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# Vernacular Practices in Contemporary Building

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## ABSTRACT

This paper explores the role of vernacular practices in contemporary building design and construction, with a focus on how traditional techniques and knowledge can be reinterpreted and integrated into modern sustainable architecture. Vernacular architecture refers to the indigenous, locally adapted building practices that have evolved over generations to respond to the specific climatic, cultural, and social conditions of a region. In recent years, there has been a growing recognition of the importance of vernacular practices as a source of inspiration for sustainable design solutions. This paper examines various case studies and research projects that highlight successful examples of incorporating vernacular principles into contemporary buildings, discussing the benefits and challenges associated with such an approach. Furthermore, it explores the potential of digital technologies and computational design tools in aiding the reinterpretation and adaptation of vernacular practices. The paper concludes by emphasizing the significance of vernacular practices in promoting cultural sustainability, fostering a sense of place, and achieving environmentally responsible architecture.

***Keywords:*** Vernacular architecture, contemporary building, sustainable design, indigenous knowledge, cultural sustainability, computational design.

## INTRODUCTION

By reinterpreting traditional techniques, the incorporation of vernacular practises in contemporary building design offers a unique approach to sustainable architecture. These practises promote cultural preservation, resource efficiency, and the creation of harmonious built environments by combining local wisdom and environmentally conscious strategies. This introduction lays the groundwork for further investigation into how vernacular practises contribute to the development of sustainable architecture in the modern era.

### BACKGROUND AND CONTEXT

Vernacular practices in contemporary building refer to the utilization of traditional construction techniques, materials, and design principles in modern sustainable architecture. It involves drawing inspiration from local building traditions and adapting them to meet the needs of today's environmentally conscious construction practices.

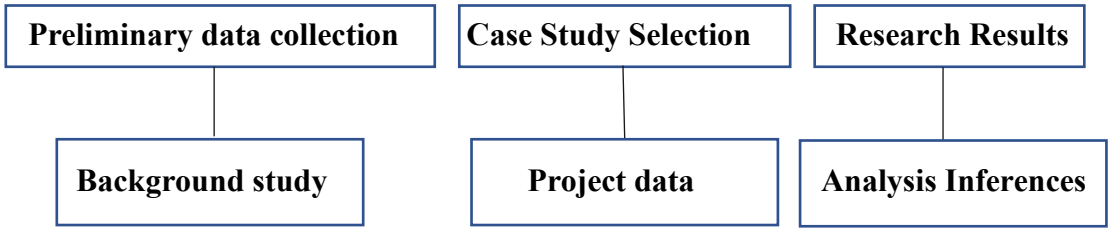
The concept of vernacular architecture stems from the idea that traditional buildings have evolved over time to suit their specific climate, culture, and available resources. They often incorporate sustainable strategies such as passive cooling, natural ventilation, use of local materials, and harmonious integration with the surrounding environment. Overall, vernacular practices in contemporary building offer a way to reconcile tradition and innovation, creating sustainable architecture that respects the past while embracing the needs of the present and future.

## AIM AND OBJECTIVES

The Aim of incorporating vernacular practises into modern architecture is to reinterpret tradition for sustainable architecture.

- Preserve Cultural Heritage
- Sustainable Material Selection
- Energy Efficiency
- Climate Responsiveness
- Community Engagement

## METHODOLOGY




- Sustainable architecture and vernacular architecture
- The characteristic features of the vernacular architecture
- Climate responsive strategies in hot and humid regions

Vernacular features
Climate responsiveness

- Site
- Passive design solutions
- Materials
- Structure innovation

# VERNACULAR ARCHITECTURE: PRINCIPLES AND CHARACTERISTICS

## DEFINITION AND SCOPE

Vernacular architecture refers to the traditional and indigenous architecture that is developed by local communities using local materials, construction techniques, and cultural practices. It reflects the unique characteristics of a particular region or community and is deeply rooted in the local context, climate, and available resources.

**Scope:** Vernacular Architecture encompasses a wide range of building types, including houses, temples, barns, mosques, and other structures that serve the needs of the community. It is often associated with rural or traditional societies, but it can also be found in urban settings, where it adapts to the local environment and social patterns.

## CULTURAL AND ENVIRONMENTAL CONTEXTS

**Cultural Context:**

- Cultural values and traditions
- Symbolism and identity

**Environmental Context:**

- Topography and landscape
- Natural resources and sustainability

## ADAPTATION TO LOCAL CLIMATIC CONDITIONS

**Orientation:** Buildings are positioned to maximize solar gain in cold climates or minimize it in hot climates. Proper orientation can enhance natural lighting and reduce the need for artificial lighting.

