Exploring Users' Perceptions on Effect of Biomimicry Design Strategies in Conference Centre Architecture in Southwest Nigerian Universities

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Abstract- ***Biomimicry has emerged as a transformative approach in sustainable architecture, drawing inspiration from nature to solve human design challenges. However, in Nigeria, particularly within university environments, the perception and impact of biomimicry design strategies on users remain underexplored. This study investigates users' perceptions and evaluates the effects of biomimicry-inspired features in selected university conference centres in Southwest Nigeria. A descriptive survey method was employed, using structured questionnaires administered to 350 respondents across three universities: the University of Ibadan, Obafemi Awolowo University, and Covenant University. Data were analyzed using descriptive and inferential statistics. Findings revealed that users positively perceive biomimicry elements such as natural ventilation, daylighting, and organic architectural forms, associating them with improved comfort, environmental quality, and aesthetic value. The impact of these features was found to significantly enhance users' satisfaction, spatial experience, and perceived efficiency of the facilities. Additionally, respondents identified biomimicry as contributing to thermal comfort and functional adaptability, although awareness of its principles was generally low. The study concludes that while biomimicry design strategies are effectively enhancing environmental performance and user satisfaction, there is a need for greater awareness and stakeholder engagement in their implementation. It is recommended that universities institutionalize biomimicry in their architectural policies, conduct post-occupancy evaluations, and promote education on nature-inspired design strategies among students and professionals.***

Indexed Terms- ***Biomimicry, Sustainable Architecture, User Perception, Conference Centres, Nigerian Universities***

I. INTRODUCTION

In the face of rising environmental challenges such as global warming, resource depletion, and greenhouse gas emissions, architects and designers have increasingly turned to sustainable strategies that can improve building performance and reduce ecological impact. Among the most promising of these strategies is biomimicry, which draws from nature's forms, processes, and systems to inspire efficient and resilient architectural solutions (Hala, 2021; Arosha & Richard, 2012). Biomimicry, from the Greek bios (life) and mimesis (to imitate), involves observing and emulating natural models that have evolved over billions of years to solve human problems (Pawlyn, 2011; Aziz, 2016).

In architectural applications, biomimicry has been used to develop buildings that emulate the structural efficiency of honeycombs, the adaptive ventilation systems of termite mounds, and the self-cleaning surfaces of lotus leaves (Ghonimi, 2015; Vincent, 2009). These strategies aim not just at environmental performance, but also enhance occupant comfort, aesthetics, and spatial quality. As such, biomimicry serves as a convergence of sustainability, creativity, and scientific insight in contemporary architectural discourse (Mirniazmandan & Rahimianzarif, 2017).

Despite global advances in biomimicry-based architecture, its application in Nigeria particularly in university environments remains limited and underexplored. While several studies have examined biomimicry in terms of ecological design and material innovation (Aida & Ehsan, 2019; Rasha & Ali, 2012), there is a noticeable gap in empirical research concerning how users perceive and experience biomimicry in real architectural contexts. Most of the literature focuses on conceptual frameworks and technical strategies, often excluding the users whose engagement with these spaces ultimately defines their success.

University conference centres, as multifunctional hubs for academic and social events, offer a suitable context for studying biomimicry design strategies. These buildings serve not only as gathering places for scholarly exchange, but also as architectural landmarks that reflect institutional identity, sustainability values, and spatial innovation (Swarbrooke & Horner, 2001; Kamilu, 2012). Given their prominence and intensive use, understanding how users perceive and respond to biomimicry elements in these spaces is critical.

In the context of Southwest Nigeria, universities such as the University of Ibadan, Obafemi Awolowo University, and Covenant University have adopted varying levels of biomimicry-inspired design in their conference centres. However, there is currently a lack of systematic data on how users evaluate these features in terms of aesthetics, comfort, sustainability, and functionality. As highlighted by Hala (2021), the success of biomimicry in architectural practice depends not only on its environmental benefits but also on how effectively it aligns with user needs and perceptions.

This study, therefore, aims to bridge this knowledge gap by exploring the perceptions of users and evaluating the effects of biomimicry design strategies in university conference centres across Southwest Nigeria. By focusing on user experience, the research contributes to a deeper understanding of how biomimicry is received in practice and provides insights that can inform more inclusive, effective, and sustainable architectural approaches in institutional settings.

