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RESEARCH ARTICLE

Assessment of Sustainable Indigenous Building Materials in Selected Resorts in Lagos State, Nigeria

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ABSTRACT

In Nigeria, the move towards sustainable construction has spurred growing interest in locally sourced building materials that meet climatic and cultural needs while minimising environmental impact. This study examines the use and perceived adoption of five sustainable indigenous building materials (compressed earth blocks, bamboo, laterite, timber and stone) in three case-study resorts in Lagos State, Nigeria: La Campagne Tropicana Resort, Ibeju-Lekki (Case 1); Whispering Palms Resort, Iworo, Badagry (Case 2); and Rosh Beach Resort, Badagry (Case 3). A case-study design combined photographic and checklist-based observation with a structured questionnaire survey, yielding 110 valid responses (54, 26 and 30 from Cases 1, 2 and 3, respectively). Data were analysed using descriptive statistics, one-way analysis of variance (ANOVA) and Tukey's honestly significant difference test. Timber recorded the highest overall mean (M = 3.57), followed by bamboo (3.36), stone (3.21), compressed earth blocks (3.08) and laterite (2.89). Scores for compressed earth blocks, laterite and stone differed significantly among the resorts, with Rosh Beach Resort lowest for all three, whereas bamboo and timber did not differ significantly. Observations recorded indigenous materials in walls, floors, roofs, ceilings, partitions, fences, structural elements and furniture, and showed that Rosh Beach Resort was built predominantly of bamboo, timber and other plant-based materials. The use of indigenous materials in contemporary resort architecture in Lagos is therefore established but uneven across materials, building components and resorts.

Keywords: *Indigenous materials; Resort architecture; Adoption; Lagos*

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1. INTRODUCTION

There is a growing need for the built environment to become less resource-intensive, to reduce embodied environmental impacts and to depend less on energy-intensive construction systems (Grierson, 2009; Zabihi et al., 2012). The issue is of great concern in Nigeria, where reliance on conventional industrial materials has been significant, and urbanisation is accelerating. Local resources and building methods have therefore become a focus of research in sustainable building, because they can limit environmental impacts while remaining adaptable to climatic and socio-cultural conditions (Erebor et

al., 2023; Unegbu et al., 2025; Yahia et al., 2024). Indigenous materials such as earth, laterite, bamboo, timber and stone are particularly relevant because they are closely linked to indigenous resources, construction knowledge and architectural traditions (Onyegiri & Ugochukwu, 2016; Taiwo & Adeboye, 2013).

However, being locally sourced is not the only factor that determines the sustainability of a material. Sustainable construction is usually considered in environmental, economic, and social terms (Gültekin et al., 2018; Ogunnaike et al., 2025; Syam et al., 2023), and material selection involves performance, availability, processing needs, durability, skill requirements, and maintenance (Windapo et al., 2022). Appropriate stabilisation and construction techniques can improve the structural and moisture performance of earth-based materials, which can also offer useful thermal properties (Abimaje et al., 2017; Akinwumi et al., 2015). Bamboo has attracted attention because of its structural efficiency and potential construction uses (Ameh & Shittu, 2021). Timber and stone remain significant in tropical architecture because of their functional and architectural flexibility, while laterite remains part of the material vocabulary of indigenous architecture in south-west Nigeria (Olaniyi et al., 2020; Olukunle, 2022).

The study of material adoption is especially relevant to resort architecture. Unlike many conventional building typologies, resorts can focus strongly on place identity, landscape integration, material expression, and user experience. Research on Nigerian resort architecture has documented the use of bamboo, stone, laterite, and other locally available materials in environmentally responsive and culturally grounded design (Adebayo & Ayeni, 2023). International research also shows that locally sourced and ecological materials can be incorporated into modern resort architecture without being confined to traditional architectural styles (Nurzein & Safeyah, 2024). Despite this body of literature, there is limited empirical evidence on the use of a range of indigenous materials across different resorts in Lagos State. Previous Nigerian studies have tended to address housing and affordability (Akinkunmi, 2022), individual materials or material performance, and general sustainable construction, while work on materials for resort design in Lekki, Lagos has focused on suitability and maintenance (Malomo et al., 2025). A comparative assessment is therefore needed that considers the use and extent of indigenous materials across the different building components of resorts.

This study aims to fill this gap by examining selected resorts in Lagos State through direct observation and user-based assessment. It evaluates the utilisation and adoption of sustainable indigenous building materials in these resorts and addresses four research questions: (1) which sustainable indigenous building materials do the selected resorts use; (2) what is the perceived level of use of the identified materials; (3) are there significant differences in the perceived level of use of the identified materials between the selected resorts; and (4) in which building components do the materials feature?