**Insulation:** Adequate insulation is incorporated into the building's design to maintain comfortable temperatures. This can include thick walls, double-glazed windows, or natural insulating materials like straw or mud.

**Ventilation:** Buildings are designed to promote natural airflow and cross-ventilation. Features like courtyards, wind towers, or louvered windows are common in vernacular architecture to promote cooling breezes.

**Roof design**: Roofs are designed to accommodate local weather conditions. In hot climates, roofs may have overhangs or be designed to facilitate heat dissipation. In rainy areas, steep roofs with wide eaves can efficiently shed water.

**Shading elements:** Structures incorporate shading devices such as verandas, balconies, or awnings to block direct sunlight and reduce heat gain. These elements provide outdoor spaces while protecting the interior from excessive heat.

## MATERIALS AND CONSTRUCTION TECHNIQUES

Vernacular architecture refers to the traditional buildings and construction techniques that are indigenous to a specific region or community. The materials and construction techniques used in vernacular architecture vary depending on the local climate, available resources, and cultural practices. Here are some common materials and construction techniques used in vernacular architecture:

- Natural materials
- Earth construction
- Timber construction
- Thatch roofing
- Bamboo construction
- Vernacular detailing
- Passive design strategies

## SOCIO-CULTURAL ASPECTS

**Historical and cultural significance:** Vernacular architecture reflects the cultural heritage and history of a specific region or community, representing their customs, traditions, and social practises.

**Social Interaction and Community:** Vernacular architecture frequently encourages social interaction and community engagement by creating spaces that facilitate communal activities and gatherings.

**Adaptability and flexibility:** Vernacular architecture is often adaptable and flexible, allowing for modifications and additions over time. It accommodates changing needs and evolving lifestyles of the community, ensuring its longevity and relevance.

**Climate and Environment:** Vernacular architecture is closely tied to the local climate and environment. It responds to factors such as temperature, rainfall, wind patterns, and solar orientation. The use of specific materials, building forms, and passive design strategies helps to create comfortable living spaces that are adapted to the local climate conditions.

**Sustainability and Resource Efficiency:** Vernacular architecture often utilizes local, readily available materials and traditional construction techniques. This approach minimizes the environmental impact associated with transportation and manufacturing of building materials. Moreover, the use of natural ventilation, shading, and passive heating and cooling techniques enhances energy efficiency and reduces reliance on artificial systems.

# INTEGRATION OF VERNACULAR PRACTICE IN CONTEMPORARY BUILDING DESIGN

## CASE STUDY OF SUCCESSFUL INTEGRATION

### 1.PIZZA 4PS, HANOI

- **Architects:** Takashi Niwa Architects
- **Year:** 2018
- **Site Area :** 712 Sq.m
- **Country:** Vietnam

*Figure 1 Pizza 4ps Exterior*

### A RESTAURANT FOR GATHERINGS IN A GARDEN WITH A PIZZA OVEN.

Gathering and sharing is a way for Vietnamese people to connect deeply with family and friends. Over meals, family and friends always gather to share their joys and stories. Similarly, Pizza 4P's operates under the motto "Delivering Wow, Sharing Happiness." As a result, the challenge of this project is to create an appropriate dining atmosphere by combining both local culture and the restaurant motto. The site, located in the heart of Hanoi, features beautiful street plants as well as enough space for an open-air garden. A restaurant with the concept of gathering in a garden was designed to provide a meaningful and pleasant dining space in consideration of the site condition, local culture, and the restaurant's motto.

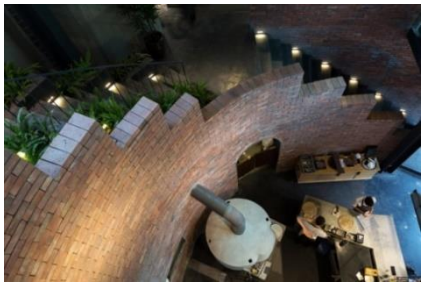


*Figure 2 Interior Curved Wall*

### OVAL COURTYARD WITH PIZZA OVEN TO MAXIMIZE THE GARDEN EXPERIENCE

The entrance is designed with an oval courtyard to maximise the landscape view for customers as they approach the open pizza kitchen. The open kitchen with signature pizza ovens serves as the main anchor in the restaurant's design. The ellipse firebrick wall that surrounds the dining space and garden creates a unique garden experience.

