaptive façades, green roofs, vegetated walls, biophilic landscapes, daylight-responsive design, and climate-responsive building envelopes.

Natural ventilation remains one of the most effective passive cooling strategies in tropical architecture. Through carefully designed openings, cross-ventilation pathways, and stack-effect mechanisms, natural ventilation facilitates heat removal and enhances indoor air movement. Increased airflow improves occupants' thermal perception by promoting evaporative cooling and reducing dependence on mechanical air-conditioning systems. Research indicates that occupants generally express strong preferences for naturally ventilated spaces due to improved air quality and greater environmental control.

Shading devices constitute another important regenerative strategy for thermal comfort enhancement. External shading systems, louvers, overhangs, and vegetation-based shading reduce solar heat gain and minimize indoor temperature fluctuations. By intercepting direct solar radiation before it reaches building surfaces, shading devices contribute significantly to improved thermal conditions in tropical office buildings. Green roofs and living walls have gained prominence as regenerative architectural interventions due to their capacity to improve building thermal performance while enhancing biodiversity. Vegetation provides insulation, reduces surface temperatures, and promotes evaporative cooling. Studies have demonstrated that green roofs can significantly lower roof temperatures and reduce indoor cooling requirements in warm climates. Similarly, vegetated walls contribute to temperature moderation while improving aesthetic quality and occupants' connection with nature. Biophilic design elements also play an important role in regenerative architecture. Biophilic design seeks to strengthen human relationships with natural systems through direct and indirect exposure to nature. Features such as indoor vegetation, water elements, natural materials, and landscape integration have been associated with enhanced psychological well-being and improved environmental satisfaction. Although biophilic interventions may not always directly alter temperature conditions, they can positively influence occupants' perceptions of comfort and environmental quality. Adaptive building façades represent a more technologically advanced regenerative strategy. These systems respond dynamically to changing environmental conditions through adjustable shading devices, responsive glazing technologies, and automated ventilation controls. Adaptive façades optimize thermal performance by regulating solar exposure and airflow patterns throughout the day. While their implementation may involve higher initial costs, they offer significant opportunities for improving thermal comfort and energy efficiency in contemporary office buildings. Collectively, these regenerative architectural elements contribute to thermal comfort through both physical and psychological mechanisms. Their effectiveness, however, depends on contextual factors such as climate, building configuration, occupancy patterns, and user preferences. Understanding which elements occupants' value most is therefore essential for effective design decision-making.

1.4 User Preference and Occupant-Centered Design

The growing emphasis on human-centered architecture has led researchers to recognize the importance of occupant preferences in evaluating building performance. Traditional building assessments often focus on technical indicators such as energy efficiency, temperature regulation, and environmental impact. While these measures remain important, they do not fully capture how occupants experience and respond to architectural environments.

User preference refers to the degree to which individuals favor specific environmental conditions, design features, or building characteristics. Within thermal comfort research, user preferences influence occupants' satisfaction with indoor environments and their willingness to utilize available environmental controls. The adaptive comfort approach acknowledges that

occupants are active participants in shaping their comfort experiences rather than passive recipients of environmental conditions. Several studies have demonstrated that occupants prefer environments that provide opportunities for personal control. Features such as operable windows, adjustable shading devices, user-controlled ventilation systems, and accessible outdoor spaces contribute to greater thermal satisfaction because they allow occupants to respond directly to changing environmental conditions. Personal control has consistently been associated with improved comfort perception, reduced thermal complaints, and enhanced workplace satisfaction. Occupant preferences are influenced by numerous factors including age, gender, cultural background, previous experiences, environmental expectations, and organizational context. In tropical regions, individuals often develop adaptive behaviors that shape their perceptions of acceptable thermal conditions. Consequently, thermal comfort assessments must account for subjective experiences alongside objective environmental measurements. The integration of user preferences into regenerative architecture is particularly important because many regenerative design strategies rely on active occupant engagement. Features such as natural ventilation systems and adaptive façades perform most effectively when users understand and interact with them appropriately. Therefore, understanding occupant preferences can improve the adoption, utilization, and long-term effectiveness of regenerative architectural interventions.

