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Balancing Architectural Expression and Climatic Responsiveness in Tropical Climate: A Case-Study Evaluation of Glazed Office Façades in Lagos, Nigeria

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Abstract

The issue of finding balance between architectural expression and effective climatic performance in tropical high-rise buildings continues to be problematic. The paper presents a comparative analysis of two LEED Gold certified office towers (Heritage Place and Kings Tower) in Ikoyi, Lagos, Nigeria. Drawing on architectural phenomenology, the research the research aims at identifying the influence of facade design and spatial organization on environmental performance and users' perception. Through physical observation over one week and content analysis of the building, the study found that while high façade transparency delivers excellent daylight, it causes unpleasant glare and thermal conditions unless moderated by deliberate passive strategies. In comparison with Heritage Place and its curtain wall facade, the perforated aluminum screen and curvilinear shape of Kings Tower that was inspired by sails of the boats in the Lagos Lagoon proved to be much more climate-responsive and provided a comfortable internal environment. The results show that successful tropical facade design is the result of the combination of material expression, spatial logic and climatic responsiveness. Practical recommendations for architects and policymakers working in Lagos are suggested.
Keywords: Architectural phenomenology, Climatic Responsiveness, Glazed façades, Tropical high-rises, Lagos Nigeria

1. Introduction

Contemporary high-rise office buildings make use of glazed façades as means of expressing corporate image and achieving the maximum daylight penetration. Moreover, being the mediator between the indoor and outdoor environments, the façade influences environmental performance in terms of daylighting, thermal comfort, energy consumption and the overall spatial experience of the building. Thus, the problem faced by architects, especially in tropical areas, is not only the construction of the attractive building but its climatically adequate architecture. This question becomes more relevant with the development of sustainable city policy amid the growth of environmental pressures (Lipowicz-budzy, 2024; Talamini et al., 2023). Glazed curtain-wall system became a typical element of the architecture of office buildings around the world. With the help of advances in glazing technology (*insulated glazing units, Low-E coatings and solar control glazing*), it became possible to admit daylighting while decreasing the amount of heat transfer (Priya et al., 2024; Tabadkani et al., 2021; Usta & Zengin, 2022). With proper spatial organization and arrangement of circulation paths, this system helps to increase the environmental performance and occupant well-being (Adel & Sheta, 2025; Ilgın & Aslantamer, 2024; Latha et al., 2023). Despite all the advantages, in the conditions of the hot-humid tropical climate, high glazing often results in excessive solar heat gain, increase in cooling loads, visual discomfort caused by glare and greater use of mechanical air conditioning system in case of insufficient incorporation of the passive environmental strategies (Desiana et al., 2025; Dimson et al., 2023; Wu et al., 2025).

Lagos, Nigeria, represents a fascinating case being one of the fastest-growing megacities in Africa, marked by rapid urban transformation and modern architectural development but also with inadequate basic services and increasing strain from climate change. The high density of the city combined with limited and costly land on which development is allowed in the commercial district results in many building development spreading upward rather than outward. Thus, this has brought about a noticeable increase in vertical development projects. Heavily glazed and a great deal of modern envelope technologies illustrate the corporate internationalist aesthetics found in a lot of these Lagos high rises (Arenibafo, 2017). However, arising from the hot-humid tropical climatic condition of the city, great reliance is always placed on mechanical cooling to achieve thermal comfort for the users (Abdullahi et al., 2025). In turn, Nigeria's energy supply challenges makes intentional façade design and passive strategies more important in cities like Lagos than in places with stable cooling infrastructure. Thus, in tropical climate, façade design constitutes a crucial factor which determines operational

performance and effectiveness of buildings that frequently lies on carefully modulated façade elements and spatial configuration (Wang et al., 2025; Wu et al., 2025).
Recently published empirical studies on high-rise glass facades in Lagos provide some somewhat useful insights but are rather not deep at a systemic and methodological level. Adebamowo & Oluwatosin (2025) evaluated Kings Tower through Mahoney Tables approach which was initially developed for low-rise buildings. At the same time, Ajibola et al., (2024) examined facade strategies in Eko Atlantic City, but mostly paid attention to the intentions and design qualities of façades. Therefore, the majority of the available researches focus either on the technical performance or architectural appearance of high-rise buildings separately. Such an approach does not give the full picture of the way how façade expression and its interaction with the spatial configuration affect the environmental experience of users. It makes it impossible to develop integrated approach to the design that would combine the aesthetic qualities and climatic responsiveness of tropical high-rise buildings. For addressing this gap, the study offers the comparative case study of two LEED Gold certified office towers located in Ikoyi, Lagos. Using architectural phenomenology as the framework of the analysis, the study develops the framework which allows analyzing the relationships between architectural expression, spatial configuration and environmental performance.
The main goals of the study are to:

i. analyze the architectural expression of the chosen office buildings;
ii. examine the spatial configuration of the buildings; and
iii. interpret the ways how architectural expression and spatial configuration influence environmental performance in the tropical climate.

This study contributes to the growing discourse on sustainable tropical architecture by demonstrating that architectural expression and environmental performance should be understood as complementary rather than competing design objectives. The findings provide practical guidance for architects, developers, planners, and policymakers involved in the design of climate-responsive high-rise buildings in Lagos and other rapidly urbanising tropical cities.