2. LITERATURE REVIEW

Indigenous Building Materials and Sustainable Construction

Indigenous building materials are materials that can be sourced from the local environment and are commonly used in local building practices. In Nigeria, examples include earth, laterite, timber, bamboo, stone, and other plant materials. Their importance in sustainable construction lies in their local availability, reduced transportation, compatibility with regional climatic conditions, and connection with traditional knowledge systems (Iweka & Adebayo, 2010; Odeyale & Adekunle, 2008; Onyegiri & Ugochukwu, 2016). Environmentally, sustainable architecture focuses on resource efficiency and on minimising ecological footprint (Adedeji et al., 2013; Taiwo et al., 2012). However, the environmental benefits of indigenous materials depend on their sources, processing, durability, and construction practice.

Earth-based construction is one of the best-documented indigenous construction methods in Nigeria. Akinwumi et al. (2015) described indigenous earth construction technology in Ota and showed that this knowledge remains relevant. A review of compressed stabilised earth bricks similarly found that, where appropriate production and stabilisation processes are used, they can serve as sustainable alternatives to conventional materials (Abimaje et al., 2017). Earth-based walls have also been found to provide thermal mass that helps moderate indoor temperatures in warm climates (Giuffrida et al., 2024; Samuel et al., 2017), which benefits passive cooling and energy reduction. Other building-material properties, such as surface colour and reflectivity, likewise influence indoor thermal conditions, thermal comfort, and cooling energy demand (Etim & Akwa, 2026). Other locally available materials have been linked to reduced construction costs (Akinkunmi, 2022; Alade et al., 2018), and lateritic interlocking blocks have been compared with sandcrete hollow blocks (Oyebisi et al., 2018).

Bamboo is another important local material. Its rapid growth, relatively high strength-to-weight ratio, and versatility in construction and interior applications have encouraged research into its contemporary use. Ameh and Shittu (2021) studied laminated bamboo boards as a replacement for timber boards and concluded that they were suitable for building applications. Nwoke and Ugwuishiwu (2011) likewise identified bamboo and earth construction as resources for affordable and environmentally friendly buildings in Nigeria, and bamboo-based panels have been tested for structural performance (Daud et al., 2018). In tropical buildings, timber is one of the most commonly used materials and has been linked with restorative indoor environments. Studies report that wood-rich environments are perceived as more restorative (Demattè et al., 2022) and that exposure to a wooden environment has a beneficial effect on one physiological indicator of wellbeing (Kumpulainen et al., 2024). These findings are relevant to resorts, which are designed for leisure and relaxation.

Sustainability also has social and cultural dimensions. Using indigenous materials in contemporary buildings, if done in a technically appropriate manner, can sustain vernacular knowledge and continuity (Lodson et al., 2018; Olaniyi et al., 2020). In resort architecture, this dimension matters because landscape, material expression, and sense of place are closely tied to architectural character. Several factors hinder the use of indigenous materials. The negative perception of local materials as inferior or outdated, together with inconsistent availability, is cited as a major factor limiting their use (Windapo et al., 2022). To be durable, raw earth and bamboo must be stabilised, protected and maintained (Alade et al., 2018). These factors are important when interpreting the perception-based adoption scores in this study.

Indigenous Materials in Resort Architecture

In tropical contexts, resort architecture often reflects climate, landscape, and identity through its material and spatial approach. Adebayo and Ayeni (2023) investigated the use of bamboo, stone and laterite in resort architecture in Nigeria and highlighted the importance of indigenous materials in modern tourism settings. The local suitability of materials also falls within ecological architectural strategies that link buildings to their environmental context (Nurzein & Safeyah, 2024), and the design of resorts with eco-friendly materials has been explored in Nigeria (Ekhaese & Ndimako, 2023). Materials are especially important in the coastal environment of Lagos, where buildings are exposed to high humidity, rain, solar exposure, and salt-laden air that place demands on the building envelope and finishes. In the tropics, passive environmental strategies such as external shading designed from sun-path analysis are also used to reduce solar heat gain and glare and to improve occupant comfort (Eberendu & Okafor, 2026), so material choice in resorts interacts with wider passive design decisions. The adoption of indigenous materials must therefore be understood in terms of where they are used, how much they are used, and whether they are openly expressed or integrated into other construction systems. This study accordingly examines adoption at both the material and the building-component level.