Aim of the Study

The aim of this study is to explore users' perceptions and evaluate the effects of biomimicry design strategies in the architecture of conference centres within selected universities in Southwest Nigeria.

Objectives of the Study

1. To assess users' perceptions of biomimicry design strategies implemented in selected university conference centres.
2. To evaluate the impact of biomimicry-inspired architectural features on user satisfaction, comfort, and spatial experience.

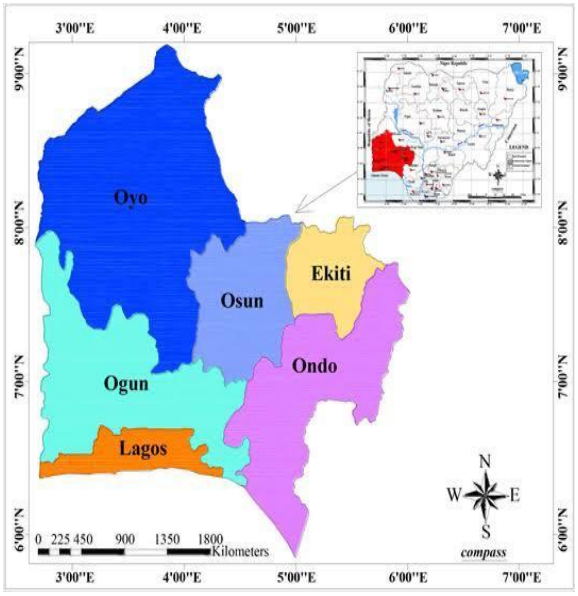

Figure 1: Map of South West, Nigeria

Source: United Nations cartographic section (2022)

Study Area

The study was conducted in Southwest Nigeria, a region comprising six states Oyo, Ogun, Ondo, Osun, Ekiti, and Lagos known for its strong academic culture and diverse architectural expressions. The region is home to several leading universities with purpose-built conference centres, making it a relevant setting for investigating biomimicry in institutional architecture.

Specifically, the research focused on three universities with prominent conference centres that exhibit biomimicry-inspired design features:

i. University of Ibadan (UI), Oyo State
ii. Obafemi Awolowo University (OAU), Osun State

iii. Covenant University (CU), Ogun State

These institutions were selected for their architectural significance and active user populations with purpose built Conference Centre, providing a rich context for assessing perceptions and evaluating the impact of biomimicry design strategies in academic environments.

II. LITERATURE REVIEW

Sustainable Design Practices in Architecture

Sustainable design has become a fundamental principle in modern architecture, particularly in response to growing global concerns about climate change, resource depletion, loss of biodiversity, and urban environmental degradation. As the built environment significantly contributes to greenhouse gas emissions and ecological disruption, architects and designers are increasingly tasked with adopting strategies that minimize environmental harm while maximizing societal and economic benefits. In this context, sustainable design has evolved from a niche concept into a mainstream architectural imperative, shaping how spaces are conceived, constructed, and operated (Kellert, Heerwagen & Mador, 2008).

Sustainable architecture often referred to as green design prioritizes the efficient use of natural resources, reduction of pollution and waste, and implementation of environmentally responsible construction methods. It goes beyond basic environmental compliance by integrating ecological principles throughout the lifecycle of a building from site selection and material sourcing to energy consumption and end-of-life deconstruction (Vincent et al., 2006). This includes the use of renewable energy systems (such as solar or wind), recycled or low-impact materials, water conservation methods, and passive design strategies like daylighting, natural ventilation, and thermal massing.

As the architectural community continues to seek pathways for addressing environmental degradation, sustainable design stands at the intersection of innovation and responsibility. Its integration into academic, residential, commercial, and institutional buildings marks a paradigm shift toward holistic and regenerative design thinking that harmonizes the built environment with the natural world.

Importance of Sustainable Design

1. Environmental Impact: The building industry is a major contributor to carbon emissions and resource consumption. Sustainable strategies like solar energy, passive ventilation, and eco-friendly materials reduce environmental degradation (El Ahmar, Azzouz & Benjelloun, 2017).
2. Economic Benefits: While initial costs may be high, sustainable buildings often lead to long-term savings. Lower energy bills, increased property value, and improved occupancy rates are typical benefits.
3. Health and Well-being: Biophilic and sustainable design strategies enhance indoor air quality, lighting, and acoustic comfort, resulting in healthier environments (Heerwagen, 2000).
4. Innovation and Technology: Advancements in smart materials and building systems (e.g., green roofs, low-emissivity glass) have expanded the scope of sustainable construction (Mwila & Halil, 2018).
5. Case Studies: Notable examples like the *Bullitt Center* in Seattle and *Bosco Verticale* in Milan illustrate the integration of green design with urban and environmental considerations.