2. Literature Review

2.1 Glazed office façades and responsiveness to tropical climate conditions

The increased use of glazed façades has brought about changes to the image of contemporary office buildings throughout the world. Translucency, reflectance, and lightness of façade systems have become distinctive elements of corporate architecture since they express modernity, ensure optimal daylight penetration and create open spaces (Lipowicz-budzy, 2024; Talamini et al., 2023). The development of insulation properties of glazing units, low-e coatings, spectrally-selective glasses, and dynamic façade systems has made it even easier for architects to incorporate glazing into their designs in an attempt to improve building performance and occupant comfort (Priya et al., 2024; Tabadkani et al., 2021; Usta & Zengin, 2022). However, the environmental performance of glazed buildings is still a matter of concern when it comes to tropical climates. Intense solar radiation and humidity often cause overheating of rooms due to excessive heat gains, increased demand for cooling systems, visual discomfort due to glare and irregular daylighting without proper modulation through passive environmental design (Desiana et al., 2025; Dimson et al., 2023; Wu et al., 2025).
Recent studies have shown that the use of external shading devices, optimal window-to-wall ratio, façade orientation and implementation of passive cooling techniques is much more efficient than the employment of innovative glazing only (Mangkuto et al., 2022; Wang et al., 2025). In Nigeria, there is little information regarding research conducted in the field of climate-responsive façades. The research conducted there until now is mostly related either to evaluation of specific technologies of façades or analysis of single buildings based on the criteria of technical performance. For example, Adebamowo & Oluwatosin (2025) assessed Kings Tower using the Mahoney Tables, while Ajibola et al., (2024) analyzed sustainable façade strategies in Eko Atlantic City. Despite the fact that the above-mentioned research has been helpful in gaining knowledge regarding climatic performance of the studied façades, architectural and spatial aspects receive comparatively less attention from researchers.

2.2 Theoretical and Conceptual Framework

This study builds on the foundation of architectural phenomenology, an approach which views architecture not as something visually designed but as a lived, sensory experience. Based on the works of Edmund Husserl (1976) and Martin Heidegger (1971), architectural phenomenology states that human understanding of architecture arises from the experience and perception of place as opposed to purely visual observation. In architectural literature, this philosophy was further developed by Christian Norberg-Schulz (1980) who introduced the concept of *genius loci.* Accordingly, he claimed that good architecture should support people's sense of belonging and fit the environment and culture in a proper way. Juhani Pallasmaa (2005) also stated that architecture should use all human senses instead of focusing exclusively on vision since it is not light and sight but light, temperature, texture, sound and motion altogether that shape our perception of space. The above concepts are especially relevant to tropical architecture due to the influence of environmental conditions, such as sunlight, humidity, airflow and thermal variations on the quality of the spatial experience. According to phenomenology, façade design serves not as an enclosure or visual medium, but as a mediator between the occupants and the environment. Therefore, transparency, shading, material and spatial configuration affect not only the environmental performance but also the perceived comfort and place.
Based on the reviewed theories, this study views the architectural performance as the combination of the four factors mentioned before. The façade performance will be evaluated in terms of transparency, reflectivity and architectural identity (Baper, 2024; Tennakoon et al., 2024; Joslyn & Abdelwahab, 2025; Lim et al., 2026). In turn, spatial configuration will be assessed in terms of core positioning, perimeter allocation, plan depth and circulation strategy (Latha et al., 2023; Ilgın & Aslantamer, 2024; Adel & Sheta, 2025). The combination of these factors will result in various environmental

performance outcomes, the quality of daylight, glare, thermal comfort and adaptability of the occupants to changing environmental conditions (Desiana et al., 2025; Lim et al., 2026). Unlike conventional evaluation approaches that focus only on technical performance, the present framework integrates environmental, spatial and experiential aspects into a single evaluation model. This allows obtaining a more comprehensive understanding of climate-responsive high-rise buildings in tropical areas.
Figure 1 show the conceptual framework, which serves as a practical analytical tool for evaluating how contemporary high-rise glazed buildings react to local climate.

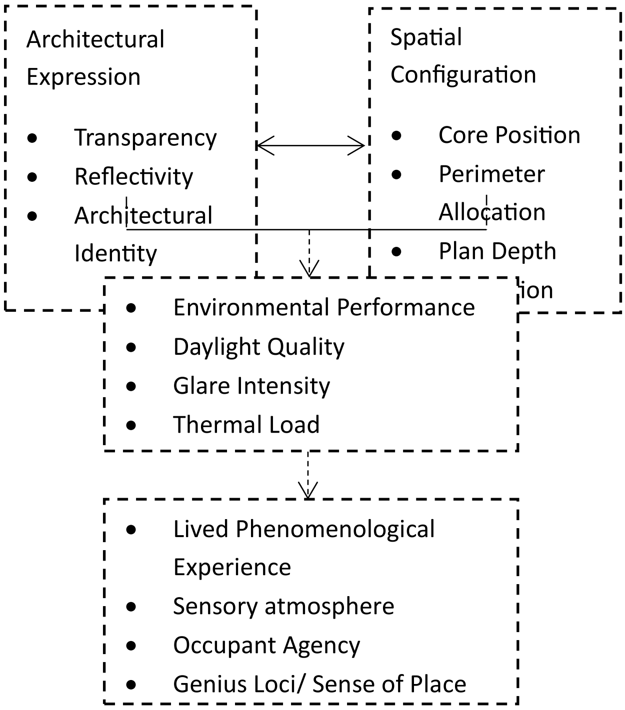

Figure 1. Conceptual Framework:
(Source: Authors, 2026).