3. MATERIALS AND METHODS

Research Design

A mixed-methods comparative case-study design (Creswell & Plano Clark, 2018) was used. The quantitative component used a structured questionnaire survey to collect respondents' perceptions of the presence and adoption of the selected indigenous building materials. The qualitative component involved direct observation of buildings and building components within the selected resorts, with photography used to document the findings. Together, these strategies allowed the study to relate perceived adoption to actual applications.

Study Area and Case Selection

The three resorts in Lagos State were purposively chosen because they represent recognisable instances of locally responsive and/or indigenous material use in resort settings and are located within the wider coastal and tourism context of the state. Case 1, La Campagne Tropicana, is sited between the Atlantic Ocean and a neighbouring lagoon in Ikegun, Ibeju-Lekki. It was established over 40 years ago and offers five accommodation typologies (Eti-Oso, Oso, Ilerigi, Obieze and Laba). Case 2, Whispering Palms Resort, is located at Iworo, Badagry. It was built in the 1980s and incrementally expanded to 122 rooms on over 10 hectares in a predominantly low-rise development. Case 3, Rosh Beach Resort, is located at Suntan Beach, Badagry. It is the newest of the three, opened c. 2023, and features eight sea cabins, outdoor cabanas, a multipurpose hall and other recreational facilities.

Study Population and Sample

The study population consisted of resort users, namely visitors, employees, and facility managers at the selected resorts. A minimum sample size was determined using Cochran's (1977) formula for an unknown population, given in Equation 1.

Sample size (n) $= \frac{z^2pq}{e^2}$ (Eqn. 1)

Where:

z = standard normal value (1.645 at the 90% confidence level)

p = assumed population proportion (0.5)

$q = 1 - p$ (0.5)

e = margin of error (0.08, about 8%)

The formula yielded a minimum sample of 106. A total of 110 valid responses were subsequently obtained: 54 from La Campagne Tropicana, 26 from Whispering Palms Resort, and 30 from Rosh Beach Resort (Table 1). Table 1 shows that Case 1 contributed about half of the responses (49.1%), followed by Case 3 (27.3%) and Case 2 (23.6%).

Table 1. Distribution of questionnaire respondents.

Resort	Location	Valid responses	Share of sample (%)
La Campagne Tropicana	Ibeju-Lekki	54	49.1
Whispering Palms Resort	Badagry	26	23.6
Rosh Beach Resort	Badagry	30	27.3
Total	Lagos State	110	100.0

Data Collection

Information on the awareness and perceived utilisation of indigenous building materials (compressed earth blocks, bamboo, laterite, timber and stone) was gathered using a structured questionnaire. Items were rated on a five-point Likert scale (Likert, 1932) (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree), supplemented by categorical questions.

A site visit was conducted using an observation checklist to document the presence of the materials in walls, floors, roofs, ceilings, structural elements, furniture, and associated architectural elements. The observations were supported by photographs and field notes, and permission was sought from the resorts before visiting and taking photographs. Selected photographs are presented as figures in the Results and Discussion section.

Ethical approval for the study was obtained from the Covenant Health Research Ethics Committee (CHREC), Covenant University, Ota, Nigeria (protocol number CHREC/1252/2026; reference CUCMC/BPRE/1252/26; approval period 17 January 2026 to 16 January 2027). Respondents participated voluntarily and were informed of the academic purpose of the survey. Their responses were kept confidential and used solely for academic purposes.

Data Analysis

Material recognition and perceived adoption were summarised using descriptive statistics (frequencies, means and standard deviations). The five-point scale was interpreted using the mean score: a mean of 3.50 or above was considered high, a mean from 3.00 to 3.49 moderate, and a mean below 3.00 low. Mean scores were compared among the three resorts using one-way analysis of variance (ANOVA), and Tukey's (1949) honestly significant difference (HSD) test was applied for pairwise comparisons where the omnibus result was significant. Statistical significance was set at $p < .05$, and effect size (eta squared, η^2) was reported alongside each F ratio and its degrees of freedom. Observational data were analysed descriptively by material, building component and resort.

4. RESULTS AND DISCUSSION

Overall Assessment of Indigenous Materials

Table 2. Overall perceived use/adoption of selected indigenous materials.

Material	*N*	Mean	*SD*	Interpretation
Compressed earth blocks	110	3.08	1.52	Moderate
Bamboo	110	3.36	1.47	Moderate
Laterite	110	2.89	1.34	Low
Timber	110	3.57	1.37	High
Stone	110	3.21	1.48	Moderate

Scale: 1 = strongly disagree to 5 = strongly agree. High ≥ 3.50; Moderate = 3.00–3.49; Low < 3.00.

