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Evaluating Digital Nomads' Awareness and Preferences for Passive and Active Sustainable Design in Lagos

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Abstract

This study evaluated digital nomads' awareness and preferences for passive and active sustainable design features in Lagos, Nigeria. Data collection was conducted in early 2025 using a structured questionnaire administered over a six-week period, targeting remote workers, freelancers, and entrepreneurs residing or working temporarily in Lagos. A total of 384 valid responses were obtained, derived from Cochran's formula for infinite populations at a 95% confidence level and 5% margin of error, ensuring statistical reliability. The survey captured awareness levels of passive strategies such as natural ventilation, daylighting, and biophilic systems, alongside preferences for active technologies including smart energy management, HVAC systems, and adaptive shading. Data were analyzed using IBM SPSS, where descriptive statistics provided baseline insights, and inferential tests iincluding Chi-square and independent samples t-tests revealed statistically significant subgroup differences ($p < 0.05$). Results showed that long-term nomads displayed stronger appreciation for passive strategies, while entrepreneurs favored active energy technologies, highlighting occupation- and experience-based divergences. Environmental factors, particularly natural lighting and indoor air quality, emerged as the most significant determinants of productivity. The study concludes that while digital nomads demonstrate increasing awareness of sustainable design, knowledge gaps persist, especially concerning ecological passive features, underscoring the need for targeted design integration and education.

Keywords: Awareness, Digital Nomads, Passive and Active Design, Statistical Significance, Sustainable Workspaces

Introduction

The rapid expansion of remote work has transformed Lagos into a thriving hub for digital nomads, prompting architects and planners to reconsider how buildings strike a balance between human comfort and environmental sustainability. As these itinerant professionals seek flexible living and working environments, their awareness of passive strategies such as natural ventilation, daylight optimization, and thermal mass and active approaches like solar harvesting, smart controls, and greywater reuse becomes vital for fostering sustainable urban habitats (Gupta, Jaiswal, & Gupta, 2024; Gómez-Monsalve et al, 2022). In Nigeria's humid tropics, leveraging vernacular lessons that once featured deep overhangs, cross-ventilation, and locally sourced materials can inform contemporary design that resonates with both ecological imperatives and cultural identity (Adeoye et al., 2023). Despite growing advocacy for biophilic urbanism and resource-efficient buildings, little is known about how mobile professionals in Lagos perceive and prioritize these features when choosing where to live and work (Thomson & Newman, 2021). Recent studies of coworking spaces in Ibadan have revealed that users value access to daylight and thermal comfort, but encounter challenges related to energy costs and privacy (Ayodele et al., 2022). Similarly, investigations into occupant health under extreme conditions highlight the importance of adaptive systems that respond to fluctuating indoor environmental quality, especially in post-pandemic scenarios (Awada et al., 2021). However, translation of these insights into tailored solutions for a nomadic demographic remains underexplored. By examining digital nomads' self-reported knowledge of passive and active sustainable design measures alongside their expressed preferences, this research aims to bridge that gap. Through a mixed-methods approach, it will illuminate which design interventions whether shading devices informed by vernacular precedents or intelligent building controls guided by digital twin technologies garner the most excellent acceptance and perceived value among this emerging cohort (Yang, Lv, & Wang, 2022). In doing so, the study aims to inform a roadmap for architects and developers committed to crafting resilient, health-promoting environments that align with both global sustainability goals and the distinctive rhythms of life in Lagos (AGBOOLA, Ojobo, & Aliyev, 2023). In recent years, sustainability has emerged as a dominant theme in architecture and interior design, particularly within the hospitality industry where the environmental footprint of resorts

continues to attract scholarly and professional attention. Globally, upcycling practices have been explored as a strategy to reduce waste, conserve resources, and generate innovative design outcomes (Deviatkin et al, 2019; Handoko et al, 2021). Wooden shipping pallets, in particular, have been recognized for their durability, versatility, and potential for repurposing into furniture, partitioning systems, and other interior applications. This shift reflects the growing demand for circular economy principles in built environments, aligning design practices with broader ecological imperatives.