2.3 Research Gap

The above review shows that much progress has been achieved in terms of the façade technologies and environmental performance of tropical buildings. However, despite the number of scientific works in this area, the majority of previous studies focused either on the technical performance, energy efficiency or the architectural appearance separately.
Moreover, while there is increasing research on climate-responsive façades in Nigeria, it remains largely descriptive and building specific without phenomenological considerations.

3. Materials and Methods

3.1 Design

The current research used a comparative qualitative case study approach based on architectural phenomenology and aided by the qualitative content analysis technique. The comparative case study approach seemed appropriate for the research since it allows for detailed analysis of similarities and differences between buildings that exist in the same environment without oversimplifying the cases involved. Unlike experimental and simulation studies that focus on quantifying façade performance using instrument measures, the current research aimed at interpreting the impact of architectural expression and arrangement on environmental performance and the experiential aspects of the occupants of buildings in a tropical environment.
Architectural phenomenology acted as the interpretive framework which focused on understanding the way in which architectural attributes such as façade transparency, material expression, spatial arrangement, lighting and thermal perception contribute to sensory experiences of architectural space by the users.

3.2 Study Context and case study selection

The research took place in Ikoyi, Lagos State, Nigeria (see Figure 2), one of the leading commercial areas known for its upscale office buildings and rapid vertical development. Lagos has a hot-humid tropical climate marked by high annual temperatures, high humidity levels, strong solar radiation, and relatively minor seasonal temperature fluctuations. These climatic factors underscore the significance of façade design in influencing indoor environmental quality and energy efficiency.
The study focused on two office buildings: Heritage Place and Kings Tower. These buildings were chosen based on four specific criteria:

1. LEED Gold certification, reflecting acknowledged sustainability standards;

2. Location within the same microclimate on Alfred Rewane Road, Ikoyi;
3. Extensive use of glazed façade systems; and
4. Different architectural strategies for designing climate-responsive façades.

The selection of buildings within the same microclimate helped reduced environmental variability, enabling the differences observed to be attributed mainly to architectural design instead of climatic factors.

Figure 2. Location map of Heritage Place and Kings Tower along Alfred Rewane Road, Ikoyi, Lagos
Source: Adapted from Google Maps (2026).

3.3 Data Collection and Analysis

Primary data were sourced through systematic field observations conducted over one week during morning, afternoon and evening periods to capture temporal variations in daylight condition, thermal perception, glare patterns, and adaptive responses. The observation tool focused on façade characteristics, spatial organization, environmental conditions, and occupant interaction with environmental control systems like shading devices and blinds. Structured field notes, and reflective memos were documented immediately after each observation session.

Secondary data were collected from the facility brochures containing floor plans, interior and exterior views, and material specification. These documents supported interpretation of spatial configuration and verified observations recorded during the field visits.

3.4 Evaluation framework

Building performance was assessed using an analytical framework developed from past studies on façade performance, spatial configuration, and environmental comfort. The framework is presented in Table 1. Each variable was assessed using clearly defined descriptive criteria rated on a 3-point ordinal scale (1= Low/Weak, 2= Moderate, 3 = High/Strong). The scale was adopted due to the study's focus on facilitating systematic comparison while preserving the qualitative and interpretive nature of phenomenological inquiry rather than generating statistically comparable measurements.

Table 1: Evaluation Framework.

Anchor Literature	Design Variables	Indicators	Rating
(Elmoghazy & Afify, 2023; Miloudi & Biara, 2026)	Façade Transparency Architectural Identity Reflectivity	Architectural Expression	Low / Moderate / High Weak / Moderate / Strong Weak / Moderate / Strong
(Latha et al., 2023; Ilgın & Aslantamer, 2024)	Core positioning Perimeter allocation Plan depth Circulation strategy	Spatial Configuration	Low / Moderate / High Low / Moderate / High Shallow/Moderate/Deep Weak / Moderate / Strong
(Desiana et al., 2025; Lim et al., 2026)	Daylight Quality Glare Intensity Thermal Load User Environmental Control	Environmental performance	Weak / Moderate / Strong Weak / Moderate / Strong Low / Moderate / High Weak / Moderate / Strong

4. Results

4.1 Heritage Place

Heritage Place is a rectilinear 14-storey office tower featuring an extensive fully-glazed curtain wall with high-performance double-glazed insulated glass units (see Figure 3). Located at the busy Alfred Rewane Road and Lugard Avenue intersection, the building has multiple exposed orientations. The repetitive modular grid and reflective surface project a confident, minimalist international corporate identity. Over the course of the week, the interior experienced strong daylight penetration in the mornings, filling open-plan workspaces with bright, energising light. However, as the sun moved westward in the afternoons, harsh direct rays penetrated deep into the perimeter zones, creating intense glare on computer screens and reflective surfaces. Occupants responded by adjusting the blinds and in some cases moving their desk away from the rays. Also, elevated temperature was noticed in the perimeter zones despite the central air-conditioning. The overall atmosphere conveyed efficiency and an experience of visual abundance paired with bodily discomfort by late afternoon.