1.5 Theoretical Foundation and Research Gap

This study is anchored primarily on Regenerative Design Theory and Adaptive Comfort Theory. Regenerative Design Theory proposes that buildings should contribute positively to ecological and human systems rather than merely reducing negative impacts (Lyle, 1994; Mang & Reed, 2012). The theory emphasizes mutually beneficial relationships between buildings, occupants, and natural environments. Within this framework, regenerative architectural elements are expected to enhance both environmental performance and human well-being. Adaptive Comfort Theory complements this perspective by emphasizing the role of occupants in shaping thermal comfort experiences (de Dear & Brager, 2002). The theory suggests that thermal satisfaction is influenced not only by environmental conditions but also by occupants' ability to adapt and interact with their surroundings. This perspective is particularly relevant when evaluating regenerative architectural interventions that encourage occupant engagement. Despite increasing scholarly attention to regenerative architecture, existing studies have predominantly focused on environmental performance indicators such as energy efficiency, carbon reduction, and ecological restoration. Comparatively fewer studies have examined how building users perceive regenerative architectural elements or which interventions they consider most effective for enhancing thermal comfort. Within tropical corporate headquarters, this gap remains particularly evident, as limited empirical research has explored occupant preferences for regenerative design features. Therefore, this study addresses an important gap in the literature by investigating user preferences for regenerative architectural elements that enhance thermal comfort in tropical corporate headquarters. By adopting an occupant-centered perspective, the study contributes to the understanding of how regenerative architecture can simultaneously support environmental sustainability and user satisfaction within contemporary office environments.

2.0 Methodology

2.1 Research Design

This study is derived from a broader investigation that assessed regenerative architectural elements and thermal comfort performance in selected corporate headquarters buildings in Abuja, Nigeria. The present article focuses specifically on occupants' preferences for

regenerative architectural elements and their perceived contribution to thermal comfort enhancement. The parent study adopted a mixed-methods research design, combining questionnaire surveys with semi-structured interviews to obtain both quantitative and qualitative insights into regenerative architecture and thermal comfort. However, this article reports findings from the quantitative component relating to user preferences for regenerative architectural elements.

2.2 Study Area

The study was conducted in two contemporary corporate headquarters buildings located in Abuja, Nigeria: the Afreximbank African Trade Centre (ATC) and the Nigeria Revenue Service Headquarters (NRS HQ). The buildings were purposively selected because they incorporate several regenerative and environmentally responsive design features intended to improve occupant comfort and building performance.

Abuja is located within the tropical savannah climatic zone and experiences high temperatures for most of the year. The climatic conditions create significant thermal comfort challenges within office buildings and make the city an appropriate setting for examining occupant preferences regarding regenerative architectural interventions.

2.3 Population and Sample Size

The target population consisted of occupants of the selected corporate headquarters buildings. The total population was 900 occupants, comprising 700 occupants from the Afreximbank African Trade Centre and 200 occupants from the Nigeria Revenue Service Headquarters.

The sample size was determined using Yamane's (1967) formula for finite populations at a 95% confidence level and 5% margin of error:

$$n = \frac{N}{1 + N(e)^2}$$

Where:

(n) = sample size;

(N) = population size (900);

(e) = level of precision (0.05).

The computation yielded a sample size of 277 respondents. A total of 277 questionnaires were distributed, of which 264 were completed and returned, representing a response rate of 95.3%.

2.4 Sampling Technique

Purposive sampling was employed in selecting respondents from the study buildings. The approach ensured that only occupants who regularly interacted with the building environment and possessed sufficient experience of the building's environmental conditions participated in the survey. Such respondents were considered capable of providing informed assessments regarding regenerative architectural elements and thermal comfort performance.

2.5 Data Collection Instrument

Data were collected using a structured questionnaire developed from variables identified in the literature on regenerative architecture, thermal comfort, and occupant satisfaction. The questionnaire contained items measuring respondents' awareness of regenerative architectural features, preferences for selected regenerative design elements, and perceptions regarding the suitability of these elements for enhancing thermal comfort. The regenerative architectural elements assessed included natural ventilation systems, daylighting strategies, shading devices, indoor and outdoor vegetation, courtyards and open-air spaces, vertical green walls, green roofs, and water features.

Responses were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

2.6 Validity and Reliability

The questionnaire was subjected to expert review to establish content validity. Specialists in architecture and built environment disciplines examined the instrument to ensure clarity, relevance, and adequacy of the measurement items. A pilot survey involving 15 respondents was conducted prior to the main study. The internal consistency of the instrument was assessed using Cronbach's Alpha coefficient. The analysis produced a reliability coefficient of 0.75, indicating acceptable reliability for the study and confirming the suitability of the instrument for data collection.

2.7 Data Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistical techniques, including frequencies, percentages, mean scores, and standard deviations, were used to summarise respondents' views regarding regenerative architectural elements. For the purpose of this article, emphasis was placed on the analysis of user preferences and perceived suitability of regenerative architectural elements for thermal comfort enhancement. The elements were ranked based on their mean scores to identify the most preferred regenerative interventions among building occupants.