Within Nigeria, however, much of the academic and professional discourse on sustainable architecture has concentrated on energy efficiency, green building certifications, and the adoption of renewable energy technologies (Adeyemi, 2023; Ogunbode et al, 2020). Far less attention has been given to material re-use strategies in the hospitality sector, despite their potential to reduce costs, minimize construction waste, and enhance cultural identity through context-specific design approaches. While studies on urban waste recycling and informal material economies exist (Akinola, 2021; Silva et al, 2020), there remains a notable absence of scholarship that directly examines how reclaimed wooden pallets can be systematically integrated into resort design in Nigeria, particularly in fast-developing urban districts such as Ikorodu, Lagos.

This gap in research is significant because the hospitality industry in Lagos is expanding rapidly, yet remains reliant on conventional imported materials that often increase construction costs and undermine local resource efficiency (Chukwu, 2022; Ojo, 2021). Moreover, global precedents suggest that material upcycling not only supports environmental sustainability but also enhances guest experience through the creation of unique, place-sensitive interiors (Deering & Roberts, 2021; Lee et al, 2023). The absence of empirical studies or design-focused research on this subject within the Nigerian context therefore leaves a critical void in both academic inquiry and practical application. This study seeks to address this gap by exploring the potential of wooden shipping pallet upcycling in the design of a resort in Ikorodu, Lagos. By evaluating their functional, aesthetic, and cultural applications within interior spaces, the research contributes to broader debates on sustainable hospitality while offering context-specific insights relevant to Lagos and similar coastal urban environments. In doing so, it not only situates Lagos within global sustainability discourse but also demonstrates how resource-conscious design can reinforce cultural identity and economic resilience within Nigeria's hospitality sector.

Aim & Objectives

To evaluate the level of awareness among digital nomads regarding passive and active sustainable design strategies and to determine their specific preferences for such features within residential and co-working environments in Lagos.

Objectives

i. To assess digital nomads' understanding of passive sustainable design measures such as natural ventilation, solar shading, and building orientation within the Lagos climate.
ii. To identify the key active sustainable design technologies, including HVAC controls, sensor-based lighting, and real-time energy monitoring, that digital nomads value most in their work and living spaces.
iii. To analyse how demographic and behavioural factors (for example, duration of stay, budget constraints, and work routines) influence digital nomads' preferences for passive versus active sustainable design solutions.

Literature Review

The awareness and preferences of digital nomads regarding sustainable workspace design can be understood through four interconnected thematic strands: passive strategies, active technologies, digital nomad workspace needs, and the Lagos context.

Passive Strategies

Passive design remains the foundation of sustainable architecture, relying on natural systems to improve thermal comfort and reduce energy demand. In Southwest Nigeria, vernacular architecture employed deep overhangs, porous walls, and courtyards to optimize shading and ventilation (Adeoye et al 2023). These lessons remain relevant in Lagos's humid tropical climate, where cross-ventilation and daylighting are vital for reducing reliance on mechanical systems (Awada et al 2021). However, while studies of coworking spaces in Ibadan highlight user appreciation for natural light and thermal comfort (Ayodele et al 2022), biophilic features such as green roofs and walls remain underutilized and poorly understood by occupants. This indicates a tension between the proven environmental performance of ecological passive solutions and the limited awareness among nomadic users who often prioritize visible and immediate comfort features over less tangible ecological systems.

Active Technologies

Active systems, by contrast, are often more visible and immediately associated with modernity, efficiency, and comfort. Smart energy management, HVAC optimization, and sensor-based controls enable responsive adaptation to fluctuating occupancy and climatic conditions (Yang et al 2022; Azimi & O'Brien 2022). In contexts such as Lagos, where power reliability is inconsistent, digital twins and backup management systems become particularly valued as they guarantee continuity for digital nomads whose productivity depends on uninterrupted connectivity. Yet, literature suggests that awareness of these technologies is uneven. Daramola and Etim (2022) show that users often rely on peer

reviews or surface impressions of technologies rather than understanding technical performance, reinforcing why nomads may prioritize visible systems such as solar panels over embedded efficiency measures. This highlights a paradox: while advanced systems can optimize performance, their adoption and effectiveness depend on user literacy and legibility.

