Contemporary Interiors Inspired by Sustainable Solutions in Vernacular Design

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Vernacular design has historical and cultural value that represents a local identity. It emerges from the surrounding environment, is inspired by nature, utilises local materials and traditional construction methods, and considers the geographical and climate features of the region. Therefore, most vernacular designs offer sustainable solutions. Despite the abundance of research on sustainable design, few studies have addressed the relationship between vernacular and contemporary sustainable interior design solutions. Hence, the objective of this research is to examine whether sustainable vernacular design solutions can be revived and how they can inspire modern concepts of sustainability. The present article offers a review of literature on sustainable applications of heritage design, including a selection of architectural and interiors examples showcasing the revival of vernacular design. A survey was conducted to determine the potential of extending and implementing traditional concepts into contemporary design. This research reveals that sustainable solutions are an integral part of vernacular design, which may bolster the effectiveness of contemporary sustainability.

**Key words:** heritage design; interior design; sustainability; sustainable interior design; vernacular sustainable solutions; vernacular interior design

**INTRODUCTION**

Sustainability is a complicated subject, as it encompasses multiple concepts. Interior design sustainability faces a variety of hurdles, as construction consumes a high volume of materials and produces a large amount of waste (Rashdan and Ashour, 2017). However, responsible designers have found that traditional design solutions could be beneficial case studies for sustainable concepts and practices in contemporary design (McDonough and Braungart, 2010; Angen, 2013). Vernacular interior design consists of a location-specific identity and the
traditions of societies within the region. It is reflected in heritage buildings, physical environments, and construction practices that emerged from the surrounding environment and evolved throughout centuries of traditional wisdom (Praseeda, Mani and Reddy, 2014). These traditional buildings adopt materials and designs that suit the local climate, environment, and socio-economic patterns (Rodwell, 2014). Several projects have implemented heritage-based interior design solutions, thus indicating the potential of extending traditional concepts into contemporary design (Oliver, 2007; Al-Kodmany, 2014). Heritage-based interior design preserves the local identity while maintaining the inhabitants’ lifestyles and wellbeing, along with saving environment resources (Adam, 2012). The present paper argues that integrating sustainable solutions of vernacular design into contemporary design can positively influence sustainability in today’s built environment. Diverging from most of the existing literature, however, this research focuses on applications of vernacular design and elements in contemporary design and technology. This study is significant, as it illustrates sustainable solutions in vernacular constructions and strengthens their relevance to contemporary design.

A literature review was conducted to explore the vernacular sustainable concepts and applications present in both heritage and contemporary designs, including books and journal articles. A qualitative research methodology was selected, which is based on the content analysis method. This research is comprised of four main stages: de-contextualisation, re-contextualisation, categorisation, and compilation (Bengtsson, 2016). Reliability was achieved by replicating this process with multiple references, thus validating the results obtained. The study also explored visual examples that were aimed at preserving the values, meanings, and flexibility of sustainable design elements that maintain a vernacular design identity while adapting to contemporary trends. Finally, the researchers conducted a survey to determine whether vernacular sustainability could be revived within contemporary design applications, followed by a quantitative analysis of the survey findings.

VERNACULAR SUSTAINABILITY

The rising phenomena of globalisation and modern design are responsible for the mass consumption of resources, the generation of large amounts of waste, and detrimental contributions to atmospheric pollution (Guedouh et al, 2019). Therefore, the improvement of new, healthy, and comfortable prototypes of exceptionally sustainable buildings is crucial to future development (Zhai and Previtali, 2010). Sustainable solutions in vernacular design can considered as an alternative approach to improve environmental performance and achieve significant transformations in building design attitudes, methods, and construction procedures (Guedouh and Zemmouri, 2017). The term “vernacular design” refers to local buildings that have grown in the fullness of time in one locality (Glassie, 2000). Most of the buildings in the world—ordinary buildings built by ordinary people—are thought to be vernacular. Buildings built by local residents with local materials using hand-built construction methods create a lasting architecture that is specific to place and culture.
Vernacular design solutions respond to the constraints of climate, material availability, and cultural factors in a particular location, all of which have been identified through countless experiments, miscalculations, and innovations by local builders with extensive knowledge and experience concerning the location (Ahmed, 2014; Santamouris, 2012). Hence, through the use of local materials and by relying on natural lighting and ventilation, vernacular design includes solutions that are essential to optimising energy efficiency at minimal cost (Rashdan and Mhatre, 2019).

