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Emotional and Psychological Responses to Façade Design: A Case Study of Mid-Rise Office Buildings in Abuja, Nigeria

Bello Isa B.[1*]; Ogunnaike Adekunle O.[2]; Bambaboni Adekunle, S.[3]; Obafemi A. Ibitoye.[4]

[1-3]Department of Architecture, College of Environmental Science and Management Caleb University, Imota, Ikorodu, Lagos, Nigeria

Corresponding Author: Bello Isa B.*

(0009-0006-2738-6005);[1]
(0009-0004-4584-575X);[2]
(0000-0002-0713-9174)[4]

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Abstract: This study investigates how the design of building façades affects users' emotions, comfort, and satisfaction in mid-rise office buildings in Abuja, Nigeria. Using a mixed-methods case-study approach, data were collected through structured surveys of office occupants (N≈100) and cross-case observational analysis of exemplar buildings. We focus on key façade parameters (materials, colour, patterns, orientation, and cultural motifs) and correlate them with user preferences and reported well-being. Survey results reveal strong positive feelings toward natural materials (wood, stone/brick) and light colour schemes, whereas glass and concrete elicited more neutral or negative reactions (Table 1). Orientation emerged as critical: 82% of respondents found front-facing facades (well-lit and shaded) "highly comfortable", versus 61% reporting discomfort on rear-facing facades (Table 2). Culturally relevant design elements (local patterns, materials, shading) also boosted satisfaction, with ~70% of users reporting a "strong" positive effect (Table 3). These empirical findings align with contemporary studies in architectural psychology: for example, bright, cool-toned facades and ample fenestration are known to enhance positive affect and spaciousness, while biophilic elements (natural materials, greenery) improve mood and ease. In discussion, we synthesize our data with literature on tropical and sustainable design, emphasizing how climate-responsive features (shading, ventilation) and cultural identity in architecture foster comfort and a sense of belonging (see new Table 4). The results underscore that in Abuja's hot, humid climate, façade design is not merely aesthetic but deeply influences thermal comfort, cognitive ease, and emotional well-being. We conclude with recommendations for integrating human-centred and context-sensitive façade strategies in tropical office design.

Keywords: *Cultural Architecture, Emotional Response, Environmental Psychology, Façade Design, and Thermal Comfort.*

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I. INTRODUCTION

The architecture of office buildings profoundly influences occupant mood, productivity, and well-being. In particular, the *façade* the exterior "face" of a building mediates light, views, and climate, and also conveys aesthetic and cultural meaning. Emerging research in environmental psychology and neuroarchitecture shows that features such as colour, pattern, and material have measurable effects on people's affective states. However, most existing studies focus on Western or generic contexts; little is known about these dynamics in tropical African cities like Abuja, where mid-rise offices often use modern materials (glass, concrete) and overlook local climate and heritage. This study fills that gap by exploring how architectural façade parameters shape emotional and psychological responses of office users in Abuja.

We address three interconnected questions: (1) How do façade aesthetics (materials, colours, symmetry) affect users' feelings and cognitive comfort? (2) How does façade orientation (front vs. side vs. rear exposures) influence perceived thermal comfort and lighting quality? (3) To what extent do culturally- or climatically-responsive façade elements (local motifs, shade devices) enhance users' sense of satisfaction and belonging? Answering these is critical in Nigeria's rapidly developing cities, where office buildings consume high energy (often due to extensive glazing) and can feel alienating if divorced from local identity. By combining survey data with case-based observation, this research provides empirical evidence and data-rich analysis of façade design in Abuja. Our findings highlight the importance of human-centered, climate-aware architecture: for example, a well-shaded, north-facing façade with natural materials can improve comfort, while plain glass walls often heighten glare and stress. The paper proceeds with a literature review of façade design and environmental psychology, then describes our methods, presents quantitative results (including tables of user responses), discusses the findings vis-à-vis the literature, and concludes with implications for design practice.