The spatial layout as seen in the typical floor plans (see figure 4) shows a central service core that holds shared facilities, surrounded by open-plan office areas positioned along the fully glazed perimeter. Circulation and service areas were concentrated internally, leaving outer edges free for main uses. However, the floor plans do not explicitly express significant façade modulation or recesses. Table 2 present the evaluation of Heritage Place.

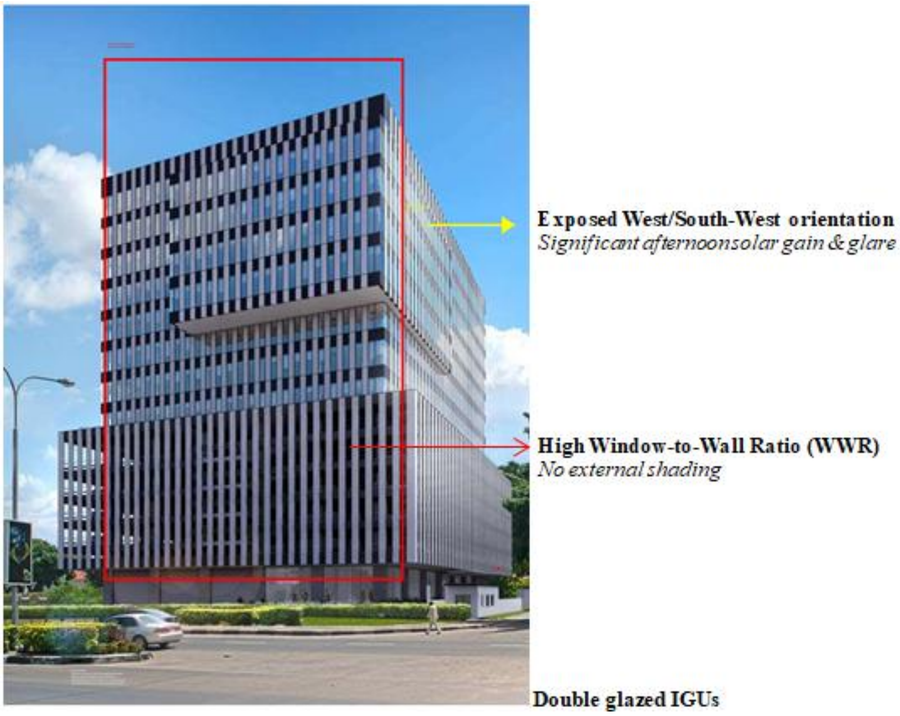

Figure 3: Fully glazed curtain wall façade of Heritage Place
(**Source:** Heritage Place Brochure, 2026; annotations by authors).

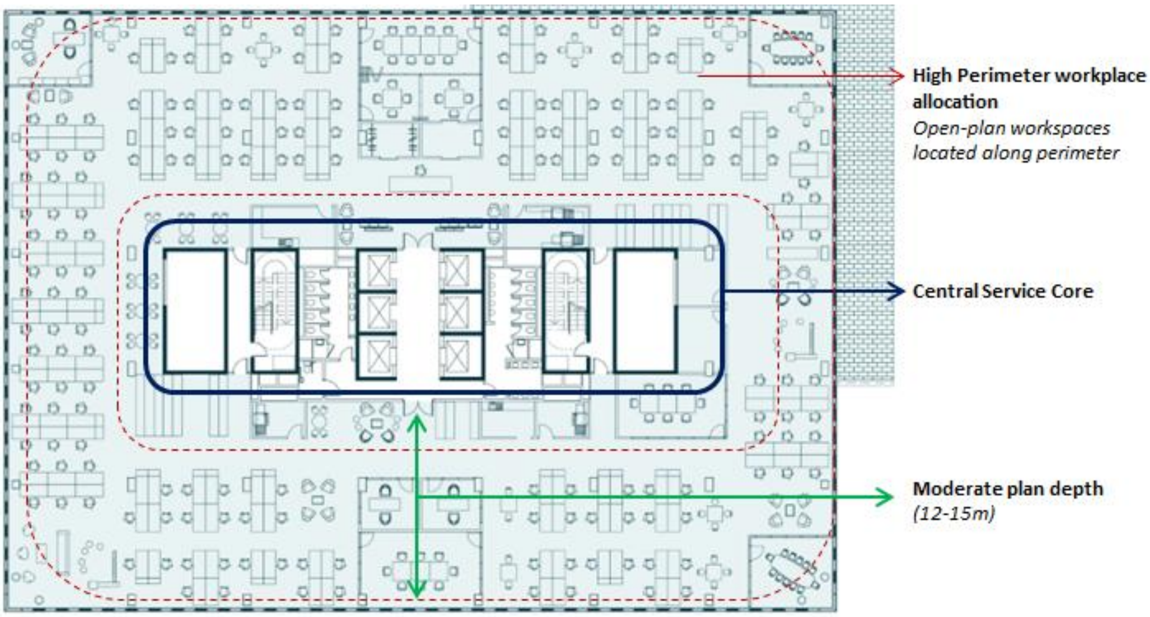

Figure 4: Typical floor plan of Heritage Place showing central service core and high perimeter workspace allocation.
(**Source:** Heritage Place Brochure, 2026; annotations by authors)

Table 2: Synthesized Evaluation Summary, Heritage Place.