Timber recorded the highest overall mean score ($M = 3.57$, $SD = 1.37$). Bamboo followed with $M = 3.36$ ($SD = 1.47$), while stone and compressed earth blocks recorded means of 3.21 ($SD = 1.48$) and 3.08 ($SD = 1.52$), respectively. Laterite had the lowest mean score at 2.89 ($SD = 1.34$). The results indicate that the selected materials were not perceived as being adopted to the same extent across the resort sample.

Resort-Level Comparison

Table 3. Resort-level mean scores for selected indigenous materials.

Material	Resort	*N*	Mean	*SD*	Level
Compressed earth blocks	La Campagne Tropicana	54	3.57	1.28	High
	Whispering Palms	26	3.50	1.50	High
	Rosh Beach	30	1.83	1.21	Low
Bamboo	La Campagne Tropicana	54	3.59	1.37	High
	Whispering Palms	26	3.42	1.53	Moderate
	Rosh Beach	30	2.90	1.54	Low
Laterite	La Campagne Tropicana	54	3.37	1.25	Moderate
	Whispering Palms	26	3.08	1.16	Moderate
	Rosh Beach	30	1.87	1.11	Low
Timber	La Campagne Tropicana	54	3.65	1.36	High
	Whispering Palms	26	3.42	1.39	Moderate
	Rosh Beach	30	3.57	1.41	High
Stone	La Campagne Tropicana	54	3.72	1.23	High
	Whispering Palms	26	3.65	1.38	High
	Rosh Beach	30	1.90	1.16	Low

Scale and interpretation as in Table 2. The "Level" column gives the interpretation of each mean score on the five-point scale (1 = strongly disagree to 5 = strongly agree): Low = mean below 3.00; Moderate = mean from 3.00 to 3.49; High = mean of 3.50 or above.

There is clear variation in perceived adoption, particularly at the resort level. Compressed earth blocks had high mean scores at La Campagne Tropicana and Whispering Palms and a low score at Rosh Beach. Laterite followed a similar pattern, with moderate ratings at the first two resorts and a low rating at Rosh Beach. Stone was rated high at La Campagne Tropicana and Whispering Palms and low at Rosh Beach. Bamboo and timber showed a more varied spread. Bamboo was rated high at La Campagne Tropicana (M = 3.59), moderate at Whispering Palms (M = 3.42), and low at Rosh Beach (M = 2.90), whereas timber was rated high at La Campagne Tropicana (M = 3.65) and Rosh Beach (M = 3.57) and moderate at Whispering Palms (M = 3.42).

Differences among Resorts

Table 4. One-way ANOVA results for differences among the three resorts

Material	$F(2, 107)$	p	η^2	Result
Compressed earth blocks	18.535	< .001	.26	Significant
Laterite	15.773	< .001	.23	Significant
Stone	22.616	< .001	.30	Significant
Bamboo	2.218	.114	.04	Not significant
Timber	0.234	.792	.004	Not significant

= significant at the 0.05 level. N *= 110 in three groups, giving 2 between-groups and 107 within-groups degrees of freedom.*

The ANOVA showed significant differences among the resorts for compressed earth blocks, $F(2, 107) = 18.535$, $p < .001$, $\eta^2 = .26$; laterite, $F(2, 107) = 15.773$, $p < .001$, $\eta^2 = .23$; and stone, $F(2, 107) = 22.616$, $p < .001$, $\eta^2 = .30$. These are all large effects. For compressed earth blocks, both La Campagne Tropicana (mean difference = 1.74) and Whispering Palms (mean difference = 1.67) scored significantly higher than Rosh Beach, but the two did not differ significantly from each other. Laterite followed a similar pattern: La Campagne Tropicana (mean difference = 1.50) and Whispering Palms (mean difference = 1.21) both differed significantly from Rosh Beach but not from each other. For stone, the mean differences between Rosh Beach and La Campagne Tropicana (1.82) and between Rosh Beach and Whispering Palms (1.75) were significant, while the other two resorts did not differ from each other. Bamboo, $F(2, 107) = 2.218$, $p = .114$, $\eta^2 = .04$, and timber, $F(2, 107) = 0.234$, $p = .792$, $\eta^2 = .004$, showed no significant differences among the resorts, so the differences between their means are small enough to be attributed to chance.

Building-Component Applications

Direct observation documented the building components in which each material was applied (Table 5) and the materials found at each resort (Table 6). The photographic record is presented in Figures 1 to 9, grouped by material.

Table 5. Observed applications of selected indigenous materials across building components.