The Critical Regionalism movement in design discusses the integration of an existing design into new designs that consider the context of a region, including a specific location, topography, climate, culture, and the emotional needs of the people (Canizaro, 2007). By applying Critical Regionalism to vernacular design, we can gain significant knowledge for the design of modern prototypes, which cannot be easily applied without first considering the consequences of operating in a local context (Wahid, 2012).

Creangă et al. (2010) argued that a deep respect of vernacular solutions and an understanding of the inhabitants’ needs will promote the responsibility of conserving the local identity of the built environment and maintaining the valuable integration of heritage buildings into today’s projects. Vernacular design represents a complex balance between material, shape, and natural surroundings. This creates very efficient eco-design outcomes that could be used as models for generating contemporary designs that are closer to the natural environment (Creang et al, 2010).

Farida Abu Bakare (2012) pointed out that First Nations people reflected a bias for sustainable thinking long before contemporary thought. Their design solutions were derived from a direct response to the construction site and an intimate understanding of nature. As a means of looking forward, contemporary designers are examining the knowledge generated over thousands of years of vernacular design, which is increasingly valued for its sustainable attributes. Responsible modern designers have asserted the effectiveness of these solutions and embedded them within their sustainable design strategies toward an improved model of contemporary design (Tipnis. 2012).

William McDonough (2010) argued that every process has side effects, but they can be deliberate and sustaining instead of unintended and pernicious. Rather than focusing exclusively on a single outcome, designers can be humbled by the complexity and intelligence of natural activity and can be inspired to build some positive side effects into urban enterprises (McDonough and Braungart, 2010). Designers can apply this concept to their exploration of various design techniques within vernacular styles, thus discovering numerous beneficial characteristics concerning visual aesthetics and sustainability (Aly, 2011). Designers can learn from the past to supplement new designs rather than replace traditional ones, and to develop ideas using hindsight rather than foresight (Angen, 2013). Modern designs inspired by
sustainable elements of vernacular design can improve our lifestyles and the future of our ecosystems (Casakin and Bernardo, 2012).

**SAMPLE ELEMENTS OF VERNACULAR SUSTAINABILITY**

Vernacular buildings across the globe provide instructive examples of sustainable solutions that have been implemented into the modern built environment. Based on the literature review of the previous section, the following subsections address three widely used elements of vernacular design, including courtyards, wind catchers, and window screens. These elements demonstrate high potential in the revival and successful implementation of vernacular sustainability in contemporary designs, both locally and worldwide.

**Courtyards**

Inner courtyards are one of the most prevalent architectural elements in arid climates, as courtyards alleviate solar overload by creating shaded spaces combined with natural cooling strategies and protection from wind (Ratti, Raydan and Steemers, 2003). The purpose of the courtyard, especially in arid climates, is to make use of the great thermal mass collected by its extensive surface area throughout the day to provide warmth during cooler nights (Guedouh and Zemmouri, 2017; Mousli, Semprini, 2015). By maximising the surface-to-volume ratio, the courtyard operates as a heat sink, thus preventing severe temperature stress and discharging interior heat into the night air, especially when the courtyard contains a pond that can cool the air via evaporating water. Courtyards also offer the comforts of natural light, privacy, security, and tranquility to interior spaces (Edwards et al., 2006; Attia, 2006). They offer natural ventilation and enhance the overall quality of the indoor environment. Therefore, the integration of courtyards will lead to energy efficient design solutions in all climates, but especially in hot, arid, and/or humid climates (Aldawoud, 2008). Traditional courtyards still offer much potential to contemporary design solutions. There are several examples of courtyards implemented in contemporary architecture and interior design around the world, as shown in Figure 1.