Category	Design Variables	Indicators	Rating (1-3)	Key Observation Across One Week	Phenomenological Interpretation
Architectural Expression	Façade Transparency	Extensive curtain wall glazing	3	Consistently high transparency throughout the week	High visual openness but climatically aggressive
	Architectural Identity	Corporate International style	3	Uniform appearance across all days	Strong global identity, weak local connection
	Reflectivity	Moderate light reflectance	2	Noticeable specular reflection, especially afternoons	Moderate - glare hotspots intensified under direct sun
Spatial Configuration	Core positioning	Central Service Core	3	Consistent spatial efficiency observed daily	Strong – maximizes perimeter exposure
	Perimeter allocation	High perimeter workspace exposure	3	Majority of workspaces along façade on all floors	High – strong daylight access but high exposure
	Plan depth	Moderate plan depth	2	Daylight faded noticeably toward core in afternoons	Moderate – acceptable but uneven distribution
	Circulation strategy	Core-dominant circulation	3	Efficient movement but limited experiential variety	Strong functionality, low spatial richness
Environmental performance	Daylight Quality	Indoor daylight availability	3	Strong in mornings; declined significantly in afternoons	Strong overall but highly time-dependent
	Glare Intensity	Visual discomfort from direct sun	2	Low in morning; moderate to high in afternoon (esp. west)	Moderate – clear daily pattern of discomfort
	Thermal load	Solar heat gain near perimeter	3	Increased thermal discomfort from midday onward	High – consistent rise in perceived heat
	User Environmental Control	Occupant adaptability (blinds, repositioning)	2	Frequent reactive adjustments observed daily	Moderate – occupants constantly compensating

4.2 Kings Tower

The Kings Tower is made of an architectural sculpture with curved shape and low-E double glazing, protected by the external perforated aluminum screen. The uniqueness of such an unusual building is determined by its resemblance to boat sails at Lagos lagoon. At the moment of my visit, the external perforated screen efficiently diffused the rays of sunlight, which provided soft and even illumination and created smooth transitions between light and shadow that were constantly changing during the whole day. Even at the period of intense sunlight, there was no glare at all. The users looked quite comfortable, moving the perforated blinds or choosing seats according to their needs concerning the amount of light. The atmosphere of the room was very tranquil and meditative, creating a great connection with the lagoon environment through filtering views.

Observation of the spatial organization as seen across the typical floors (level 3- 14), shows that spaces are wrapped around a central service core, with high perimeter allocation enhanced by the curved façade (refer to Figure 5). Due to the curvature, kings tower seem to have a more dynamic spatial depth across levels. In terms of circulation strategy, the building is centralized and vertical-core based, as seen in the arrangement of the 4 passenger elevators, fire escape, and service lobbies integrated within the core. No perimeter circulation corridors were seen. Table 3 shows the researcher's assessment of Kings Tower building.

Table 3: Synthesized Evaluation Summary, Kings Tower.

Category	Design Variables	Indicators	Rating (1-3)	Key Observation Across One Week	Phenomenological Interpretation
Architectural Expression	Façade Transparency	Filtered transparency via perforated screen	2	Consistent filtered light across all weather conditions	Moderate – well-balanced permeability
	Architectural Identity	Sculptural, lagoon-inspired curvilinear form	3	Strong contextual presence maintained daily	Strong – *embodies genius loci*
	Reflectivity	Low due to external shading layer	1	Minimal reflection even during peak sun hours	Low – highly effective modulation
Spatial Configuration	Core positioning	Centralised Core	3	Optimized perimeter exposure consistent daily	Strong
	Perimeter allocation	Enhanced by curved geometry	3	Increased usable façade interface across floors	High
	Plan depth	Shallow-to-moderate optimised depth	3	Even daylight distribution maintained throughout the day	Strong
	Circulation strategy	Integrated/mixed circulation zones	3	Supported varied movement and social interaction	Strong
Environmental performance	Daylight Quality	Diffused daylight penetration	3	Soft, consistent diffusion across morning to afternoon	Strong – stable and comfortable
	Glare Intensity	Reduced visual discomfort	1	Minimal glare observed even in peak afternoon hours	Low – well controlled

	Thermal load	Reduced solar heat gain	1	Stable thermal conditions throughout the week	Low – effective passive control
	User Environmental Control	Enhanced adaptive comfort	3	Intuitive, less frequent adjustment needed	Strong – high occupant agency