Material	Observed building-component applications	Resorts where observed	Figures
Compressed earth blocks	Wall construction (compressed and burnt brick walling in some chalets)	Whispering Palms; La Campagne Tropicana	1, 8
Bamboo	Wall construction, partitions, perimeter fencing, ceiling mats and partial roofing	La Campagne Tropicana; Rosh Beach; Whispering Palms (gazebos)	3–5
Laterite	Wall construction	Not visible; not photographed	–
Timber	Flooring, wall panels, roof rafters, ceiling panels, structural framing (columns and stilts), staircases, doors and furniture	All three resorts	4, 6, 7
Stone	Wall construction (cladding) and architectural/landscape applications	Whispering Palms; La Campagne Tropicana	2

Walling: Compressed Earth Blocks and Stone

Compressed earth blocks formed the walls of main buildings at Whispering Palms Resort (Figure 1). At La Campagne Tropicana, compressed and burnt brick walls were recorded in the Oso chalets (Figure 8b) and brick masonry in the Obieze chalets. None was found at Rosh Beach. Stone appeared at Whispering Palms as decorative wall cladding (Figure 2), and at La Campagne Tropicana in wall cladding and landscaping.



Figure 1. Compressed earth blocks as wall construction material at Whispering Palms Resort: (a) to (c) walls of buildings at the resort. Source: Authors' fieldwork.



Figure 2. Stone as wall cladding material at Whispering Palms Resort. Source: Authors' fieldwork.

Bamboo

Bamboo was the most versatile of the plant-based materials recorded. At La Campagne Tropicana the Eti-Oso chalets are walled in bamboo (Figure 3a), and other units combine bamboo with timber (Figure 3b). The Ilerigi chalets stand on timber stilts, are reached by timber staircases and are enclosed largely in bamboo (Figure 4). At Rosh Beach the sea cabins combine timber and bamboo (Figure 5a). Two kinds of bamboo were in use there (Figures 5b and 5c): a large hollow type, known locally as "Chinese bamboo", used mainly for perimeter fences, and a smaller solid local type that marks off internal spaces. The fences are built from poles set side by side and tied with locally sourced rope, so no industrial fasteners are needed. At Whispering Palms, bamboo and thatch were used in outdoor sitting areas and gazebos.



Figure 3. Bamboo and timber at La Campagne Tropicana: (a) bamboo as wall construction material for the Eti-Oso chalets; (b) hybrid of timber and bamboo as construction materials. Source: Authors' fieldwork.



Figure 4. Hybrid of timber and bamboo as construction materials for the Ilerigi beach-side chalet at La Campagne Tropicana: (a) timber staircase; (b) timber stilts supporting a bamboo-clad structure. Source: Authors' fieldwork.



Figure 5. Bamboo at Rosh Beach Resort: (a) hybrid of timber and bamboo as construction materials for the sea cabins; (b) and (c) the two types of bamboo used in perimeter fencing and internal demarcation. Source: Authors' fieldwork.

Timber

Timber was found in more components than any other material. The Eti-Oso chalets have raised timber floors (Figure 6a) and rest on timber columns bound at the core with locally sourced rope. Timber also forms roof rafters and the radial framing under thatch (Figures 6b and 6c), as well as stilts, staircases (Figure 4), doors, fascia boards and the intermediate floor and staircase of the Laba units. At Rosh Beach, seating was made from timber and local cane (Figure 7).



Figure 6. Timber in floor and roof construction: (a) timber as floor construction material, Eti-Oso chalet, La Campagne Tropicana; (b) and (c) thatch and timber as roof construction materials, Whispering Palms Resort. Source: Authors' fieldwork.