**Figure 1.** Courtyards found in the interior designs of contemporary residences (Source: Home Designing, 2020)
Wind Catchers

Wind catchers have played a considerable role in the cooling and ventilation of traditional buildings (Patel and Rajan, 2015; El-Shorbagy, 2010). They act as a natural ventilation system that is used to capture wind at a higher elevation and direct it into the inner environment of a building (Bahadori, Dehghani-Sanij and Sayigh, 2014). The operational principles of wind catchers are based on pressure differences: they allow hot air (less dense) to rise and escape through its exhaust channels, while cooler winds flow down to replace the warm air (Hughes, Calautit and Ghani, 2012). Wind catchers play a significant role in providing optimum indoor air quality by delivering fresh air to the indoor space while extracting stale air (Iyengar, 2015; Hedayat et al, 2015). Traditional wind catchers consist of several components, including openings, a roof, a head, a channel, and internal partitions (Ionescu et al, 2015). These are combined to form a hollow square tower that catches wind from any direction, creating an air stream that helps ventilate the occupied interior space (Kassir, 2016). Samples of contemporary applications of wind catchers are shown in Figure 2.

Figure 2. Samples of wind-catcher applications

(a) Wind Catcher embedded in Carnegie Centre California, USA. Design By: EHDD Architects. (Source: EHDD, 2020.)

(b) Windcatcher House, Utah, USA. Design By: Design Build BLUFF Architect. (Source: BLUFF, 2020)
Latticework Window Screens

The latticework window screen is an architectural element that was developed to meet various functions, including ensuring privacy, controlling the passage of natural light to protect occupants from the glaring hot sun, and governing climate conditions in the dwelling by controlling airflow, reducing the temperature of air currents, and increasing the humidity of air currents (Mohamed, 2015; Giovannini et al., 2015). Moreover, by creating an air draft, latticework window screens become part of the cooling mechanism that is connected to wind towers and courtyards (Grout, 2020), (El Basyouni, 2017). Latticework window screens feature different patterns and materials, such as wood and gypsum, which were developed to satisfy a variety of conditions and functions (Karamata and Andersen, 2014). These screens have moved beyond the confines of traditional use, coming into a new role as iconic ornaments of modern skyscrapers, thus affirming local identity and serving as a shading device to aid cooling (Rashdan and Mhatre, 2019). Some contemporary designers have transformed this vernacular window screen into high-tech, responsive shading systems. Interior designers have implemented the latticework window screen to control natural lighting within the interior environment and to increase privacy in a particular space. Figure 3 shows some examples of latticework window screens in modern design solutions.
**Local and Traditional Materials**

In the present study, the literature review on vernacular design indicates that using local materials is an integral part of vernacular sustainability due to its low environmental impact. Fuelled by globalisation, the Modernism movement led to the worldwide dissemination of new industrially produced and standardised materials, at the cost of abandoning or minimising the use of traditional materials. Modern materials require high energy inputs during the manufacturing process (Fernandes, Mateus and Bragança, 2014). In addition, the centralised production of modern materials implies large transportation energy consumption. Materials such as ceramic tiles, concrete, and alkyd paint have major environmental impacts during a
building’s overall lifecycle (Mota, Mateus and Bragança, 2012). On the contrary, vernacular materials, characterised by a low-tech profile due to lack of production technology, have a limited carbon footprint. Moreover, they are generated from local, natural resources so they do not emit any harmful gases, which enhances Indoor Air Quality (IAQ) performance, and are naturally biodegradable, which has a low impact on environmental pollution (Rashdan and Mhatre, 2019). Natural materials such as lime, adobe, timber, bamboo, and stone have positive impacts on the overall lifecycle of a building, since its total embodied energy and environmental impact can be significantly reduced (Zafer and Kuyrukçu, 2015; Sanz-Calcedo, Luna and Soriano, 2012). By replacing modern materials with local, natural materials, interior designers can preserve the local identity while reducing the volume of construction materials consumed. Vernacular materials can once again flourish as finishing materials for interior spaces, as shown in Figure 4