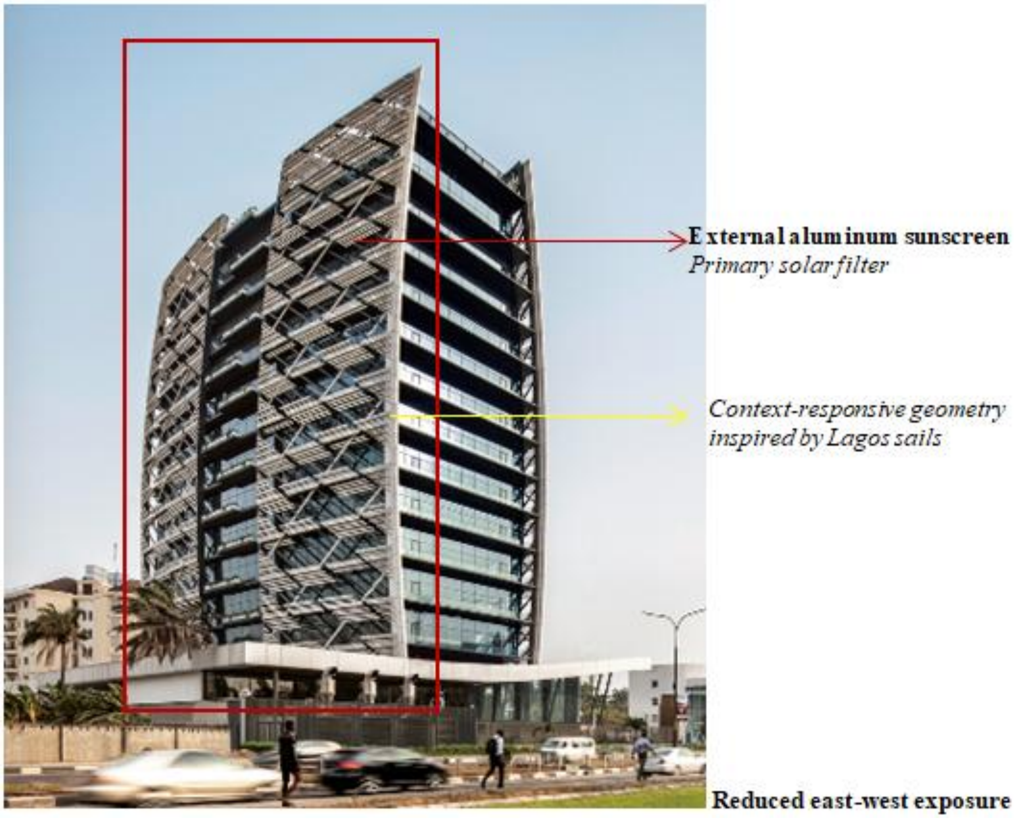

Figure 5. The perforated aluminum sunscreen and curvilinear façade of Kings Tower
(**Source:** Kings Tower Brochure, 2026; annotations by authors).

Figure 6. Typical floor plan of Kings Tower showing optimized curved geometry, enhanced perimeter allocation, and balanced plan depth
(**Source:** Kings Tower Brochure, 2026; annotations by authors).

4. Discussion

4.1 Architectural Expression and Climatic Responsiveness

In this research, the interrelationship of architectural expression and spatial configuration in creating climatically responsive glazed facades was explored through the phenomenological comparison of Heritage Place and Kings Tower located in Lagos, Nigeria. The results demonstrate that the environmental performance of glazed high-rise buildings depends not on the transparency of façade but on the combination of architectural expression and appropriate passive design strategies for achieving climatic responsiveness of the building. According to the results of the comparative analysis, despite having the same function, location and sustainability credentials, the case study buildings show different performance due to the different design of their glazed façades. Having the extensive glass facade, Heritage Place provided high daylighting and visual openness but at the same time faced the problem of glare and perceived discomfort in the afternoons. In contrast, Kings Tower used a layered system of low-e glass covered with the perforated aluminium screen which moderated the sun radiation and ensured visual connections with the surrounding environment. The obtained results confirm that façade transparency does not ensure climatic responsiveness of buildings in hot-humid environment. Rather, glazed facades perform well in conjunction with passive environmental design strategies such as shading, façade articulation and climate-specific building design.

Similar results were obtained in the studies by Oliveira & Pedrini (2023) who showed that high transparent glazed offices in tropical Brazil experience significant problems of overheating and visual discomfort in the absence of passive solar control. In addition, Mangkuto et al., (2022) found that the application of fixed and adaptive shading systems increases thermal and daylight performance of different oriented facades while (Desiana et al., 2025) state that the combination of glazing and shading system improves visual comfort and indoor environmental quality of the building. In a similar way, Wang et al., (2025) in the systematic review emphasised the significance of passive environmental principles for achieving the optimal performance of climate-responsive façades complemented with the technologies of dynamic envelope. However, in contrast with the previous studies, the current research goes beyond the performance perspective of the issue under consideration. Unlike other studies, the present study shows that climatic responsiveness should also be regarded as an architectural quality rather than a technological achievement. While the previous researches evaluated the façade systems in terms of energy efficiency or thermal performance, the findings obtained in this study indicate that façade expression has an impact on the way the occupants perceive and interact with the environmental conditions in the building. Moreover, the results obtained in this research provide further insight into the local context. The studies carried out by Adebamowo & Oluwatosin (2025) and Ajibola et al., (2024) investigated climate-responsive façade strategies in Lagos from the technical and descriptive perspective. Despite identifying the climatic challenges related to the glazed buildings in the region, these studies paid less attention to the experiential aspect of façade design. Therefore, by applying the approach of architectural phenomenology and environmental evaluation, the current study suggest that climate-responsive façades not only improve the performance of the building but also create richer experience which strengthens occupants' relationship with the environment.