Biomimicry in Architecture

Biomimicry is an innovative, nature-inspired design approach that draws from the structure, functions, and systems found in the natural world to address human challenges in a sustainable and efficient manner (Rasha, 2012). Rooted in the belief that nature through billions of years of evolution offers refined solutions to complex problems, biomimicry provides architects and designers with a framework for developing resilient, resource-conscious, and contextually adaptive built environments. Popularized by biologist Janine Benyus in her seminal work Biomimicry: Innovation Inspired by Nature, the concept has gained international recognition as a transformative model for ecological design (Shivi, 2019).

In architectural practice, biomimicry moves beyond aesthetics to engage with the functional intelligence

of biological systems. Applications include emulating physical forms—such as the aerodynamic shapes of birds for wind resistance or the ribbed structure of leaves for material optimization as well as imitating natural processes like thermoregulation in termite mounds for passive ventilation, or photosynthesis-inspired energy generation. At a systems level, architects may draw from the organizational principles of ecosystems to create closed-loop water cycles, zero-waste systems, or buildings that operate like living organisms (Badarnah & Kadri, 2015).

2.2.1 Origins of Biomimicry

Historically, humans have observed nature to solve complex problems. Ancient innovations, from boat hulls inspired by fish to Leonardo da Vinci's flight studies of birds, reflect early biomimicry. Otto Schmitt's work in the 1950s coined the term *biomimetics*, while George de Mestral's invention of Velcro based on burrs marked a pivotal commercial application.

Janine Benyus (1997) later formalized the concept of *biomimicry*, outlining its three levels:

1. Form: Mimicking physical structures.
2. Process: Emulating natural mechanisms (e.g., photosynthesis).
3. System: Designing based on ecosystems and interconnections.

Pioneering Architects and Landmark Projects

- Michael Pawlyn – Eden Project (UK): Geodesic structures inspired by soap bubbles and plant forms, optimizing light and ventilation.
- Mick Pearce – Eastgate Centre (Zimbabwe): Passive cooling modeled after termite mounds, reducing energy demand.
- Ken Yeang – Bioclimatic Towers: Green skyscrapers that function like vertical ecosystems with passive ventilation and solar strategies.
- Stefano Boeri – Bosco Verticale (Italy): Residential towers acting as urban forests, improving air quality and biodiversity.

Table 1: Distinction between Biomimicry, Bionics, and Biomimetics

Term	Definition	Focus	Example
Biomimicry	Emulating nature's strategies to solve human problems (Mwila & Halil, 2018)	Sustainable design solutions	Ventilation system modeled after termite mounds
Bionics	Creating synthetic systems modeled after biological systems	Medical/technical applications	Prosthetic limbs mimicking human movement
Biomimetics	Broader field encompassing both biomimicry and bionics (Nihal & Shams, 2019)	Any biological inspiration in human design	Spider silk-inspired materials

Author's field survey and compilation 2025

Principles of Biomimicry in Design

Biomimicry in architecture emphasizes sustainability through nature-inspired strategies that align human-made environments with ecological wisdom. According to Gifford (2007), these principles are rooted in the observation that natural systems, refined over billions of years of evolution, inherently balance efficiency, resilience, and adaptability. Architects who adopt biomimetic principles aim to design buildings that not only function efficiently but also integrate harmoniously with their environment. The following are the core principles that guide biomimicry in architectural practice:

1. Emulating Natural Forms: Designers often begin by studying the shapes, geometry, and structural patterns of natural organisms. These forms ranging from the streamlined wings of birds to the fractal patterns of tree branches are not only

aesthetically pleasing but also optimized for efficiency, aerodynamics, and structural integrity. For example, the aerodynamic form of a fish or bird may inspire the shape of a building to reduce wind resistance or improve natural airflow.