**Figure 4. Applications of vernacular materials in contemporary design**

(a) The New Gourna project, Egypt
Design By: Hassan Fathy (Source: Miles, 2006)
SURVEY ON REVIVING VERNACULAR SUSTAINABILITY

Survey Methodology
A survey was conducted to address the possibility of reviving vernacular sustainability in contemporary design. A quantitative research method was selected to identify the potential to implement sustainable elements of vernacular design in contemporary design concepts and solutions (Leavy, 2017). The selection criteria included designers who had been practising interior design for at least two years. Multiple sampling frames were used to identify potential respondents for this study, such as professional interior design organisations, university professors with practical experience, and designers within interior design firms. The sampling frames produced a list of 200 designers who met the inclusion criteria, each of whom was invited to participate in the study in November 2019 via email and telephone. Forty designers (20%) withdrew from the study, citing time constraints or lack of interest; therefore, 160 designers participated in the final research, yielding a response rate of 80%. The respondents included university faculty members, company owners, creative directors, design project managers, and design assistants. All respondents were made fully aware of the purpose and content of the study, and all agreed to participate voluntarily.

The goals of the survey are as follows:
1. Explore any significant relations between the solutions offered by vernacular design and modern sustainability;
2. Identify the reasons, methods, and limitations in reviving vernacular sustainable design; and
3. Determine designers’ attitudes toward integrating vernacular design into contemporary sustainable solutions.

The survey consisted of three parts and ten questions. Table 1 shows a matrix of the survey goals and questions. The survey collected data from each respondent, after which a descriptive data analysis method was used to synthesise the results.

Table 1: Matrix showing linkage between survey goals and each question

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<thead>
<tr>
<th>Survey Goals</th>
<th>Survey Questions</th>
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<tr>
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<td>Part I</td>
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<td>Goal 1</td>
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<td>Goal 2</td>
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<td>Goal 3</td>
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**Survey Findings**

The first part of the survey consisted of four questions discussing the significance of sustainable heritage solutions within the context of contemporary design. As seen in Figure 5, most of the respondents (89.71%) either strongly agreed (n = 48, 30%) or agreed (n = 76, 41.88%) or moderately agreed (n = 27, 17.83%) that vernacular design solutions represent the best sustainable practice in their respective locales. Slightly more than half of the respondents (n = 94, 58.75%) agreed that sustainable solutions in vernacular design are integral to the effectiveness of contemporary sustainability. A large majority of respondents (90%) strongly agreed (n = 36, 22.5%), agreed (n = 78, 48.75%), or moderately agreed (n = 30, 18.75%) that vernacular design elements can contribute to the future of sustainable design. Finally, a large majority (n = 144, 92.85%) agreed that sustainable vernacular design solutions can be integrated within contemporary design technologies.

**Figure 5. Survey results from Part I**
The second part of the survey included two questions measuring the flexibility of applying vernacular design practices worldwide. Figure 6 shows how the respondents answered. For the first question (Figure 6a), slightly more than half of the respondents (n = 87, 54.83%) disagreed that sustainable practices in vernacular design are not flexible enough for worldwide applications. For the second question (Figure 6b), nearly a third of the respondents (n = 49, 30.62%) thought that the most efficient way to revive vernacular sustainability would be to implement it locally, while nearly half of the respondents (n = 65, 40.63%) believed that region-wide applications would be more efficient and slightly more than a quarter (n = 46, 28.75%) assumed that international applications would be effective.