Digital Nomad Workspace Needs

Globally, digital nomads are drawn to spaces that merge environmental quality, flexibility, and simplicity of use. Gupta et al (2024) identify adaptability, comfort, and indoor environmental quality as central to nomadic satisfaction, while Zenkteler et al (2023) demonstrate that intuitive lighting and temperature controls enhance productivity and reduce cognitive load. Nigerian studies echo these findings, with coworking users in Ibadan valuing daylight and comfort but struggling with infrastructural inefficiencies and privacy concerns (Ayodele et al 2022). These insights reveal that nomads expect spaces that not only support concentration but also allow transitions into collaborative and social engagement (Talas 2022). Biophilic integration, such as indoor greenery or access to natural views, further enhances psychological well-being, yet such strategies remain underrepresented in Lagos-based workspaces. This suggests that while international literature points to the psychological and functional benefits of ecological and adaptive spaces, Nigerian practice lags in translating these into nomad-centered designs.

Lagos Context

The Lagos environment introduces unique constraints and opportunities that shape the relevance of both passive and active design. High humidity, heavy rainfall, and unstable electricity supply make hybrid solutions imperative, combining vernacular passive wisdom with advanced energy and water systems (Agboola et al 2023; Gómez-Monsalve et al 2022). Adaptive reuse of abandoned or underutilized structures offers further potential for creating resilient nomadic hubs that minimize embodied carbon while preserving heritage (Yegin 2022). However, the local reality also underscores gaps between global best practices and implementation capacity. For instance, while green infrastructure is widely advocated (Thomson & Newman 2021), Lagos workspaces often underprioritize it, focusing instead on short-term functional technologies. Thus, Lagos represents both a testbed and a challenge for embedding sustainability into nomadic workspaces, requiring solutions that are not only technologically advanced but also culturally legible and climatically resilient.

Synthesis

Taken together, the literature suggests that sustainable design for digital nomads is most effective when passive and active systems complement one another and are communicated

clearly to users. Passive strategies promise long-term ecological and cultural value, yet remain underrecognized, while active technologies are highly valued but sometimes over-relied upon due to their visibility. Nomadic workspace needs further complicate this picture, demanding flexibility, simplicity, and biophilic qualities that Lagos has yet to integrate fully. The Lagos context intensifies these dynamics, positioning the city as a critical laboratory for reconciling sustainable ambitions with practical constraints. This creates a clear gap for studies that assess not only awareness and preferences but also how cultural, infrastructural, and climatic realities mediate the adoption of sustainable workspace strategies.

Study Area

The study area encompasses the Lagos metropolis, a prominent hub for digital nomads in West Africa, characterized by its tropical coastal climate and rapid urban expansion. Positioned along the Gulf of Guinea, Lagos experiences consistently high temperatures, intense solar radiation, and pronounced seasonal rainfall. Within this context, three districts (Victoria Island, Lekki, and Yaba) were identified for their concentration of coworking venues, serviced apartments, and short-stay rentals catering to remote workers. These districts collectively represent a spectrum of building densities, typologies, and infrastructure reliability, thereby providing a comprehensive setting in which to evaluate awareness of and preferences for passive and active sustainable design strategies.

Study Population and Size

The population for this study comprised digital nomads who resided or worked temporarily in Lagos for at least one month and relied on digital technologies to perform professional tasks remotely. With no formal register of this group available, the population was treated as effectively infinite. Using Cochran's approach for an infinite population and standard assumptions (95% confidence level, 5% margin of error, maximum variability), a target of 385 valid questionnaire responses was established to ensure statistical reliability.

Data Collection Methods

Data collection was conducted solely through a structured questionnaire designed to measure both awareness of passive sustainable strategies, such as natural ventilation, solar shading, and optimal building orientation, and preferences for active systems, including sensor-driven lighting controls, HVAC management, and real-time energy-monitoring dashboards.

Ethical Considerations

This study adhered to established research ethics to ensure the integrity of the process and the protection of participants. Participation was entirely voluntary, and informed consent was obtained prior to questionnaire administration. Respondents were assured of anonymity and confidentiality, with no personal identifiers collected. Data were used solely for academic purposes and stored securely to prevent unauthorized access. Care was taken to avoid leading questions or coercion, and participants were free to withdraw at any point without consequence. The study design complied with ethical guidelines of social science research and aligned with institutional requirements for postgraduate studies.