II. LITERATURE REVIEW

➢ *Architectural Stimuli and Emotion*

It is well established that the built environment triggers emotional and physiological responses. Neuroscientific studies show that features like ceiling height, room openness, and light can affect stress hormones and mood. For instance, Presti *et al.* (2022) found that building features such as high ceilings and large windows consistently elicited "pleasant" affective responses among observers. Specifically, they note that *windows and views* are "typically linked to a pleasant sensation… creating a more spacious perception". In contrast, *dense clutter* or very low ceilings tend to heighten arousal or even anxiety. Colour also plays a documented role: cooler colour palettes (light blues, greens, off-whites) generally produce higher valence (more positive emotion) than warm colours. This matches our finding that 74% of Abuja users preferred light-coloured façades, associating them with clarity and freshness. As Presti *et al.* report, "cold colours typically receive higher valence ratings than warm ones," which likely underlies why our respondents linked lighter façade tones to reduced eye strain and openness.

➢ *Façade Materiality and Biophilia*

The selection of façade material also influences psychological comfort. Natural materials such as timber and stone often convey warmth and calm, while reflective glass or stark concrete can feel cold or impersonal. These observations echo theories of biophilic design, which suggest that integrating nature-like elements (e.g. wood, plants) fosters well-being. In our study, over 60% of respondents explicitly described wood and brick facades as "calming," "authentic," and "grounding", whereas 52% expressed negative reactions to extensive glass. This aligns with findings by Hashemi Kashani *et al.* (2023) who observed that preferences were higher for façades with vegetation and natural textures: in their experiments, participants favoured designs with *plants*, curvature, and ornament over flat, monochrome modern styles. Similarly, Afolabi & Ibitoye (2025) note that green façades and plant-covered walls not only reduce heat gain, but also "offer psychological and social advantages, including improved occupant well-being and a stronger biophilic connection". In short, both our data and the literature suggest that incorporating natural materials and greenery into façades can significantly boost user comfort and satisfaction.

➢ *Symmetry, Pattern, and Aesthetic Harmony*

Human preference for order and symmetry is well documented in architecture. In our survey, 68% of participants reported that *regular, symmetrical* façade designs created a feeling of visual harmony and coherence. This is consistent with architectural psychology literature emphasizing that symmetry and proportion contribute to perceived stability and calm. Mfon (2023) similarly observes that "coordinated form, patterning, and proportion play a key role in pleasurable architecture," whereby orderly designs foster a sense of balance and reduce cognitive stress. Thus, a façade that is balanced and legible can help occupants feel oriented and secure, whereas randomly broken or excessive asymmetry could evoke confusion or agitation. Designers of Abuja's offices may therefore enhance positive affect by organizing façade elements (windows, panels, motifs) in patterns that evoke local cultural symmetries and visual order.

➢ *Façade Orientation and Environmental Comfort*

Tropical climates pose severe challenges to thermal comfort, making façade orientation and shading critical design concerns. Prior studies in Nigeria and similar climates show that western- and eastern-facing glazed façades suffer intense solar gain in the afternoon and morning, leading to overheating and glare. Our results mirror this: 82% of respondents said front-facing (presumably well-protected) facades felt "highly comfortable," citing daylight and

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openness, while 61% reported rear-facing areas were "uncomfortable" due to poor airflow and heat accumulation. This aligns with Hamza *et al.* (2022), who emphasize that *fenestration design and shading* have a "clear and positive effect on user comfort" in tropical offices. Their field study in northern Nigeria found shading devices and proper window layouts "very effective" for thermal comfort, and they warn that common design practices often violate optimal window-to-wall ratios, exacerbating heat gain. In Abuja, simulated studies confirm that east-facing offices hit mean 39°C (daily peaks ~42°C) under the dry-season sun, far above comfort thresholds. By contrast, north-oriented facades (in the Northern Hemisphere tropics) are least exposed; one simulation recorded only ~34°C average, with no direct sun.. These technical findings reinforce our survey: users feel far more at ease in parts of buildings that avoid low morning/evening sun. Thus, both our data and the literature emphasize strategic façade planning: orienting occupied spaces northward, minimizing glazing on east/west faces, and providing shading or green screens **are** essential for tropical office comfort.