4.2 Spatial Configuration as a Mediator of Environmental Performance

In addition to façade design, the results reveal that the spatial configuration is equally important factor influencing the environmental performance of the building. Both buildings use the design principle of the centralised service core surrounded by perimeter office spaces; however, due to the different plan geometry and façade articulation, the buildings provide noticeably different environmental conditions. While in the case of Heritage Place, the differences in daylight distribution and thermal conditions between perimeter and interior spaces are more pronounced, in the case of Kings Tower the balance of daylight and visual comfort is achieved because of the moderated plan depth and curvilinear geometry.

The obtained results corroborate the increasing evidence confirming the strong dependence of building performance from the spatial configuration. Latha et al., (2023) concluded that the plan depth and perimeter configuration influence the daylight penetration and building energy performance, while Ilgın and Aslantamer (2024) found that alternative skyscraper forms result in different spatial efficiency and environmental quality of the building. Similarly, Adel & Sheta, (2025) demonstrated the direct influence of spatial configuration on the daylight distribution and occupant experience in large public buildings. The obtained results support the previous conclusions and show that the spatial organisation also determines the phenomenological aspects of the building. Importantly, the results imply that the performance of façade cannot be assessed independently of internal planning. Rather than being separate design factors, the façade systems and spatial configuration interact to determine the daylight quality, glare intensity, thermal conditions and adaptive behaviour of the occupants. The integrated approach contributes to the discussions on the holistic building performance assessment.

4.3 Phenomenological Interpretation of Environmental Experience

The phenomenological approach applied in the current study provides an additional perspective usually lacking in climate-responsive façade researches. Unlike building performance studies which focus on measurable environmental indicators, architectural phenomenology recognises the importance of the multi-sensory nature of human experience of the building which includes light, temperature, movement, texture and atmosphere. Being consistent with Pallasmaa's (2005) idea that the architecture should engage all the senses, not only vision, the results demonstrate that the Kings Tower creates the coherent sensory environment providing diffused daylight, moderated thermal conditions and reduced visual discomfort. The occupants of the building display fewer adaptive responses which indicate that the environmental conditions ensure the stable patterns of occupation. On the contrary, due to the extensive transparency, Heritage Place provides the high level of visual openness but at the same time requires more frequent environmental adaptation through adjustment of blinds and relocation of workstations during the intense afternoon solar radiation.

Similar results support the concept of *genius loci* developed by Norberg-Schulz, (1980) according to which the meaningful architecture should strengthen the relationship of people with the place through the adequate response to the environmental context. The curvilinear form, lagoon-inspired architectural identity and climate-responsive façade of Kings Tower create the feeling of environmental integration better than the international curtain-wall expression of Heritage Place. The research demonstrates that climatic responsiveness possesses both technical and experiential dimensions. As such, environmental performance should be appraised not only by reductions in heat gain or improvements in daylight availability but also by the quality of the sensory environments that buildings create for their occupants.

4.4 Theoretical and Practical Implications

The findings offer empirical evidence to support the theoretical framework developed for this study through the confirmation that architectural expression, spatial configuration and environmental performance act as interdependent, not independent, factors in the design of tropical buildings. Such theoretical contribution is significant since previous façade assessment frameworks tended to emphasise performance at the expense of architectural meaning and the environment experienced by occupants. In practice, the outcomes indicate that architects designing in tropical climates should look beyond the current trend of embracing highly glazed façades as signs of modernity and consider developing a comprehensive envelope design that involves appropriate glazing techniques, climate-responsive passive shading systems, spatial planning and building forms. Also, regulatory bodies should develop performance-based criteria for façade assessment that would involve consideration of both the efficiency of environmental systems and quality of architecture (see Table 4 for essential design variables, their effects on environmental performance, and the related design implications).

Kings Tower was more climatically responsive than Heritage Place, but such findings should not be understood as advocating for any particular façade strategy as universally applicable in tropical architecture. Climate-responsive designs should be considered a context-specific process involving careful consideration of orientation, materials used, façade articulation, space planning, ventilation possibilities and adaptability of the occupants. Further research, especially those involving post-occupancy evaluation and environmental monitoring, would offer additional insights into the identified relationships. Generally, this study makes a significant contribution to the development of discourse on sustainable tropical architecture in that it reveals how architecture can be climatically responsive and express itself simultaneously. Such phenomenon is possible when considering architectural design using the framework developed in this study.

Table 4: Design Variables, Impact and Implications.