Data Analysis

Upon completion of data collection, questionnaire responses were coded and imported into IBM SPSS for analysis. Descriptive statistics (frequencies, percentages, means, and standard deviations) were generated to profile demographic characteristics and baseline awareness levels. Inferential analyses, including Chi-square tests for categorical variables and independent-samples t-tests to compare mean preference scores across subgroups (e.g., duration of stay, accommodation type), were employed to identify significant relationships between respondent attributes and sustainable-design preferences. Open-ended responses were reviewed manually to contextualize quantitative findings, without recourse to qualitative analysis software.

Results and Discussion

This study examines digital nomads' awareness and preferences regarding passive and active sustainable design measures in Lagos workspaces. Using a survey of 384 respondents, we analyzed their demographic profiles, familiarity with sustainable concepts, and the importance they attached to specific features. Descriptive and inferential statistics were employed to identify key trends and subgroup differences.

Demographic Profile of Respondents

Table 1: Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage (%)
Age	18–24	78	20.3
	25–34	231	60.2
	35–44	75	19.5
Gender	Male	243	63.3
	Female	136	35.4
	Other	5	1.3

Characteristic	Category	Frequency	Percentage (%)
Occupation	Freelancer	132	34.4
	Remote Worker	147	38.3
	Entrepreneur	72	18.8
	Other	33	8.6
Duration as Nomad	<1 year	45	11.7
	1–3 years	156	40.6
	4–6 years	123	32.0
	7+ years	60	15.6

Source: Authors' Fieldwork, 2025

The data reveals that most digital nomads in Lagos fall within the 25–34 age group, aligning with global trends that associate this lifestyle with millennials and younger professionals. A male majority (63.3%) suggests a gender disparity in digital mobility in this region. The occupational distribution indicates a dominance of remote workers (38.3%) and freelancers (34.4%). In comparison, nearly 41% of respondents have been nomads for at least four years, showing a stable nomadic population with sustained exposure to workspaces.

Analysis by Research Objectives

This section presents a structured analysis of the collected data to evaluate the awareness, preferences, and perceptions of productivity among digital nomads about passive and active sustainable design strategies in Lagos-based workspaces. Both descriptive and inferential statistics were employed using IBM SPSS to establish patterns, quantify central tendencies, and test for statistically significant associations between variables. Graphical visualizations complement the tabular outputs to enhance interpretability.

Table 2: Awareness of Passive Sustainable Design Measures

Concept	Mean	Std. Deviation
Passive cooling (natural ventilation)	3.82	1.21
Daylighting	3.45	1.34
Green roofs/walls	2.67	1.42
Smart lighting systems	3.89	1.18
Energy-efficient HVAC systems	3.76	1.23

Source: Authors' Fieldwork, 2025

Among the passive strategies examined, intelligent lighting systems had the highest familiarity (Mean = 3.89), closely followed by passive cooling. Green roofs/walls showed a significantly lower mean (2.67), indicating a pronounced knowledge gap in more

biologically integrated passive strategies. This disparity may be rooted in the lack of visible implementation or education on biophilic architecture within Lagos-based workspaces.