2. Emulating Natural Processes: Beyond shapes, biomimicry also involves replicating biological mechanisms such as self-healing, filtration, or photosynthesis. Incorporating self-cleaning surfaces inspired by lotus leaves, or ventilation systems modeled after termite mounds, allows buildings to perform functional tasks passively, reducing reliance on mechanical systems and lowering energy consumption.
3. Emulating Ecosystems: Ecosystems are complex, interconnected systems that operate in closed loops where the waste of one organism becomes a resource for another. Applying this principle to architecture means designing buildings and communities that recycle resources, manage waste internally, and interact positively with their surroundings. For instance, greywater recycling systems and energy loops emulate ecosystemic cycles to support sustainability.
4. Using Sustainable Materials: Nature relies on locally available, biodegradable, and renewable materials. Biomimetic architecture similarly advocates for the use of materials that are non-toxic, sustainably sourced, and capable of reintegration into natural cycles. Examples include bamboo, rammed earth, or bio-based composites that minimize environmental degradation and reduce the carbon footprint of construction.
5. Harnessing Renewable Energy: Just as nature makes efficient use of solar, wind, and kinetic energy, biomimicry in architecture encourages the design of systems that harness these renewable sources. Solar panels inspired by the orientation of sunflower petals or building facades that track the sun to optimize energy collection exemplify how natural mechanisms can guide energy efficiency.
6. Adaptability: One of nature's most vital characteristics is its ability to adapt to changing environmental conditions. Architectural designs inspired by this principle may feature responsive building skins, adaptive shading devices, or dynamic insulation systems that adjust in response to light, temperature, or humidity thereby increasing occupant comfort and building resilience.
7. Resource Optimization: Natural systems are incredibly efficient in their use of materials and energy. Biomimicry promotes designing buildings with minimal material waste, maximum functionality, and an emphasis on doing more with less. This principle supports lean design strategies that prioritize multifunctional spaces, modular systems, and efficient building envelopes.

Biomimicry Design Strategies and Techniques

According to Badarnah & Kadri (2015) and Shivi (2019), key techniques include:

1. Form and Shape Emulation – Structures inspired by biological forms (e.g., bird wings).
2. Material Optimization – Lightweight composites modeled after bone or plant fibers.
3. Energy Efficiency – Passive systems inspired by termite mounds or leaf structure.
4. Water Management – Rain harvesting inspired by desert beetles or fish gills.
5. Adaptive Design – Skins that respond to environmental conditions.
6. Structural Efficiency – Web-like or modular forms based on spider webs or corals.
7. Sustainable Manufacturing – Biodegradable or renewable production techniques.
8. Waste Reduction – Closed-loop systems inspired by natural nutrient cycles.

User Perceptions and Attitudes Towards Sustainable Design

Understanding users' attitudes towards sustainable and biomimetic design is essential for the success and usability of such spaces. Occupant satisfaction greatly influences how sustainable features are accepted, maintained, and valued over time (Becker & Jahn, 2017).

According to Pedersen (2007), six factors influence user perception:

1. Awareness: Users with knowledge of environmental benefits are more likely to embrace sustainable features.

2. Aesthetic Integration: Seamless incorporation of sustainable elements improves acceptance.
3. Comfort and Well-being: Features that improve air, light, and thermal comfort are well-received.
4. Cost Perception: Perceived long-term savings influence attitudes positively.
5. Functionality: Adaptable, user-friendly designs are better appreciated.
6. Social and Environmental Values: Users support buildings that promote environmental stewardship and social impact.

III. RESEARCH METHODOLOGY

Research Design

This study adopted a descriptive survey research design to examine users' perceptions and evaluate the effects of biomimicry design strategies in university conference centre architecture within Southwest Nigeria. This design was appropriate for collecting data directly from building users to explore their experiences, opinions, and evaluations of nature-inspired architectural elements.

Study Population

The population for this study comprised users of selected purpose-built conference centres across three universities in Southwest Nigeria. These users included academic staff, students, non-academic personnel, and facility managers who actively engage with the spaces and are positioned to assess the functionality, comfort, and aesthetic qualities of the biomimicry-inspired features.

Sample Frame and Sampling Technique

A purposive sampling technique was used to select three universities with conference centres that exhibit distinct biomimicry-inspired architectural forms. The sampling focused on high-capacity, purpose-built facilities to ensure a broad and diverse user base. The universities and their respective sample frames and sizes are outlined below:

Table 2: Universities with purpose-built conference centres with biomimicry form

S/N	University	Conference Centre	Capacity (Sample Frame)	Sample Size (5%)
1	University of Ibadan (UI)	UI International Conference Centre, Ibadan	1,000	50
2	Obafemi Awolowo University (OAU)	OAU Conference Centre, Ile-Ife	2,500	125
3	Covenant University (CU)	CU Conference Centre, Ota	3,500	175
	Total		7,000	350

Source: Author's field survey and compilation, 2025

A stratified random sampling approach was employed within each institution to ensure representation across different user categories, including students, staff, and management personnel.