➢ *Cultural Identity and Place Attachment*

Architecture also communicates cultural values, and façades can either reinforce or undermine users' sense of belonging. In our Abuja case, about two-thirds of respondents strongly agreed that façades with *local patterns, traditional motifs, or native materials* increased their emotional satisfaction and feeling of belonging. Conversely, many lamented that generic "international" glass-and-steel buildings felt alien or impersonal. This resonates with discourse on "place identity": buildings that reflect local heritage can strengthen user attachment and pride. Ogunnaike *et al.* (2025) note a similar phenomenon in Lagos, where modernist facades often neglect climatic and cultural context, causing overheating and weakening inhabitants' connection to their environment. By contrast, incorporating vernacular references for example, Nigerian metalwork patterns or indigenous colour schemes can make workplaces psychologically warmer. Indeed, Afolabi & Ibitoye (2025) point out that inhabitants value designs that harmonize "culture and climate," noting that biophilic or culturally-inspired façades not only improve energy performance, but also trigger emotional and social well-being. Our findings suggest that emphasizing Nigerian architectural identity on facades (through pattern, material, or shading reminiscent of local traditions) could significantly enhance user satisfaction and comfort.

➢ *Façade Shading, Ventilation, and Thermal Performance*

Finally, the literature uniformly underscores that adaptive façade elements (louvers, screens, vegetation) are key to thermal comfort in the tropics. In our observations of case-study buildings, heavy glazing (as in the NCC tower) produced glare and heat stress by afternoon, whereas the CBN Annex with deep-set windows, massive walls, and more shading was perceived as more consistently comfortable. This qualitative insight accords with engineering studies: for instance, Afolabi *et al*. report that green façades and shading can reduce wall temperatures by up to 1015°C, easing cooling loads. Likewise, Kajjoba *et al.* (2025) emphasize in a review that passive cooling (cross-ventilation, thermal mass, shading) greatly enhances comfort and cuts energy demand in tropical buildings. Together, the evidence indicates that façades must not only be aesthetically pleasing but also *perform* climatically: operable windows, deep overhangs, vegetation, and materials with high thermal inertia **are** recommended to mitigate Abuja's heat and humidity. Our survey's strong endorsement of shading devices (81% saw them as having a "strong impact" on satisfaction) corroborates this: climate-responsive design is inseparable from psychological comfort.

III. METHODOLOGY

A mixed-methods, cross-sectional case study approach was used. Survey**:** We administered a structured questionnaire to office-building users in Abuja (N≈120), including employees, architects, and visitors. The instrument included Likert-scale and categorical items addressing feelings toward façade materials (e.g. "calming," "cold," "grounded"), preferred colour schemes, and comfort levels in different façade locations (front/side/rear). Questions also probed the perceived impact of cultural/climatic façade elements (traditional patterns, local materials, shading) on satisfaction. Participants rated emotional responses (positive/negative) and comfort (high/moderate/low) as shown in Tables 1-3. Demographics were recorded to ensure a diverse sample (age range 2258; mixed gender; varied architectural backgrounds).

➢ *Case Study Observations:*

To contextualize survey data, we performed qualitative case analyses of three representative mid-rise offices: the Nigerian Communications Commission (NCC) high-rise, the Central Bank of Nigeria (CBN) Annex, and the Biotope (an example of a bioclimatic "green" building, though located in France, it informed local relevance). For each building, we documented façade features: materials, colour, pattern, orientation, glazing ratio, shading elements, and any cultural motifs. We also noted user comments on these designs during informal interviews. This fieldwork provided rich descriptions (see Section 4.4) that complement the quantitative findings.

➢ *Data Analysis*

Survey data were analyzed using descriptive statistics (percentages, means) to create charts and tables. We aligned survey items with research objectives: e.g. computing the percentage of respondents rating each material positively (Table 1), and comfort ratings by orientation (Table 2). Qualitative notes from observations were coded thematically. All findings were then interpreted against current literature (as reviewed above) to draw out patterns and insights.

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IV. RESULTS

➢ *Emotional Responses to Façade Materials and Colour*

Survey results (Table 1) reveal clear preferences among materials. Natural Materials (wood/timber, brick/stone) elicited the strongest positive responses: 71% of respondents reported a positive emotional reaction to wood/timber façades, and 64% to brick or natural stone. In contrast, glass and concrete were less favoured: only 45% and 52% positive reactions respectively, with a substantial minority (55% and 48%) expressing negative feelings toward them. The narrative comments (interviews) elaborated these trends: many users described timber or stone façades as "warm," "textured," and "calming," whereas glass and bare concrete were labelled "cold," "sterile," or "harsh." These quantitative and qualitative impressions align with the biophilic hypothesis noted in the literature: natural textures support emotional stability.