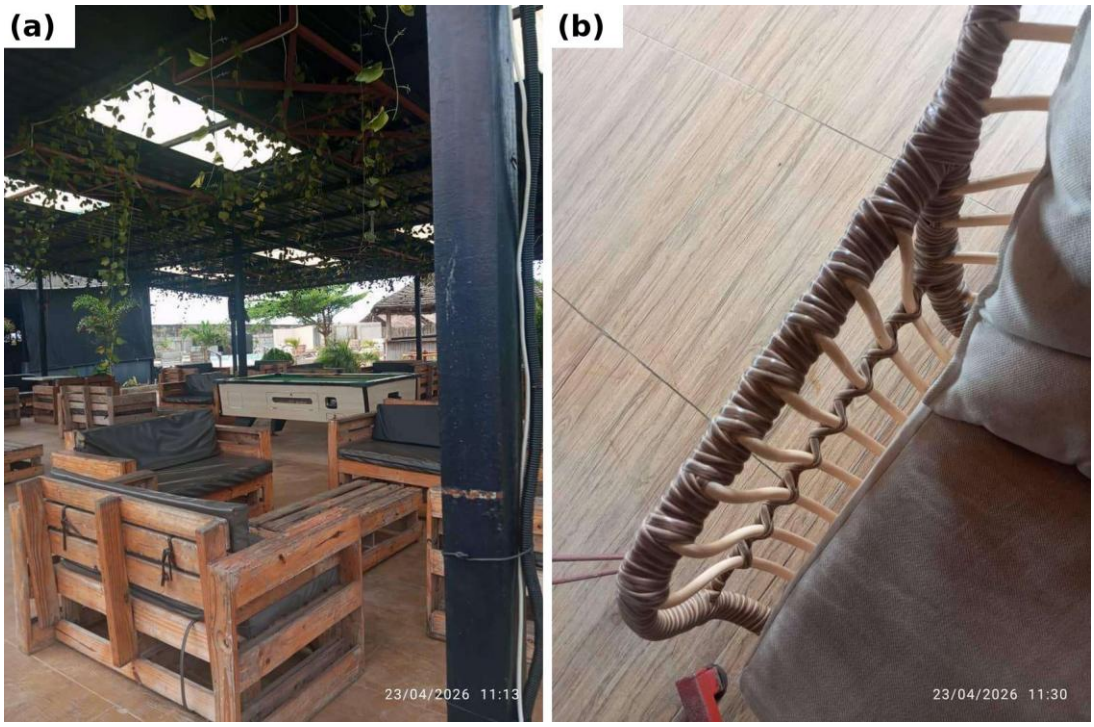


Figure 7. Furniture at Rosh Beach Resort: (a) chairs constructed from timber; (b) local cane used as the seat frame. Source: Authors' fieldwork.

Other Plant-Based Materials

The observation also recorded plant-based materials that were not included in the questionnaire. Dried thatch forms the roofs of the chalets at La Campagne Tropicana and of the gazebos and cabanas at Whispering Palms and Rosh Beach.

Woven mats line the ceilings of the Oso chalets at La Campagne Tropicana (Figure 8), and raffia mats line the ceiling of the multipurpose hall at Rosh Beach (Figure 9b). The beach cabanas at Rosh Beach have thatch tied to tree-wood members that act as both trusses and posts; some of these are living trees that sprout in the rainy season (Figure 9a).



Figure 8. Woven mats as ceiling covering material in the Oso chalets at La Campagne Tropicana: (a) chalet interior; (b) brick wall and doorway of a chalet. Source: Authors' fieldwork.



Figure 9. Thatch and raffia at Rosh Beach Resort: (a) timber and thatch as construction materials for the beachside cabanas; (b) raffia mats as ceiling covering for the multipurpose hall. Source: Authors' fieldwork.

Taken together, the observations show that none of the materials is confined to one job. Timber appeared in floors, wall panels, roof rafters, ceiling panels, structural framing and furniture. Bamboo appeared in walls, partitions, fences, ceiling mats and partial roofing. Compressed earth blocks and laterite were mainly walling materials, and stone was used for wall

cladding and in architectural and landscape features. The materials therefore differed not only in whether they were present but in how widely they were applied. Table 6 sets out the material mix at each resort.

Table 6. Summary of observed material applications by resort.

Resort	Observed indigenous materials and applications
La Campagne Tropicana	Bamboo walling (Eti-Oso and Ilerigi chalets); timber flooring, columns, stilts, staircases, doors and fascia boards; dried thatch roofing; compressed and burnt brick walling (Oso and Obieze chalets); woven or raffia mat and Ankara fabric ceilings
Whispering Palms Resort	Compressed earth block walling in main buildings; stone cladding; bamboo and thatch in gazebos and outdoor sitting areas; timber roof members. Accommodation blocks use machine-made bricks and reinforced concrete.
Rosh Beach Resort	Bamboo cabin walls, perimeter fencing and internal demarcation; timber doors, living-tree cabana supports and furniture; thatch cabana roofs; raffia mat ceilings in the multipurpose hall; cane seating; Ankara fabric ceilings in cabins

Discussion of findings

Overall Pattern of Adoption

The findings show that sustainable indigenous materials are already recognisable in the material vocabulary of the selected resorts in Lagos State, but the overall scores indicate that adoption is not perceived to be evenly spread. Timber scored highest (M = 3.57) and laterite lowest (M = 2.89). The high score for timber is consistent with its continued importance in tropical architecture, where it serves structural, finishing, and interior functions (Olaniyi et al., 2020; Olukunle, 2022), and it is supported by the observation records, which show timber in floors, roofs, stilts, staircases, and furniture at all three resorts (Figures 4, 6, and 7). Its popularity in leisure settings may also be linked to its perceived restorative qualities: Demattè et al. (2022) found that wooden indoor environments are perceived as more restorative, and Kumpulainen et al. (2024) reported improved physiological indicators of well-being in wooden interiors. The present study did not measure well-being, so these studies offer a plausible explanation rather than evidence of cause, but they are relevant to resorts, which are designed for relaxation. The comparatively low score for laterite, despite its place in the material vocabulary of south-west Nigerian architecture (Olukunle, 2022), may reflect the perception and availability problems that Windapo et al. (2022) identified, whereby local materials are seen as inferior or outdated and are inconsistently available.