Data Collection Instruments

Primary data were gathered using a structured questionnaire divided into three major sections:

Section A: Users' perceptions of the biomimicry design strategies (e.g., natural form, ventilation, lighting, structure).

Section B: Users' evaluation of the impact of these features on environmental comfort, usability, and satisfaction.

The questionnaire utilized a five-point Likert scale format for closed-ended questions,

Method of Data Analysis

The collected data were analyzed using both descriptive statistical methods. Descriptive analysis including frequency distributions, mean scores, and standard deviations was used to summarize users' perceptions, experiences and also to evaluate the impact of biomimicry features on users.

IV. ANALYSIS AND RESULTS

Assessment of Users' Perception of Biomimicry Design Strategies

The data from Table 3 below show the assessment of users' perceptions of biomimicry design strategies in selected universities, focusing on the aesthetic appeal of the environment, connection to nature, and the comfort and user-friendliness of conference centers designed with biomimicry principles.

Aesthetic Appeal of the Environment

The first factor evaluates how biomimicry design strategies enhance the aesthetic appeal of the environment. Covenant University have a total average mean score (TWV/f) of 4.18. Obafemi Awolowo University follows with a TWV/f of 3.95, showing a relatively higher weighted value despite fewer total responses. The University of Ibadan records the lowest average mean score (TWV/f) of 3.90. Overall, the combined TWV/f for this factor is 4.01, showing that users generally perceive biomimicry design strategies as positively enhancing the environment's aesthetic appeal.

Connection to Nature

The second factor assesses users' feelings of connection to nature when inside conference centers designed with biomimicry strategies. Covenant University demonstrates the highest total frequency (175) and a TWV/f of 4.01, reflecting a strong recognition of this aspect. University of Ibadan has the lowest TWV/f of 3.96, with a total frequency of 50, indicating less pronounced perceptions of connection to nature. Obafemi Awolowo record the highest TWV/f of 4.40, indicating significant appreciation for this factor.

Comfort and User-Friendliness

The final factor evaluates the comfort and user-friendliness of biomimicry-designed conference centers compared to traditional designs. University of Ibadan achieves the highest mean sore (TWV/f) of 4.48, showing widespread acknowledgment of comfort and usability. Obafemi Awolowo University follows with a TWV/f of 4.18, while Covenant University records the lowest TWV/f of 4.13. The combined TWV/f for this factor is 4.26, showing a generally positive perception of comfort and user-friendliness.

Table 3: Assessment of Users' Perception of Biomimicry Design Strategies Index AUPBDS

Selected Universities		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Frequency (n)	TWV	TWV/n
University of Ibadan	The biomimicry design strategies used in Conference Centre enhance the aesthetic appeal of the environment.	2	3	5	28	12	50	195	3.90
Obafemi Awolowo University		3	7	15	68	32	125	494	3.95
Covenant University		5	10	22	49	89	175	732	4.18
Total									12.03/3
									4.01
University of Ibadan	I feel more connected to nature when	0	3	8	27	12	50	198	3.96

Obafemi Awolowo University	inside Conference Centre that incorporate biomimicry design strategies.	0	2	12	45	66	125	550	4.40
Covenant University		2	5	27	96	45	175	702	4.01
Total									12.37/3
									4.12
University of Ibadan	Conference Centre designed with biomimicry principles are more comfortable and user-friendly compared to traditional designs.	0	0	2	22	26	50	224	4.48
Obafemi Awolowo University		0	2	15	66	42	125	523	4.18
Covenant University		0	4	23	95	53	175	722	4.13
Total									12.79/3
									4.26

Source: Author's Field Survey, 2025

Assessment of Users' Perception of Biomimicry Design Strategies

The data from Table 4 below reveal the user perceptions of biomimicry design strategies and their impact on indoor environments, architectural influence, future adoption, and the aesthetic atmosphere in selected universities in Southwest Nigeria index. The analysis evaluates four factors: the contribution of biomimicry design strategies to healthier indoor environments, their influence on the overall campus experience, user interest in future adoption of biomimicry, and the perceived aesthetics of natural forms and patterns in conference centers.