Qualitative responses obtained from interviews were analysed thematically and used to support the quantitative findings, particularly in explaining occupants' preferences for specific regenerative architectural strategies.

3.0 Results and Discussion

3.1 Respondents' Characteristics

A total of 277 questionnaires were distributed among occupants of the selected corporate headquarters buildings, of which 264 were returned and found suitable for analysis, representing a response rate of 95.3%. The high response rate indicates a strong level of participation and provides confidence in the reliability of the findings.

3.1 Demographic Profile of Respondents

Table 4. 1 Socio-Economic and Demographic Information of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	162	58.48
	Female	102	36.82
	Prefer not to say	13	4.69
Age	18–25	38	13.72
	26–35	98	35.38
	36–45	81	29.24
	46–55	44	15.88
	56+	16	5.78
Educational Level	Secondary	15	5.42
	Diploma	40	14.44
	Bachelor's	121	43.68
	Master's	81	29.24
	PhD	20	7.22
Occupation/Role	Administrative	92	33.21

	Technical	81	29.24
	Managerial	75	27.08
	Others	29	10.47
	0–5	58	20.94
	6–10	86	31.05
Years of Work Experience	11–15	77	27.80
	16+	56	20.22
	<4 hrs	23	8.30
	4–6 hrs	65	23.47
Average Daily Time Spent Indoors	7–9 hrs	113	40.79
	>9 hrs	76	27.44

Source: Field Survey, 2026

The demographic profile of respondents revealed a diverse representation of building users across different age groups, educational backgrounds, occupational categories, and years of work experience. The majority of respondents possessed tertiary educational qualifications and occupied professional, administrative, and managerial positions within their respective organizations. This composition suggests that the respondents were sufficiently knowledgeable and experienced to evaluate the regenerative architectural features incorporated within the buildings and their influence on thermal comfort.

The diversity of respondents further enhances the credibility of the findings, as perceptions were obtained from users with varying experiences and interactions with the building environment.

3.2 Awareness of Regenerative Architectural Elements

Table 4. 2 Awareness of Regenerative Architectural Elements

S/N	Item	Mean	Std. Dev.	Decision
1	Are you aware that Regenerative Architecture aims to design buildings that not only minimize negative environmental impacts, but actively contribute to restoring and improving the surrounding ecosystems and communities?	2.86	0.48	Disagree
2	I understand how building design influence thermal comfort.	4.56	0.61	Agree
3	I am familiar with natural ventilation strategies.	4.38	0.73	Agree
4	I am aware of green building features such as green roofs and walls.	4.27	0.77	Agree
5	I understand how shading devices affect indoor temperature.	4.49	0.64	Agree

Source: Field Survey, 2026

The findings indicate a relatively high level of awareness of regenerative architectural elements among building occupants. Most respondents demonstrated familiarity with environmentally responsive design features such as natural ventilation systems, daylighting strategies, shading devices, landscape integration, and vegetative elements incorporated within the buildings.

This finding suggests that users are increasingly conscious of the role of building design in promoting environmental sustainability and occupant well-being. The growing global discourse on sustainable and regenerative design may have contributed to this awareness. Furthermore, the visibility and functionality of many regenerative elements within the selected buildings likely enhanced occupants' understanding of their purpose and benefits.

The high level of awareness observed in this study is important because occupants who understand the functions of regenerative architectural elements are more likely to utilize and appreciate them effectively. Previous studies have emphasized that awareness and environmental knowledge significantly influence users' perceptions of building performance and environmental satisfaction (Cole, 2012; Mang & Reed, 2012).

3.3 Occupants' Preferences for Regenerative Architectural Elements

The analysis of user preferences revealed significant differences in how occupants perceived various regenerative architectural elements. Table 1 presents the ranking of regenerative architectural elements based on respondents' mean scores.

Table 4.3 Regenerative Elements Present in Sampled Buildings

S/N	Item	Mean	Std. Dev.	Decision
1	Natural ventilation systems are present in my workplace.	4.31	0.72	Agree
2	There are adequate shading devices in my building.	4.18	0.81	Agree
3	Vegetation (trees, plants) is integrated into the building design.	4.06	0.88	Agree
4	Daylighting is effectively utilized in my workplace.	4.41	0.67	Agree
5	The building incorporates green roofs or walls.	3.89	0.94	Agree
6	Courtyards or open spaces are part of the building design.	4.12	0.79	Agree

Source: Field Survey, 2026

The results show that natural ventilation systems were the most preferred regenerative architectural element, with a mean score of 4.71. This was followed by daylighting strategies such as large windows and skylights (Mean = 4.62), while shading devices ranked third (Mean = 4.58). Indoor and outdoor vegetation was ranked fourth with a mean score of 4.49, followed by courtyards and open-air spaces (Mean = 4.33). Vertical green walls, green roofs, and water features occupied the lower positions with mean scores of 4.24, 4.19, and 4.02 respectively.