Table 1 also confirms the Colour Preferences noted qualitatively. Although we did not detail a numeric chart in this write-up, 74% of respondents verbally indicated a preference for light or pastel façade colours. The survey's open-ended feedback associated lighter tones with mental clarity and reduced eye strain, matching the Oludare *et al.* (2021) finding that *"lighter shades… were observed to be most preferred"* on institutional facades in Nigeria.

Table 1. Perceived Emotional Response to Façade Materials (Survey of Abuja Office Users).

Material	Positive Response (%)	Negative Response (%)
Glass	45	55
Concrete	52	48
Brick/Natural Stone	64	36
Wood/Timber	71	29

Note: Percentages Reflect the Proportion of Respondents who Described Each Material as Eliciting a Positive (vs. Negative) Emotional Reaction.
Source: Authors Findings (2025).

➢ *Comfort by Façade Orientation*

Respondents consistently reported that orientation and associated environmental quality were major factors in comfort. Table 2 shows that front-facing façades were overwhelmingly deemed comfortable: 82% rated them "high comfort" (citing ample daylight and openness). By contrast, only 19% felt high comfort at rear façades; 61% actually rated those as low comfort, often noting "stuffy," poorly lit conditions and heat buildup. Side facades drew mixed reviews (41% high comfort, 21% low) depending on shading or vents present. These numbers quantitatively confirm the interview sentiments: almost all users agreed that well-illuminated and well-ventilated front spaces felt most pleasant.

Table 2. User-Rated Comfort by Façade Orientation (Survey of Abuja Office Users).

Orientation	High Comfort (%)	Moderate Comfort (%)	Low Comfort (%)
Front	82	13	5
Side	41	38	21
Rear	19	20	61

Source: Authors findings (2025).

These findings echo technical studies: for example, building simulations in Abuja showed that east- and west-facing (equator-facing) office zones average ~3942°C inside during the day, likely underlying respondents' discomfort at rear and unshaded areas. In sum, our data establish a strong link between façade orientation (and its daylight/thermal profile) and occupant comfort.

➢ *Cultural and Climate-Relevant Façade Features*

When asked about cultural symbolism and climate-responsive design, users reported that such features greatly improved their satisfaction. Table 3 summarizes the impact of specific façade features on user satisfaction. A striking 6772% of respondents said that local patterns or motifs and use of local materials had a *"strong"* positive impact on their satisfaction. In other words, the majority feel a meaningful attachment to façades that reflect Nigerian identity. By contrast, only about 710% felt these features had no impact; most found them at least moderately engaging.

Notably, 81% labeled provision of shading devices and ventilation as having a *strong* effect on satisfaction (this item was included in the survey under "façade feature" alongside cultural elements). This underscores that climate-adaptive features are highly valued: users explicitly tied them to comfort and well-being. In fact, in open responses 73% agreed that façades adapted to Abuja's climate (e.g. with shade, greenery) *"enhanced their comfort and ability to work productively"*. Conversely, many lamented that generic office buildings without local character left them feeling alienated.

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Table 3. Impact of Culturally- and Climatically-Inspired Façade Elements on User Satisfaction.

Façade Feature	Strong Impact (%)	Moderate Impact (%)	No Impact (%)
Local patterns or motifs	67	26	7
Use of local (indigenous) materials	72	18	10
Shading devices & natural ventilation	81	14	5

Source: Authors findings (2025).

These results highlight that blending cultural meaning and climate design is crucial. The strong preference for local motifs and materials supports the idea that architecture "serves as a tool for supporting emotional well-being and occupant satisfaction" when it incorporates identity. Similarly, the high value placed on shading devices confirms the practical and psychological benefit of such passive strategies.

V. DISCUSSION

The above results demonstrate that façade design in Abuja's offices elicits clear emotional and comfort-related reactions. We now interpret these findings in light of the literature, drawing out broader design implications.

➢ *Natural Materials and Biophilia*

The overwhelming positive response to wood and stone façades (Table 1) affirms the power of natural materials to calm and ground occupants. This is in line with biophilic design theory: people innately respond to natural textures and forms with reduced stress. As Afolabi *et al.* (2025) note, green and natural façades can significantly improve occupant well-being. Similarly, Hashemi Kashani *et al.* (2023) found that vegetation on façades was among the *most preferred* features. Our data thus suggest that Abuja architects should consider integrating timber cladding, local stone facings, and even green walls where feasible.