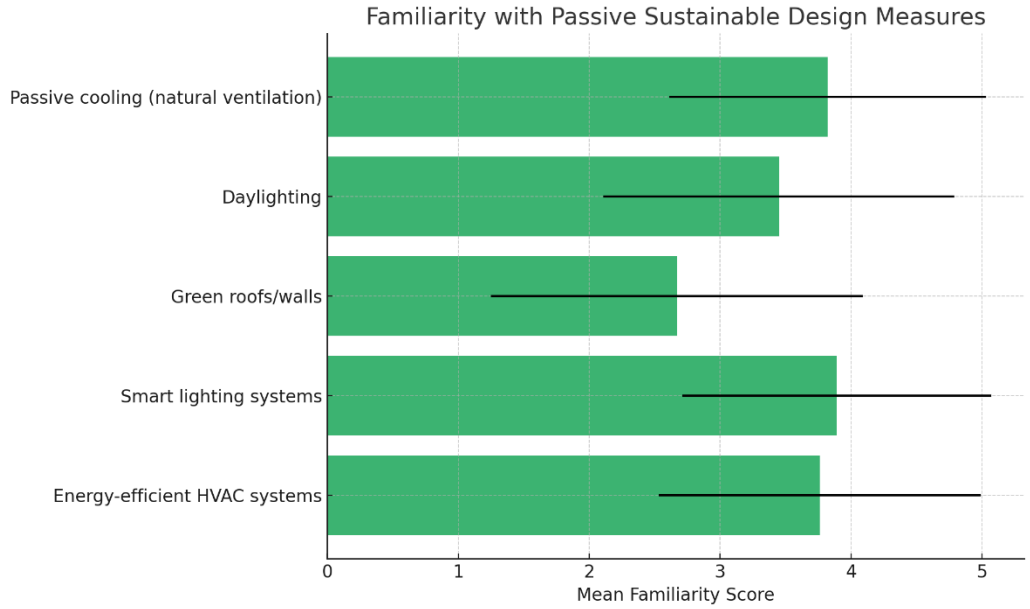


Figure 1: Horizontal Bar Chart Showing Familiarity with Passive Sustainable Design Measures; Source: Author's Field Survey and SPSS Output (2025)

Table 3: Importance of Active Sustainable Technologies

Feature	**Mean**	**Std. Deviation**
Natural ventilation	4.32	0.91
Renewable energy (solar panels)	4.15	0.98
Adaptive shading	3.78	1.12
Smart energy management	4.21	0.95
Sustainable materials	3.65	1.24

Source: Authors' Fieldwork, 2025

Respondents placed the highest value on natural ventilation (Mean = 4.32), underscoring its perceived direct impact on air quality and thermal comfort. Intelligent energy management also ranked highly, suggesting a strong preference for efficiency-enhancing technologies. In contrast, sustainable materials received the lowest importance score, perhaps due to limited awareness of material sustainability or its less tangible benefits in daily workspace use.

Table 4: Impact of Environmental Factors on Productivity

Factor	Mean	Std. Deviation
Natural lighting	4.56	0.73
Air quality	4.48	0.81
Noise control	4.23	0.92
Temperature regulation	4.37	0.85
Access to outdoor spaces	3.89	1.14

Source: Authors' Fieldwork, 2025

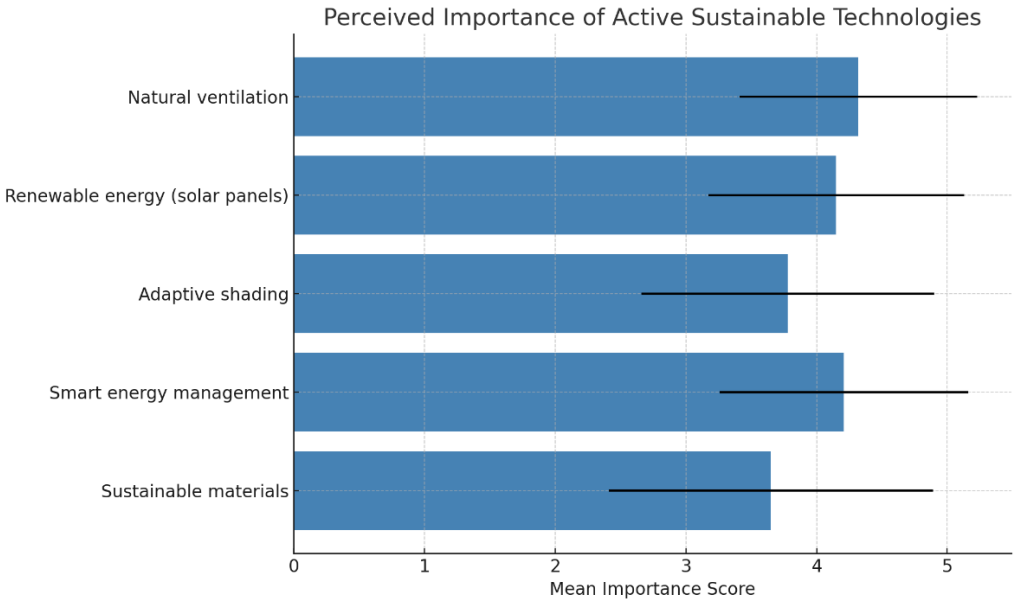


Figure 2: Horizontal Bar Chart Showing Perceived Importance of Active Sustainable Technologies; Source: Author's Field Survey and SPSS Output (2025)