Contribution to Healthier Indoor Environments

This factor assesses the extent to which biomimicry design strategies improve indoor air quality and natural lighting. Covenant University had the highest TWV (755) and average mean score TWV/f (4.31), showing the strongest perception of these benefits among its respondents. Obafemi Awolowo University followed with a TWV/f of 4.34, while the University of Ibadan recorded the highest average mean score TWV/f (4.46). The data reveal that Covenant University prioritizes indoor environmental quality through biomimicry, more so than the other institutions.

Architectural Influence on Campus Experience

This factor evaluates how biomimicry in architectural design enhances the overall user experience on campus. Covenant University recorded the highest TWV (779) and average mean score TWV/f (4.45), showing a stronger perception of its positive impact compared to Obafemi Awolowo University with average mean score (TWV/f of 4.23) and the University of Ibadan (TWV/f of 4.42). These findings show that Covenant University stands out in leveraging biomimicry principles to enrich campus life.

Interest in Future Adoption of Biomimicry Design Strategies

This factor explores the willingness of respondents to see more conference centers adopting biomimicry strategies in the future. Covenant University recorded the highest TWV (750) and average mean score TWV/f of (4.29), followed by Obafemi Awolowo University with a TWV/f of 4.32. The University of Ibadan scored the highest TWV/f (5.60). This shows a strong interest among respondents from Covenant University and University of Ibadan in expanding

biomimicry principles, reflecting their positive experiences with existing strategies.

Aesthetic Contribution of Natural Forms and Patterns
This factor examines how the natural forms and patterns in biomimicry-designed conference centers create an appealing aesthetic. Covenant University recorded the highest TWV (790) and TWV/f (4.51), showing a strong acknowledgment of this principle's aesthetic value. Obafemi Awolowo University and the University of Ibadan followed with TWV/f values of 4.58 and 4.60, respectively. These findings reveal that Covenant University leads in providing aesthetically pleasing environments influenced by biomimicry.

Table 4: Assessment of Users' Perception of Biomimicry Design Strategies AUPBDS

Selected Universities		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Frequency (n)	TWV	TWV/n
University of Ibadan	Biomimicry design strategies contribute to a healthier indoor environment (e.g., improved air quality, natural light).	0	0	6	15	29	50	223	4.46
Obafemi Awolowo University		0	0	25	33	67	125	542	4.34
Covenant University		0	5	30	45	95	175	755	4.31
Total									13.11/3
									4.37
University of Ibadan	The use of biomimicry in architectural design positively influences my overall experience on campus.	0	0	7	15	28	50	221	4.42
Obafemi Awolowo University		0	0	10	76	39	125	529	4.23
Covenant University		0	0	16	64	95	175	779	4.45
Total									13.10/3
									4.37
University of Ibadan	I would like to see more Conference Centre adopting biomimicry design strategies in the future.	0	0	0	20	40	50	280	5.60
Obafemi Awolowo University		1	2	15	45	62	125	540	4.32
Covenant University		3	5	16	66	85	175	750	4.29
Total									14.21/3

									4.74
University of Ibadan	The natural forms and patterns in biomimicry-designed Conference Centre create a more pleasant and inspiring atmosphere.	0	0	0	20	30	50	230	4.60
Obafemi Awolowo University		0	0	4	45	76	125	572	4.58
Covenant University		0	0	5	75	95	175	790	4.51
Total									13.69/3
									4.56

Source: Author's Field Survey, 2025

Evaluation of the Impact of Biomimicry Design Strategies on Users

The data from Table 5 presents the evaluation of the impact of biomimicry design strategies on users, focusing on their well-being, environmental sustainability, and energy savings across the selected conference centers. The analysis utilizes the Total Weighted Value (TWV) and Average Mean Score for Total Weighted Value (TWV/f) to assess the significance of these factors across selected universities.

Well-being Impact

The first factor examines how biomimicry design strategies influence users' well-being while utilizing campus facilities. Covenant University reports the highest average mean score of TWV/f of 4.35, showing a moderately positive impact on well-being. Obafemi Awolowo University follows with a TWV/f of 4.11. The University of Ibadan shows a TWV/f of 4.06, the lowest among the institutions. Overall, the combined TWV/f average for this factor is 4.17, showing that users generally perceive biomimicry strategies as beneficial to their well-being.