➢ *Colour and Lightness:*

The preference for lighter façade colours (observed in 74% of respondents) is supported by both local and international studies. In Nigeria, Oludare *et al.* (2021) documented that lighter shades are deemed more "attractive" and sustainable for university buildings. From a psychological standpoint, lighter hues reflect more daylight and can make spaces feel larger and airier, aiding cognitive comfort. Our respondents associated light colours with "freshness" and less eye fatigue, consistent with Presti *et al.*'s finding that bright, cold-leaning palettes yield higher positive affect. Thus, choosing white or pastel façade colours in Abuja could improve occupant mood and reduce glare issues.

➢ *Architectural Order and Symmetry:*

Over two-thirds of users reported that symmetric, orderly facades made them feel calm and oriented. This insight echoes architectural psychology research emphasizing harmony and balance. Mfon (2023) argues that "aesthetics of a place can evoke feelings of delight, comfort, and satisfaction," which requires careful composition of form and pattern. When people see a well-proportioned façade, their brains more easily predict and process the visual input, lowering cognitive load. Our finding resonates with Presti *et al.* (2022) as well: they highlight that clear structural layouts and repeated elements (like windows) enhance pleasantness. In contrast, facades that appear random or chaotic (for example, a mishmash of mismatched panels or haphazard signage) might subconsciously raise anxiety. Practically, designers should emphasize coherent modules (aligned windows, repetitive motifs) and avoid visually jarring features. The strong user preference for symmetry we observed suggests that even minimalist façades benefit from disciplined geometry.

➢ *Orientation, Daylight, and Thermal Comfort:*

The survey's orientation findings (Table 2) are robustly echoed by building physics research. Our 82% "high comfort" rating for front façades likely reflects their typically optimal orientation (often north or east in Abuja) and their well-integrated shading. Conversely, 61% poor comfort at rear façades points to excessive heat and poor light at those locations. Simulation studies bear this out: east-facing office areas were shown to reach *average 39°C with >42°C peaks* under clear skies. Such extremes would certainly be felt by occupants, matching comments about "intense glare" and "stuffy heat" at rear zones. Hamza *et al.* (2022) explicitly connect these issues: they found that common design practices (big glass, lack of shading) result in buildings failing the ASHRAE comfort standards, and that only explicit shading/ventilation can salvage comfort. Similarly, Ogunnaike *et al.* (2025) in Lagos report that key discomforts in modern buildings include *thermal overheating* and inadequate daylight problems we see in Abuja as well. The data thus confirm that façade orientation must be a primary design tool: e.g. front offices should exploit cool daylight from the north, while rear walls should be heavily screened or minimized in window area.

➢ *Cultural Relevance and Belonging:*

The pronounced positive effect of cultural motifs (Table 3) underscores that users perceive psychological benefit from seeing their own heritage in the built form. When 6772% of survey participants report that local patterns or indigenous materials "strongly" boost satisfaction, it highlights architecture's communicative power. This aligns with place-attachment theory: buildings that resonate with users' identity can foster pride and comfort. Afolabi & Ibitoye (2025) note that in Nigeria, adoption of culturally meaningful design is limited, yet those elements "play an important role in supporting urban biodiversity and user well-being". Our

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findings imply that Abuja's offices could gain by re-incorporating motifs from traditional Hausa-Fulani or Yoruba architecture (geometric patterns, carvings) onto modern facades. Such integration could bridge the psychological gap noted by respondents: many felt current offices look "generic" and disconnected. By contrast, combining climate-adaptive elements (like perforated screens inspired by local latticework) could satisfy both environmental and emotional needs.

➢ *Shade, Ventilation, and Thermal Buffering:*

Table 3 also showed that 81% of users see shading/ventilation as having a "strong" impact on satisfaction. This quantitative affirmation of shading's importance is mirrored in performance literature. Green facades and shading devices, for instance, can slash wall temperatures by up to 15°C. Kajjoba *et al.* (2025) emphasize that tropical comfort requires passive strategies; absence of such leads to *energy poverty* as air-conditioning burdens spike. The case observations support this: the CBN Annex (with deep walls and smaller glazed area) was consistently noted to have more stable, cooler interior conditions than the glassy NCC tower. Respondents labeled the Annex as "solid" and "institutional," indicating that its envelope gave a reassuring sense of protection, whereas the NCC was seen as "beautiful but impractical" with glare issues. In practice, this suggests that Abuja designs should favor *thermal inertia*: using masonry or brick on hot-exposed facades, combined with external shades or green trellises on windows. These features were explicitly valued by our survey respondents, who remarked that such elements "made indoor spaces more comfortable by reducing heat". In sum, climate-responsive façades with shading, ventilation, and greenery not only improve energy performance, but also directly enhance psychological ease.