The highest-rated productivity drivers were natural lighting (Mean = 4.56) and air quality (Mean = 4.48). These findings emphasize the psychological and physiological importance of well-ventilated, naturally lit spaces. Interestingly, access to outdoor spaces had the lowest score (Mean = 3.89), suggesting that while desirable, such amenities are secondary to core indoor environmental controls in productivity perception.

Table 5: Duration as Nomad vs. Preference for Passive Design

Duration	Passive Cooling (Mean)	Daylighting (Mean)	p-value
<1 year	3.45	3.12	0.021*
1–3 years	3.78	3.41	0.015*
4–6 years	3.92	3.58	0.008*
7+ years	4.10	3.75	0.003*

Source: Authors' Fieldwork, 2025

A clear and statistically significant trend ($p < 0.05$) was observed: the longer individuals have been digital nomads, the greater their appreciation for passive design measures. This suggests that extended exposure to diverse workspace conditions may cultivate a deeper understanding of the benefits of natural ventilation and daylighting, likely through first-hand experience.

Table 6: Occupation vs. Importance of Active Technologies

Occupation	**Smart Energy Management (Mean)**	**Renewable Energy (Mean)**	**p-value**
Freelancer	4.15	4.02	0.042*
Remote Worker	4.28	4.18	0.023*
Entrepreneur	4.32	4.25	0.011*

Source: Authors' Fieldwork, 2025

Statistically significant differences emerged in how occupational groups rated the importance of active technologies ($p < 0.05$). Entrepreneurs placed the highest value on intelligent energy systems and renewable energy. This may reflect their heightened sensitivity to operational efficiency and cost-effectiveness, possibly tied to managing small teams or personal investments in coworking infrastructure.

Summary of Key Findings

The study revealed that the digital nomad population in Lagos is predominantly composed of individuals aged 25 to 34, with males constituting the majority of this group. Most participants identified as either remote workers or freelancers, and a considerable proportion had been practicing digital nomadism for over a year. This indicates a relatively mature and experienced group whose preferences have likely been shaped by sustained exposure to diverse working environments. In terms of awareness of passive sustainable design measures, digital nomads demonstrated moderate familiarity. Intelligent lighting systems and passive cooling techniques such as natural ventilation were the most recognized strategies, reflecting a general appreciation for systems that directly affect thermal and visual comfort. However, green roofs and walls received the lowest familiarity scores, highlighting a significant knowledge gap regarding biophilic and nature-based passive solutions. This suggests the need for awareness and visibility of such features in workspace design. When evaluating the perceived importance of active sustainable technologies, natural ventilation and intelligent energy management systems emerged as the most valued features. Respondents expressed a clear preference for technologies that promote air movement, thermal comfort, and energy efficiency. On the other hand, sustainable materials were considered least important, implying that the

benefits of material sustainability are either under-communicated or not as tangibly experienced by users.

Environmental factors affecting productivity were also assessed. Natural lighting and indoor air quality were identified as the most critical elements for maintaining focus and comfort, followed by temperature regulation and noise control. Interestingly, access to outdoor spaces was rated the lowest, suggesting that while outdoor amenities are appreciated, digital nomads prioritize core indoor environmental qualities that directly impact work performance.

Further analysis revealed that the duration of digital nomadism had a significant influence on the preference for passive design features. Those with more years of nomadic experience reported higher appreciation for passive cooling and daylighting strategies. This trend suggests that prolonged exposure to various workspace conditions fosters a deeper understanding and appreciation of environmentally responsive design elements.