Resort-Level Variation in Earth, Laterite and Stone

The results for compressed earth blocks, laterite and stone are of particular interest because scores varied considerably between resorts, and the ANOVA showed significant differences with large effect sizes (η^2 = .23 to .30). Compressed earth blocks were observed in the main buildings at Whispering Palms (Figure 1) and as brick walling in chalets at La Campagne Tropicana (Figure 8), but not at Rosh Beach. This is consistent with Nigerian studies showing that earth-based construction is technically viable when suitable production, construction and stabilisation methods are used (Abimaje et al., 2017; Akinwumi et al., 2015) and with Olukunle's (2022) account of earth as a sustainable building material in south-west Nigeria. In the hot-humid coastal setting of the resorts, earth walls may also be attractive for their thermal mass, which helps to moderate indoor temperatures (Giuffrida et al., 2024; Samuel et al., 2017), although thermal performance was not measured here. Stone showed the same pattern: it appeared as cladding at Whispering Palms and La Campagne Tropicana (Figure 2) but was not recorded at Rosh Beach.

For all three materials, Rosh Beach recorded the lowest scores, and the observation record helps to explain why. Rosh Beach, the newest of the three resorts, is built mainly of bamboo, timber, thatch, raffia and cane (Figures 5, 7 and 9), and no earth or stone walling was documented. The differences in scores therefore appear to reflect real differences in both material

palette and perception, and they show that the use of indigenous materials is not consistent across resort projects. Laterite was recorded as a walling material but was not visible for photography. As an earth-based material, it may have been rendered, painted, or otherwise covered, which could explain why its perceived adoption was lower than its presence would suggest. These patterns accord with evidence that the use of green building materials is shaped by perceptions and intentions (Puttamanjaiah & Thangamuthu, 2025) and that the extent of local-material use is related to perceived status and availability (Windapo et al., 2022). They also agree with studies showing that locally sourced materials can provide contextual architectural identity and sustainability when properly integrated (Adebayo & Ayeni, 2023; Lodson et al., 2018; Olaniyi et al., 2020).

Uniformity in Bamboo and Timber

In contrast, bamboo and timber showed no significant differences among the resorts, which suggests a more uniform pattern. Bamboo means ranged from 2.90 to 3.59, and timber means ranged from 3.42 to 3.65, so these materials appear to be more widespread across the sampled resorts than the other materials assessed. This agrees with studies that identify bamboo as a promising construction and interior material (Ameh & Shittu, 2021; Daud et al., 2018) and as a resource for affordable, environmentally friendly buildings (Nwoke & Ugwuishiwu, 2011), and that identify timber as an important local material in sustainable and vernacular construction (Lodson et al., 2018; Olaniyi et al., 2020). One difference deserves attention. The perceived use of bamboo was low at Rosh Beach (M = 2.90), where it was used extensively in cabin walls and perimeter fencing (Figure 5). Respondents may not have regarded fencing or landscape bamboo as a building material, although this was not tested and the difference between resorts was not statistically significant.

Perception, Observation and Building-Component Application

A key contribution of this study is the combination of perception data with direct observation. A material may be known but not recognised as having a constructional role, and a material that is physically present may be covered or made effectively invisible. Using both methods therefore gives a more complete estimate of adoption than either would alone. The observations also show the range of ways in which indigenous materials are applied, from walling to structural framing, roofing, flooring, partitions and furniture. This suggests that adoption should be judged not only by whether a material is present but by how and for what purpose it is used in a building. The observations further reveal the coexistence of indigenous and conventional materials: at Whispering Palms, machine-made bricks and reinforced concrete are used for the accommodation blocks, while indigenous materials are used for the walling of the main buildings and for outdoor structures. Such combinations may be partly explained by the need to stabilise, protect and maintain raw earth and bamboo to ensure durability (Alade et al., 2018) and by the persistence of negative perceptions of local materials (Windapo et al., 2022). Thatch, raffia and cane were also observed but were not included in the questionnaire, and future surveys would benefit from including them.