Design Variables	Impact on Environmental Performance	Envelope-Space Design Implications
Façade Transparency	Increased solar heat gain and potential glare in perimeter zones due to high window-to-wall ratio	Optimize window-to-wall ratio (WWR); integrate shading devices and spectrally selective glazing to balance daylight and heat gain
Architectural Identity	Tension between formal expression and environmental performance when design is visually driven	Integrate environmental strategies (orientation, shading, façade articulation) within the architectural expression to align form with performance
Reflectivity	Increased visual discomfort due to reflected and direct solar radiation	Specify low reflectivity or spectrally selective glazing; pair glazing with external shading devices to diffuse incident light
Core Positioning	Enhanced environmental control and reduce solar exposure in central zones	Maintain centralized core layouts to buffer internal spaces and enhance energy efficiency
Perimeter Allocation	Increased exposure to solar radiation and environmental variability	Combine perimeter office allocation with passive shading methods and orientation-sensitive façade treatments
Plan Depth	Increased dependence on artificial lighting in deep floor areas	Maintain optimal plan depth; introduce light wells, atria, or intermediate zones to enhance daylight penetration
Circulation Strategy	Influences daylight access and spatial experience across floors	Design balanced circulation layouts to improve daylight access and spatial adaptability
Daylight Quality	Improved visual comfort when daylight is diffused and controlled	Design façades for diffused daylight rather than maximum transparency; integrate shading layers and light-modulating elements
Glare Presence	Reduced visual comfort and productivity in exposed zone	Incorporate external shading devices (louvers, screens), and adaptive shading systems to minimize direct solar penetration
Thermal Exposure	Increased cooling load and energy demand due to solar heat gain	Employ climate-responsive façade systems, including double-skin facades, shading devices and passive cooling strategies
User Interaction	Limited adaptability reduces occupant comfort and environmental responsiveness	Integrate user-adjustable systems (operable shading, blinds, adaptive controls) to enhance interaction within the interior spaces.

While Kings Tower exhibited better adaptability to climatic conditions compared to Heritage Place, it is crucial not to interpret the results as advocating for a one-size-fits-all facade strategy for tropical architecture. Climate-sensitive design should be viewed as a context-specific process necessitating the thoughtful integration of orientation, material choices, facade design, spatial arrangement, natural ventilation possibilities, and occupant flexibility. Future research incorporating long-term post-occupancy assessments and environmental monitoring would offer deeper insights into the correlations highlighted in this study. In essence, this research enriches the dialogue on sustainable tropical architecture by illustrating that architectural design and climatic adaptability can coexist harmoniously. Through an integrated phenomenological perspective, they emerge as mutually reinforcing aspects of superior architectural design that can enhance environmental performance while improving the quality of occupants' environmental experience.

5. Conclusions

With the rise of highly glazed office buildings in rapidly growing tropical cities, the study aimed to explore how modern facade design can harmonize aesthetics with environmental efficiency. The results revealed that the effectiveness of climate responsiveness in facades is influenced not only by transparency but also by how well architectural design integrates with passive environmental strategies and spatial organization. On one hand, Heritage Place allowed ample daylight and visual connectivity. However, its extensive glass facade led to increased glare, perceived heat, and occupant discomfort during intense sunlight. On the other hand, Kings Tower combined advanced glazing with shading and a climate-friendly building shape to achieve better light distribution, reduced discomfort, and enhanced thermal comfort. These findings emphasize the significance of holistic design approaches where facade design, building shape, spatial layout, and environmental strategies work together rather than in isolation.

In addition to its practical insights, this study enriches the discourse on sustainable tropical architecture by showcasing the benefits of architectural phenomenology in evaluating climate-responsive buildings. Unlike traditional facade assessments focusing solely on technical aspects, the proposed framework integrates architectural design, spatial layout, environmental performance, and user experience in a comprehensive model. That way, the research expands our understanding of how environmental factors impact not just building efficiency but also occupants' comfort, sensory experiences, and attachment to tropical office spaces. Moreover, the study carries implications for architectural practices and policies. As skyscraper construction transforms Lagos and other tropical urban landscapes, architects and developers should move beyond using glass facades as symbols of modernity and embrace integrated climate-responsive design strategies combining suitable glazing technologies, external shading systems, climate-adaptive building forms, efficient spatial arrangements, and user-friendly environmental controls (see Table 5 for summary of recommendations). Similarly, urban planners and regulatory bodies should promote facade design guidelines based on performance that balance architectural excellence with environmental responsibility.

Table 5: Summary of Practical Recommendation.

S/N	Recommendation	Stakeholders	Expected Outcome
	Establish climate-appropriate maximum WWR standards	Planning Authorities	Reduced heat gain and glare
	Mandate performance simulations before permit approval	Regulatory Agencies	Evidence-based façade design
	Incorporate passive design requirements in national codes	Government & Energy Commissions	Improved natural comfort
	Develop guidelines linking core planning, plan depth, and façade strategies	Architects Registration Bodies	Integrated, high-performance buildings
	Promote adaptive and layered façade technologies	Architects & Developers	Enhanced occupant agency and comfort

In essence, this study highlights that architectural design and climate responsiveness are not conflicting goals but rather complementary aspects that, when harmoniously integrated, can create buildings that are environmentally sound, contextually fitting, and emotionally engaging. The proposed analytical framework serves as a valuable tool for evaluating future high-rise projects in Lagos and other tropical areas, laying the groundwork for further research incorporating quantitative environmental assessments, post-occupancy reviews, and broader comparative studies across various climatic and urban settings.

Limitations

The findings of this study may not be directly generalisable to other building types, climate regions, or urban context because of its comparative qualitative case study approach of just two LEED gold-certified office buildings situated within the same area. Future studies should therefore include a larger sample of office buildings across different tropical cities.

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Conflicts of Interest

The author(s) report no conflicts of interest

Data Availability Statement

The information backing up this study’s result can be accessed from the author upon request.

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Not required (no human subjects).

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