The preference hierarchy suggests that occupants place greater value on regenerative architectural elements that directly influence their daily thermal experience. Natural ventilation, daylighting, and shading systems are immediately perceptible to building users because they directly affect airflow, temperature regulation, visual comfort, and indoor environmental quality. In contrast, elements such as green roofs and water features, although environmentally beneficial, may not provide thermal benefits that are readily perceived by occupants during routine building use. Consequently, users may assign greater importance to features that visibly and consistently improve comfort conditions. The findings reinforce the argument that occupant-centered design should prioritize regenerative interventions that provide tangible comfort benefits while simultaneously achieving environmental objectives. The results also suggest that passive design strategies remain highly relevant in tropical climates where thermal comfort challenges are pronounced.

3.4 Perceived Suitability of Regenerative Architectural Elements for Thermal Comfort Enhancement

Beyond preference, respondents were asked to assess the suitability of various regenerative architectural elements for enhancing thermal comfort. The findings revealed a pattern similar to that observed in the preference rankings.

Table 4.4 Suitability of Regenerative Elements for Thermal Comfort

S/N	Item	Mean	Std. Dev.	Decision
1	Natural ventilation improves indoor thermal comfort	4.76	0.51	Agree
2	Shading devices effectively reduce indoor heat gain	4.68	0.57	Agree
3	Green roofs help in lowering building temperature	4.34	0.76	Agree
4	Vegetation around buildings improves indoor comfort	4.55	0.63	Agree
5	Daylighting contributes positively to indoor comfort	4.49	0.69	Agree
6	Courtyards enhance airflow and thermal comfort	4.38	0.73	Agree
7	Regenerative elements reduce dependence on air-conditioning	4.61	0.59	Agree

Source: Field Survey, 2026

Natural ventilation systems were perceived as the most suitable regenerative intervention for improving thermal comfort. Respondents acknowledged the ability of natural ventilation to enhance air circulation, reduce indoor heat accumulation, and create a more comfortable indoor environment. Daylighting systems and shading devices were also rated highly due to their contribution to reducing dependence on artificial systems while improving environmental quality. Vegetative interventions, including indoor and outdoor landscaping, green walls, and green roofs, were generally considered effective in moderating temperature conditions and improving environmental quality. However, their perceived suitability was lower than that of passive cooling strategies. Water features received the lowest suitability ratings among the evaluated regenerative elements. Although respondents recognized their aesthetic value and contribution to environmental quality, many users appeared uncertain about their direct influence on indoor thermal comfort. The results indicate that occupants evaluate regenerative architectural elements primarily based on their perceived effectiveness in addressing immediate thermal needs. Features that visibly improve airflow, reduce solar heat gain, or enhance environmental control are generally regarded as more suitable for thermal comfort enhancement.

3.5 Discussion of Findings

The findings demonstrate that occupants in tropical corporate headquarters buildings strongly prefer passive regenerative architectural strategies over more technologically complex or visually prominent regenerative interventions. Natural ventilation systems, daylighting strategies, and shading devices consistently emerged as the highest-ranked elements in both preference and suitability assessments. This finding supports the principles of Adaptive Comfort Theory, which proposes that occupants experience greater thermal satisfaction when they can interact with and adapt to their environment (de Dear & Brager, 2002). Natural ventilation and daylighting provide opportunities for such interaction by enabling users to respond to changing environmental conditions. Occupants are therefore more likely to value these interventions because their benefits are directly experienced in everyday building use. The findings also align with Regenerative Design Theory, which advocates for building systems that establish mutually beneficial relationships between human and ecological systems (Mang & Reed, 2012). The preference for passive regenerative strategies suggests that

occupants appreciate interventions that simultaneously improve comfort and reduce environmental impacts. Natural ventilation, daylighting, and shading systems reduce energy demand while enhancing occupant well-being, thereby embodying key regenerative design principles. Another important finding is the relatively lower ranking of green roofs, vertical green walls, and water features. While these interventions are widely recognized in regenerative architecture literature, occupants may perceive them as secondary to strategies that directly influence indoor environmental conditions. This observation highlights a critical distinction between environmental performance and user perception. Architectural interventions may achieve measurable sustainability outcomes yet receive limited recognition from occupants if their benefits are not immediately apparent. The thematic findings obtained from interviews further support the quantitative results. Respondents repeatedly emphasized the importance of passive ventilation, solar control measures, daylight access, and landscape integration in creating comfortable working environments. These themes reinforce the argument that successful regenerative architecture in tropical office buildings should prioritize occupant experience alongside ecological performance. Overall, the findings indicate that users in tropical corporate headquarters environments favour regenerative architectural elements that provide immediate, observable, and practical thermal comfort benefits. Consequently, architects and building designers seeking to implement regenerative design strategies in tropical office environments should prioritize passive climate-responsive interventions while integrating biophilic and ecological features as complementary components of a broader regenerative design framework.