Environmental Sustainability

The second factor assesses the environmental sustainability of conference centers designed with biomimicry strategies. University of Ibadan stands out with the highest mean average mean score for Total Weighted Value (TWV/f) of 4.80, showing significant recognition of the environmental benefits. Obafemi Awolowo University records a TWV/f of 4.78, while the Covenant University has the lowest TWV/f of 4.55.

Energy Savings and Resource Consumption

The third factor focuses on energy savings and reduced resource consumption in biomimicry-designed conference centers. Obafemi Awolowo University achieves the highest TWV/f of 4.63, showing the users' agreement with the energy-saving benefits. University of Ibadan follows with a TWV/f of 4.50, and the Covenant University records the lowest TWV/f of 4.29. The average TWV/f for this factor across the institutions is 4.47, revealing that users generally recognize the energy-saving advantages of biomimicry design strategies.

The findings reveal that biomimicry design strategies are positively received across the selected universities, with varying degrees of impact on well-being, environmental sustainability, and energy efficiency. Covenant University consistently shows higher total frequencies and average mean score for Total Weighted Value (TWV/f), showing that users in this institution benefit the most from biomimicry design. Institutions with lower average mean score for Total Weighted Value (TWV/f), such as the University of Ibadan and Obafemi Awolowo University, could explore ways to improve the adoption and visibility of biomimicry strategies to enhance user satisfaction.

Table 5: Evaluation of the Impact of Biomimicry Design Strategies on Users Index EIBDSUI

Selected Universities		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Frequency (n)	TWV	TWV/n
University of Ibadan	Biomimicry design strategies have a positive impact on my well-being while using campus facilities.	0	0	12	23	15	50	203	4.06
Obafemi Awolowo University		0	4	22	55	44	125	514	4.11
Covenant University		0	2	21	66	86	175	761	4.35
Total									12.52/3
									4.17
University of Ibadan	The environmental sustainability of Conference Centre with biomimicry design strategies is noticeable and impactful.	0	0	0	10	40	50	240	4.80
Obafemi Awolowo University		0	0	0	28	97	125	597	4.78
Covenant University		0	0	0	78	97	175	797	4.55
Total									14.13/3
									4.71
University of Ibadan	Energy savings and reduced resource consumption in biomimicry-designed Conference Centre are evident.	0	0	5	15	30	50	225	4.50
Obafemi Awolowo University		0	0	0	46	79	125	579	4.63
Covenant University		4	5	22	49	95	175	751	4.29
Total									13.42/3
									4.47

Source: Author's Field Survey, 2025

Evaluation of the Impact of Biomimicry Design Strategies on Users

The data from Table 6 below presented the evaluation of the impact of biomimicry design strategies on users, focusing on their behavior, comfort, productivity, and awareness index. The evaluation used a five-point Likert scale, with the results summarized using total weighted values (TWV) and average mean score (TWV/f).

The first factor examined was the role of biomimicry design in encouraging sustainable behavior among users. Covenant University showed the highest agreement with a TWV of 696 and average mean score TWV/f of 3.98, showing a strong preference for this approach. Obafemi Awolowo University followed with a TWV of 541 and TWV/f of 4.33, while the University of Ibadan recorded the lowest TWV of 199 and average mean score TWV/f of 3.98.

The second factor considered the comfort level inside a conference center designed with biomimicry

principles compared to traditional buildings. Covenant University again had the highest TWV of 774 and average mean score TWV/f of 4.42, followed by Obafemi Awolowo University with a TWV of 571 and TWV/f of 4.57. The University of Ibadan recorded the lowest TWV of 223 and average mean score TWV/f of 4.46.

The third factor was the impact of biomimicry-designed spaces on overall productivity and satisfaction. Covenant University led with a TWV of 757 and TWV/f of 4.33, showing a strong belief in the positive impact of biomimicry on productivity. Obafemi Awolowo University had a TWV of 544 and TWV/f of 4.35, while the University of Ibadan had the lowest TWV of 215 and average mean score TWV/f of 4.30.

The final factor evaluated the respondents' perception of how biomimicry-designed conference centers improve their awareness and engagement with natural environments. Covenant University had TWV of 715 and TWV/f of 4.01, followed by Obafemi Awolowo University with a TWV of 524 and TWV/f of 4.19. The University of Ibadan recorded the lowest average mean score TWV/f of 3.98.

The data reveal that respondents from Covenant University consistently show the highest levels of agreement across all factors related to the impact of biomimicry design strategies. This shows that users from this institution perceive more positive behavioral, comfort, productivity, and awareness benefits from biomimicry in design. Obafemi Awolowo University also show significant agreement, though not as high as Covenant University. The University of Ibadan shows relatively lower agreement levels, showing less enthusiasm and recognition of the benefits of biomimicry design strategies.