**Figure 6. Survey results from Part II**

![Survey results from first question of Part II](image)

**No doubt that the location or site of the project are important in shaping vernacular design. Do you think that the application of vernacular design best practice do not have enough flexibility for spreading worldwide?**

(a) Survey results from first question of Part II

![Survey results from second question of Part II](image)

**In order to achieve efficient reviving of the vernacular sustainable design, how the application should be implemented?**

(b) Survey results from second question of Part II

The third part of the survey asked four questions to examine the potential of and obstacles against reviving sustainable vernacular design. As shown in Figure 7a, the respondents were
asked to identify which elements of vernacular design would affect their design concepts, leading to possible implementation in their final designs. There was range of opinions on this question, with the majority (n = 114, 71.25%) nominating visual architectural and design elements, two thirds (n = 106, 66.25%) preferring passive strategies for lighting and ventilation, more than half (n = 97, 60.63%) favouring traditional materials, nearly half (n = 75, 46.88%) selecting socio-cultural traditions, more than a third (n = 63, 39.38%) choosing climate responsiveness, and one third (n = 55, 34.38%) selecting traditional technologies for energy efficiency. As shown in Figure 7b, when asked which aspects might limit the application of vernacular solutions in contemporary design, the majority selected high-rise buildings (n = 124, 77.50%) and rapid urbanisation (n = 123, 76.88%), less than half nominated construction complexity (n = 67, 41.88%), more than a quarter pointed to the degradation of natural resources (n = 45, 28.13%), and a small minority selected a lack of craftsmanship (n = 19, 11.88%).

Figure 7. Survey results from first and second questions of Part III
The third question of Part III asked the respondents to identify which reasons supported the reappearance of vernacular designs in recent years. Figure 8a shows that the majority believed that the need for natural energy-efficient solutions (n = 139, 86.88%) and a greater awareness of the importance of sustainability (n = 137, 85.63%) have positively supported the revival of sustainable vernacular solutions, whereas more than half selected the phenomena of encountering globalisation (n = 98, 61.25%) and reusing heritage sites for tourism purposes (n = 99, 61.88%).

Finally, the respondents were asked which methods could support the revival of sustainable vernacular design. Figure 8b shows that a minority selected the increase of scholars concerned about the implementation of sustainable vernacular design into technology-driven contemporary solutions (n = 25, 15.63%), that designers should emphasise heritage conservation and vernacular sensibilities (n = 23, 14.38%), and that design educators should integrate vernacular sustainability into the design curriculum (n = 26, 16.25%). More than half (n = 86, 53.75%) thought that a blend of all three reasons would help disseminate sustainable vernacular solutions into contemporary design.
DISCUSSION

Traditional and vernacular designs provide shelter and comfort through the evolution of construction techniques that have been passed down through generations. Because local residents develop the built environment using solutions inspired by nature and local materials, vernacular design inevitably expresses the culture of both the people and the area. Indigenous buildings—constructed repeatedly over generations—represent time-tested responses to local climate conditions (Asquith and Vellinga, 2006).

Paul Oliver argued that vernacular architecture is the architectural language of the inhabitants’ ethnic, regional and local dialects (Mousli and Semprini, 2015). The various elements of
heritage design developed over years of local architectural wisdom and knowledge arose from
the need to create solutions capable of withstanding the nature of the region while respecting
the traditional norms of the society and local socio-economic conditions. The result of this has
led to sustainability in the built environment, which is a natural by-product of the vernacular
concept of designing (Rashdan and Mhatre, 2019). Therefore, heritage buildings in each region
tend to represent highly sustainable solutions in response to the surrounding climate conditions.
For instance, the vernacular designs of courtyards, wind catchers, and latticework window
screens offer creative, flexible, and sustainable solutions that achieve a marvellous balance
between heating and cooling in arid climates (Forouzandeh and Richter, 2019). These dynamic
solutions mitigate the impact on natural resources by reducing the use of materials and limiting
the building’s energy consumption (Oliver, 2007; Next.CC, 2020).