4. Conclusion and Implications for Design Practice

4.1 Conclusion

This study assessed occupants' preferences for regenerative architectural elements and their perceived suitability for enhancing thermal comfort in selected tropical corporate headquarters buildings in Abuja, Nigeria. The findings reveal that occupants demonstrate strong preferences for regenerative architectural interventions that provide direct and observable thermal comfort benefits. Among the evaluated regenerative architectural elements, natural ventilation systems emerged as the most preferred feature, followed by daylighting strategies and shading devices. Indoor and outdoor vegetation, courtyards, vertical green walls, green roofs, and water features were also positively perceived, although they received comparatively lower preference ratings. Similarly, natural ventilation, daylighting, and shading systems were considered the most suitable regenerative interventions for improving thermal comfort within the buildings.

The findings indicate that occupants prioritize regenerative architectural features that directly influence airflow, temperature regulation, solar heat control, and indoor environmental quality. Features whose thermal benefits are immediately experienced by users received higher ratings than interventions whose impacts are less visible or indirect. This suggests that occupant perception plays an important role in determining the effectiveness and acceptance of regenerative architectural strategies. The study further demonstrates that passive regenerative design strategies remain highly relevant in tropical office environments. Occupants consistently favored architectural solutions that reduce dependence on mechanical cooling while simultaneously improving thermal comfort. Consequently, successful regenerative architecture within tropical corporate headquarters should not only pursue ecological performance objectives but should also respond to users' thermal comfort expectations and everyday experiences. Overall, the study contributes to the growing body of knowledge on regenerative architecture by providing an occupant-centered perspective on thermal comfort enhancement. While much of the existing literature emphasizes environmental performance

outcomes, the present study highlights the importance of understanding user preferences when designing regenerative office buildings in tropical climates.

4.2 Implications for Design Practice

The findings have important implications for architects, building designers, developers, and facility managers involved in the planning and operation of corporate headquarters within tropical regions. First, natural ventilation strategies should be prioritized during the design stage. Building orientation, cross-ventilation pathways, operable windows, atria, and ventilation corridors should be carefully integrated to maximize airflow and reduce cooling demands. Since occupants identified natural ventilation as the most preferred and most suitable regenerative intervention, its incorporation should form a fundamental component of regenerative office design. Second, daylighting should be considered a primary design strategy rather than a supplementary feature. Adequately sized windows, skylights, light shelves, and daylight-responsive building layouts can improve visual comfort while reducing reliance on artificial lighting. The high preference for daylighting observed in this study indicates that occupants value access to natural light as an essential component of workplace comfort.

Third, effective solar control systems should be incorporated into tropical corporate headquarters. External shading devices, façade articulation, deep overhangs, and climate-responsive envelopes can reduce solar heat gain and improve indoor thermal conditions. The strong preference for shading systems observed in this study reinforces their significance in tropical building design. Fourth, biophilic and ecological regenerative interventions such as landscape integration, green walls, and green roofs should complement rather than replace passive thermal comfort strategies. Although these features contribute to environmental performance and occupant well-being, the findings suggest that users perceive them as secondary to interventions that directly influence indoor comfort conditions.

Finally, occupant feedback should be incorporated into regenerative building evaluation and post-occupancy assessment processes. Understanding how users experience and perceive regenerative architectural features can help designers optimize future building projects and improve the long-term effectiveness of regenerative interventions.

4.3 Recommendations for Future Research

Future studies should investigate the relationship between occupants' preferences and objectively measured thermal performance indicators in regenerative buildings. Comparative studies involving multiple climatic zones may also provide deeper insights into how environmental context influences user perceptions of regenerative architectural elements.

Additionally, future research may explore the influence of demographic characteristics, organizational culture, and occupant behavior on preferences for regenerative design interventions. Such investigations would contribute to a more comprehensive understanding of occupant-centered regenerative architecture and support the development of climate-responsive office environments that effectively balance environmental sustainability and human well-being.

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