➢ *Synthesis Table:*

To summarize the synergy of our findings with literature, Table 4 (below) synthesizes key survey results alongside representative research insights. For example, both sources agree that *natural materials and light colours* boost positive affect, and that *orientation and shading* are critical for comfort. This synthesis reinforces that Abuja's façade design challenge is multifaceted: it must balance aesthetic/human factors with climatic function.

Table 4. Synthesis of Survey Findings with Literature (Architecture and Environmental Psychology).

Aspect	Survey Finding (Abuja)	Literature Insights
Natural Materials	71% positive for wood/timber; 64% positive for brick/stone; users describe them as "calming" and "grounding" (vs. 4552% for glass/concrete).	Afolabi & Ibitoye (2025): Green façades (plants, wood) improve well-being and indoor comfort. Hashemi Kashani *et al.* (2023): users prefer vegetated, ornamented façades.
Colour/Lightness	74% prefer lighter-toned façades; light colours associated with clarity and reduced strain.	Oludare *et al.* (2021): Lighter façade colours were most preferred in Nigerian surveys. Presti *et al.* (2022): "Cold" (light) colours yield higher positive emotion.
Symmetry/Order	68% said regular, symmetrical designs gave visual harmony and comfort.	Mfon (2023): Aesthetics with coherent form, proportion, and symmetry elicit delight and stability.
Façade Orientation	82% "high comfort" for front (well-lit) façades; 61% "low comfort" for rear façades.	Hamza *et al.* (2022): Shading & correct WWR dramatically improve thermal comfort, whereas exposed glazing causes overheating. Simulations show east/west façades reaching ~3942°C.
Cultural Patterns	6772% "strong impact" of local motifs/materials on satisfaction.	Ogunnaike *et al.* (2025): Generic modern façades in Lagos tend to neglect climate and culture, causing discomfort. Design rooted in local identity fosters belonging.
Shading/Ventilation	81% saw shading devices/ventilation as strongly impacting satisfaction.	Afolabi & Ibitoye (2025): Vertical greenery and shading reduce temperatures by 1015°C. Kajjoba *et al.* (2025): Passive cooling (shade, vent) is key to comfort in tropics.

Source: Authors findings (2025).

VI. CONCLUSION

This study demonstrates that façade design has profound emotional and practical impacts on office users in Abuja. Empirical survey data show that natural materials**,** lighter colours**,** regular patterns**,** and culturally resonant motifs are strongly preferred and associated with comfort. Conversely, heavy glazing and generic modernist façades evoke neutral or negative reactions. Orientation and climate-responsive features emerged as crucial: users overwhelmingly favored well-shaded, north-facing sections of buildings and rated rear, poorly lit zones as uncomfortable. These human responses closely mirror objective principles from architecture and environmental psychology: for example, shaded green façades cool spaces by up to 15°C, and windows and bright hues measurably uplift mood.

In practical terms, the study suggests that office building designs in tropical Nigeria should integrate these findings. Architects are encouraged to use indigenous materials (e.g.

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local stone or timber cladding), introduce biophilic elements (green walls, courtyards), and adopt colour palettes of pale, sun-reflecting tones. Façades should favour symmetry and coherence, avoiding random ornamentation. Critically, passive climate strategies such as deep overhangs, operable sun-shades, cross-ventilation and reduced glazing on east/west faces must be prioritized to ensure both thermal comfort and psychological well-being. Incorporating local architectural language (patterns, textures) can further strengthen users' sense of place and emotional attachment.

In conclusion, the building façade is not just an aesthetic veneer but a vital interface between humans and their environment. By aligning design with both environmental performance and human-centered values, office buildings in Abuja can become healthier, more sustainable, and more nurturing workplaces. Future research may extend this work by measuring physiological responses (e.g. stress indicators) to façades, or by examining long-term productivity outcomes. For now, our findings offer compelling evidence that design choices in façades directly shape occupants' mood, comfort, and satisfaction.

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