Thermal Comfort and Passive Environmental Performance

Although thermal performance was not measured, the findings can be read against wider evidence on how building materials and design strategies shape comfort in warm climates. Etim and Akwa (2026) used a numerical simulation to show that surface reflectivity strongly influences indoor temperature, thermal comfort, and cooling energy demand, with higher reflectivity lowering peak indoor temperatures and cooling load. Their work concerns surface properties rather than indigenous materials, but it underlines that material properties are environmental performance variables and not only questions of appearance or availability. For the resorts studied, this suggests that surface finish and colour (for example, the

rendering or painting of earth and laterite walls) may affect thermal comfort and merit measurement in future work, alongside the thermal mass of earth walls noted above (Giuffrida et al., 2024; Samuel et al., 2017).

In the same way, Eberendu and Okafor (2026) reviewed shading designs derived from sun-path analysis and reported that they reduce solar heat gain and glare and improve indoor environmental quality and occupant comfort in tropical buildings. That review does not address indigenous materials directly, but it is relevant to the resort context. The thatch roofs, raised timber structures on stilts and bamboo screening observed in this study (Figures 4 to 6 and 9) may contribute to shading and ventilation, although this was not assessed. The adoption of indigenous materials is therefore best understood together with passive design strategies suited to the tropical microclimate, and pairing the two, then testing them through measured environmental performance, would strengthen the case for wider use.

Limitations

Several limitations apply to this study. The three resorts were chosen purposively, the groups were unequal in size (26 to 54 respondents), and the sample was not intended to represent every resort in Lagos State. Questionnaire responses record what people perceive, not how materials perform. The photographs show how materials are applied but not how much of a building they cover. The study therefore compares adoption across resorts; it does not certify the structural, thermal or life-cycle performance of any material.

5. CONCLUSION

This study evaluated the utilisation and adoption of five sustainable indigenous materials (compressed earth blocks, bamboo, laterite, timber and stone) in three tourist resorts (La Campagne Tropicana, Whispering Palms Resort and Rosh Beach Resort) in Lagos State, Nigeria. In response to the first objective, all five materials were recorded at the resorts, together with other materials that were not in the questionnaire, namely thatch, raffia, woven mats and cane. Regarding perceived adoption, respondents rated timber highest (M = 3.57), and it was the only material in the high band. The moderate materials were bamboo (3.36), stone (3.21), and compressed earth blocks (3.08), and laterite was lowest (2.89). The third objective was to test for differences in ratings between the resorts. Significant differences were found for compressed earth blocks, laterite and stone, with large effects (η^2 = .23 to .30) and with Rosh Beach consistently the lowest scorer, but not for bamboo or timber. The observations help to explain this pattern: no earth or stone walling was found at Rosh Beach, the newest resort, which was built mainly from bamboo, timber, thatch, raffia and cane. Regarding the fourth objective, indigenous materials were found in walls, floors, roofs, ceilings, partitions, fences, structural framing and furniture, as the figures show. Timber was used in the widest variety of ways, followed by bamboo, while compressed earth blocks, laterite and stone were largely limited to walling. Many of these materials form part of working building systems and, although conventional brick and concrete are still used alongside them, as in the accommodation blocks at Whispering Palms, the indigenous materials are not merely decorative or traditional features. The use of indigenous materials is therefore a reality in current resort architecture in Lagos State, but the extent of adoption depends on the material and the context. Practitioners are advised to specify the role of each material, to consider stabilisation, treatment, detailing and maintenance, and to pair indigenous materials with passive design strategies suited to the tropical climate (Eberendu & Okafor, 2026; Etim & Akwa, 2026). The results make no definitive statement on material performance, because they rest on three purposively selected resorts and on perception data. Future work should include more resorts and materials such as thatch, raffia and cane, and should link adoption studies with measured environmental performance, life-cycle assessment and post-occupancy evaluation.

For architects and developers, the findings argue for judging indigenous materials by the specific function they serve in a building, rather than as a single group. Earth needs stabilisation, careful detailing and protection from moisture. Bamboo needs treatment and well-designed connections. Timber needs the right species, protection and upkeep. Stone and laterite call for attention to sourcing, durability and construction quality (Alade et al., 2018; Windapo et al., 2022). Thatch and woven mats, which are widely used in these resorts, also need protection and upkeep; at Whispering Palms, for instance, thatch roofs were covered with tarpaulin. In resorts, these technical points can be combined with material choices and passive design strategies that respond to local climate and identity (Eberendu & Okafor, 2026; Etim & Akwa, 2026).

6. COMPETING INTERESTS

None to declare.

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