These findings show that the implementation of biomimicry design strategies in the new conference center at LAUTECH could be more positively received by stakeholders who are more familiar with or supportive of such approaches, particularly those from Covenant and Obafemi Awolowo universities. It show that incorporating these strategies will enhance user comfort, productivity, and sustainable behavior, aligning with modern sustainable design trends.

Table 6: Evaluation of the Impact of Biomimicry Design Strategies on Users Index EIBDSUI

Selected Universities		Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Total Frequency (n)	TWV	TWV/n
University of Ibadan	The design of biomimicry Conference Centre on campus encourages sustainable behavior among users.	0	4	7	25	14	50	199	3.98
Obafemi Awolowo University		0	8	12	36	69	125	541	4.33
Covenant University		2	12	23	89	49	175	696	3.98
Total									12.29/3
									4.10
University of Ibadan	The comfort level inside Conference Centre designed with biomimicry principles is higher compared	0	0	6	15	29	50	223	4.46
Obafemi Awolowo University		0	0	5	44	76	125	571	4.57

Covenant University	to traditional buildings.	0	0	13	75	87	175	774	4.42
Total									13.45/3
									4.48
University of Ibadan	My overall productivity and satisfaction are enhanced by the presence of biomimicry-designed spaces on campus.	0	3	7	12	28	50	215	4.30
Obafemi Awolowo University		0	2	18	39	66	125	544	4.35
Covenant University		0	5	22	59	89	175	757	4.33
Total									12.98/3
									4.33
University of Ibadan	Biomimicry-designed Conference Centre improve my awareness and appreciation of sustainable architectural practices.	0	2	9	27	12	50	199	3.98
Obafemi Awolowo University		0	3	15	62	45	125	524	4.19
Covenant University		0	9	22	89	55	175	715	4.09
Total									12.26/3
									4.09

Source: Author's Field Survey, 2025

CONCLUSION

This study has examined the perceptions of users and the perceived impact of biomimicry design strategies within selected university conference centres in Southwest Nigeria. Findings from the analysis of responses across University of Ibadan, Obafemi Awolowo University, and Covenant University reveal that users generally recognize and positively respond to various biomimicry elements embedded in the architectural designs of these facilities. Elements such as nature-inspired forms, passive ventilation systems, daylight optimization, and adaptive spatial configurations were acknowledged for enhancing environmental comfort, aesthetic appeal, and spatial efficiency.

Furthermore, the study confirms that biomimicry-driven design features contribute significantly to occupant satisfaction, with many users associating these elements with improved air quality, thermal comfort, and a more engaging spatial experience. This reinforces the assertion that biomimicry is not only a tool for environmental sustainability but also a means of improving human interaction with the built environment.

However, despite the clear benefits, the study also highlights a gap in user awareness and institutional promotion of biomimicry principles. In some cases, users appreciated the effects of these features without fully understanding the biomimetic inspiration behind them. This underscores the need for greater educational integration and stakeholder involvement in sustainable architectural practices.

RECOMMENDATIONS

In light of the findings from this study, several key recommendations are proposed to enhance the integration and effectiveness of biomimicry design strategies in university conference centres.

First, there is a pressing need to improve awareness and understanding of biomimicry among building users. Many respondents in this study experienced the benefits of nature-inspired design elements but lacked knowledge about their biomimetic origins. Universities should therefore implement educational initiatives such as workshops, public exhibitions, or targeted campaigns to sensitize students, staff, and facility managers to the principles and advantages of biomimicry in architecture.

Another recommendation is the incorporation of more user-centric approaches in the design and planning of biomimicry-based facilities. Actively involving end-users such as lecturers, students, and facility personnel during the design process can help ensure that the spaces created are not only environmentally efficient but also functionally appropriate and comfortable.

Furthermore, architects and facility managers within academic institutions should receive regular training on the principles and applications of biomimicry. By building the capacity of design professionals and building managers, universities can ensure that these features are not only implemented effectively but also maintained for optimal performance over time.

Finally, it is recommended that educational institutions develop clear policies that support the inclusion of biomimicry and other sustainable design principles in all future building projects. Such policies would institutionalize sustainability as a core objective in campus development and encourage long-term innovation in design thinking.

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