Occupational differences also played a role in shaping attitudes toward sustainability. Entrepreneurs, more so than freelancers or remote workers, place a higher premium on active technologies, such as intelligent energy systems and solar panels. This group's greater interest in sustainable technologies may stem from their operational responsibilities or long-term investment thinking, which favours efficiency, resilience, and brand positioning. Overall, the findings suggest that digital nomads in Lagos are becoming increasingly aware of the importance of environmental quality in workspace design. There is a pronounced demand for active technologies that enhance comfort and efficiency. However, awareness of passive and nature-based strategies remains limited, particularly among less experienced users. These insights highlight the importance of integrating sustainable features into design and enhancing user education to foster a broader appreciation and utilization of sustainable practices.

Conclusion and Recommendations

This study explored the awareness, preferences, and productivity-related impacts of sustainable design features among digital nomads in Lagos. The findings provide meaningful insights into how this unique and growing population perceives both passive and active sustainable measures in contemporary workspaces. While respondents demonstrated a relatively high appreciation for active technologies, particularly natural ventilation and intelligent energy management, there was moderate awareness of passive features, such as daylighting and natural ventilation, and a markedly low familiarity with ecologically integrated systems, like green roofs and walls.

Notably, the data revealed that longer-term digital nomads exhibit a more refined understanding and preference for passive sustainable strategies, likely resulting from prolonged exposure to various workspace environments. Similarly, entrepreneurs displayed a stronger inclination toward investing in active sustainable technologies,

suggesting that economic orientation and user roles influence sustainability values. Environmental elements such as natural lighting and air quality were found to have the most significant impact on productivity, further reinforcing the need for workspace designs that prioritize occupant comfort and environmental control. Digital nomads in Lagos are not only receptive to sustainable design; they are also actively promoting it. However, they are actively influenced by it in their daily performance and long-term preferences. However, gaps in awareness, especially concerning passive ecological features, must be addressed through targeted education, experiential engagement, and design transparency.

Recommendations

i. Incorporate Core Active Sustainability Features in Workspace Design: Designers and workspace developers should prioritize natural ventilation, intelligent energy management systems, and energy-efficient lighting as standard features. These are consistently rated highly by digital nomads for their comfort and functional benefits.
ii. Promote Awareness and Visibility of Passive Design Elements: There is a pressing need for educational initiatives through digital signage, user guides, or interactive displays to inform users about passive systems such as green roofs, daylighting strategies, and thermal massing. Design strategies should not only be integrated but also made visible and explainable to occupants.
iii. Leverage Long-Term Users as Sustainability Advocates: Experienced digital nomads showed greater alignment with sustainable preferences. Co-working space operators and architects can engage long-term users to share their knowledge or participate in peer-led sustainability campaigns, further fostering a culture of environmental consciousness.
iv. Customize Workspaces Based on Occupational Profiles: Entrepreneurs, remote workers, and freelancers differ in their expectations. Designers should consider modular and adaptive workspace solutions that respond to the specific technological and environmental needs of these user types. For instance, energy dashboards may appeal more to entrepreneurs managing operational costs.
v. Enhance Biophilic Integration and Green Infrastructure: Although underappreciated, biophilic design components such as green walls, roof gardens, and access to vegetative elements should be incorporated more boldly. Their health and psychological benefits are well-documented, and increasing their presence in shared workspaces can improve both wellness and sustainability literacy.
vi. Conduct Longitudinal and Experimental Studies: Future research should involve longitudinal tracking of digital nomads' workspace experiences and possibly

experimental interventions. This would help quantify the real-time benefits of specific sustainable features and validate design investments.

vii. Policy and Certification Incentives: Urban planning authorities and workspace certifying bodies in Nigeria should consider frameworks that incentivize sustainable office design. This can include tax benefits, fast-tracked permits, or inclusion in green directories, particularly for spaces that serve the mobile and digital workforce.

Study Limitations

The study was limited by its reliance on self-reported data, which may be influenced by respondent bias or incomplete awareness of sustainable design features. The absence of a formal register of digital nomads in Lagos meant that sampling relied on accessibility, which may not fully capture the diversity of the population. The cross-sectional design provides insights at a single point in time but does not account for evolving preferences or long-term behavioural shifts. Finally, infrastructural and cultural variations across different districts of Lagos may limit the generalizability of the findings to other urban contexts.

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