Vernacular elements are not only used to perpetuate a decorative element; they are also highly
functional, as these dramatic architectural features demonstrate the harmony between human-
constructed environments and nature (Bahadori, Dehghani-Sanij and Sayigh, 2014). Despite
some views to the contrary, there is a prevailing thought that innovative building technologies
are the hallmark of modern architecture, as tradition is commonly viewed as the antonym of
modernity. Hence, there is a need to address the blurred lines between the traditional and
modern technical aspects of construction. This issue can be tackled by exploring and assessing
the application of traditional methods to modern design, as well as investigating some aspects
of mainstream modernist design solutions and concepts inherent to vernacular design.

There are several experiments demonstrating the potential of sustainable vernacular solutions
in contemporary design. For example, contemporary designers have adapted wind catchers,
interior courtyards, and latticework window screens from vernacular architecture. These
vernacular elements provide thermal comfort to inhabitants through natural means, which
bolsters the building’s energy efficiency; reduces the carbon footprint; and mitigates the
negative impacts of energy-driven solutions for ventilation, daylight control, and improving
IAQ (Patel and Rajan, 2015; Iyengar, 2015).

The survey results of the present study show that passive strategies for lighting, ventilation,
and traditional materials sourced locally have the greatest impact on modern design concepts,
showing potential for broader implementation. The respondents nominated high-rise buildings,
rapid urbanisation, and construction complexity as major aspects limiting vernacular design
applications. The respondents also pointed out the need for natural energy-efficient solutions
and the reusing of heritage sites for tourism purposes as key reasons for the reappearance of
vernacular design in recent years.

These results suggest that designers believe in the creativity, functionality, and effectiveness
of vernacular sustainable solutions, proposing that these features offer the most useful ways to
improve and adapt vernacular techniques to modern sustainability. Designers should promote
heritage-inspired solutions to all stakeholders and raise awareness throughout the global community about these sustainable practices that can meet the needs of today’s inhabitants and lower the overall environmental impact.

CONCLUSIONS

The present research conducted a literature review to identify the vernacular sustainable design role in contemporary design concepts and solutions. This study offers several examples of vernacular design applications that comprise significant components of sustainable modern designs. The survey results and illustrated examples propose several successful models for achieving effective and sustainable contemporary designs inspired by vernacular practices. Although these practices emphasise a sense of regionalism and local identity, they carry enough flexibility to be applied anywhere in the world that shares the same climate and natural conditions of the original design.

Most of the designers who participated in the survey agreed that vernacular design represents the best practices for sustainable construction. The designers also confirmed the credibility of sustainable vernacular solutions, as they are integral to the effectiveness of contemporary sustainability while positively contributing to the future of sustainable design.

The revival of sustainable vernacular design can be achieved by raising awareness of its potential among modern designers through several collaborative professional and academic activities to be conducted, such as scholarly lectures, seminars, and workshops. These activities should explore the principles of vernacular sustainability and the process of implementing sustainable vernacular solutions into contemporary, technology-driven design, which, in turn, supports heritage conservation and increases the vernacular sensibilities of contemporary designers. Moreover, integrating vernacular sustainability within the design curriculum will produce a new generation of designers who are well versed in the capabilities and effectiveness of traditional design solutions. To achieve the best implementation practices worldwide, future research should focus on filling the gaps in information regarding international classifications of the natural and climatic conditions of each region, and the vernacular design element that is most sustainable in addressing these conditions. Nevertheless, more elaborate studies are needed to evaluate, understand the best vernacular techniques so that they can be improved and translated to contemporary solutions in order to be accurately endorsed, in the design sector. It’s the prerogative of each stakeholder to prioritise and establish these sustainable vernacular solutions in their future designs.
REFERENCES