*Figure 3 Courtyard Garden*

### MATERIAL SELECTION AND ARRANGEMENT TO INDUCE COMMUNICATION WITH THE GARDEN

#### 1. Cast Iron wall with plants pattern

Cast iron is commonly used as a fence in traditional Vietnamese homes. This common local material is recognised as a garden symbol. To make use of this one-of-a-kind feature, a curtain-like façade made of cast iron was installed alongside the glass wall. To create the atmosphere of a garden, the cast iron is selectively designed with leaf and flower motifs.

*Figure 4 Cast Iron Patterns*

Cast Iron wall with plants pattern . Cast iron is widely used as a fence in typical Vietnamese houses . This is recognized as a symbol of a garden and is used a curtain - like façade as a vertical shading device. Using a cast iron wall with a plant pattern is a creative and effective way to induce communication with the garden. The cast iron material adds a touch of elegance and durability to the design. The plant pattern incorporated into the wall design brings a natural element to the space, blurring the boundaries between the garden and the surrounding area.

*Figure 5 Handmade Bricks used in Curved Wall*

### 2. Handmade bricks and fire bricks

In Vietnam, firebrick is a very beautiful and trustworthy material. The curved wall in the pizza kitchen is made of fire bricks, which creates a visual connection to the pizza oven void. It connects the inside and outside of the garden to create a unified gathering space. The garden path is made of handcrafted bricks.

### 3. Concrete Tile

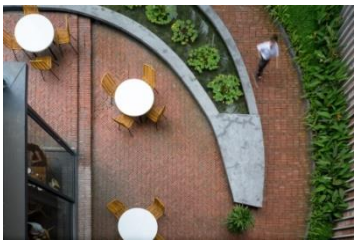


*Figure 6 Concrete Tiles*

Cement tile is a traditional and widely used building material in Vietnam. The cement tiles have plant patterns imprinted on them. Customers can connect to the garden atmosphere while looking out at the street trees.

### 4. Brass Inlayed Floor

Vietnam's handcraft culture is fascinating. The interior floor contributes to the intended garden atmosphere by using inlayed brass with a plant arrangement pattern. The materials and finishes are chosen to create a one-of-a-kind dining experience in a garden setting. The restaurant's goal is to provide a special gathering place.


*Figure 7 Ground Floor Plan*

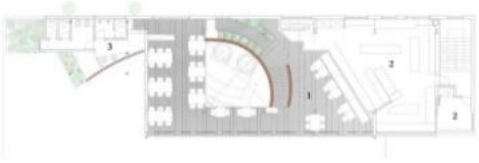


*Figure 8 First Floor Plan*

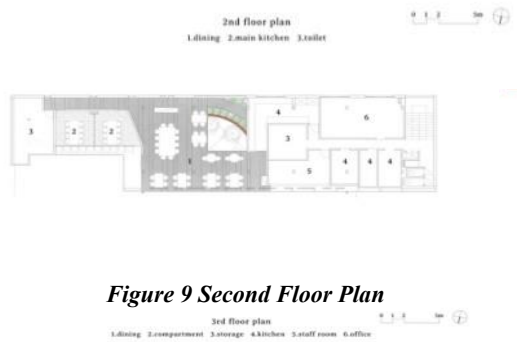



*Figure 9 Second Floor Plan*

*Figure 10 Elevation*

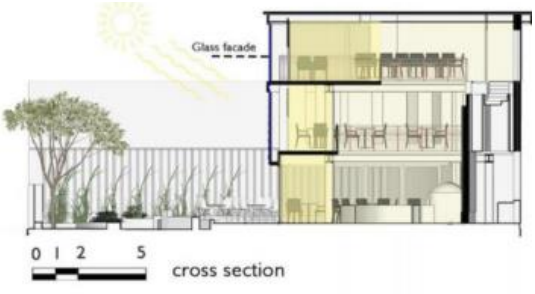



*Figure 11 Cross Section*

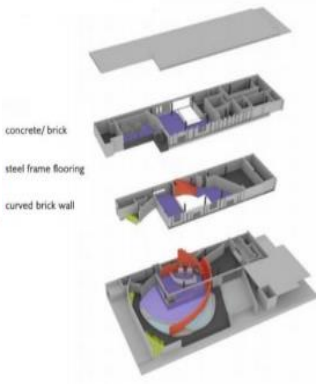



*Figure 12 Exploded View*

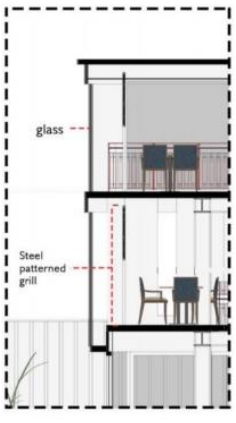



*Figure 13(a) Section Blow-up of the front facade*

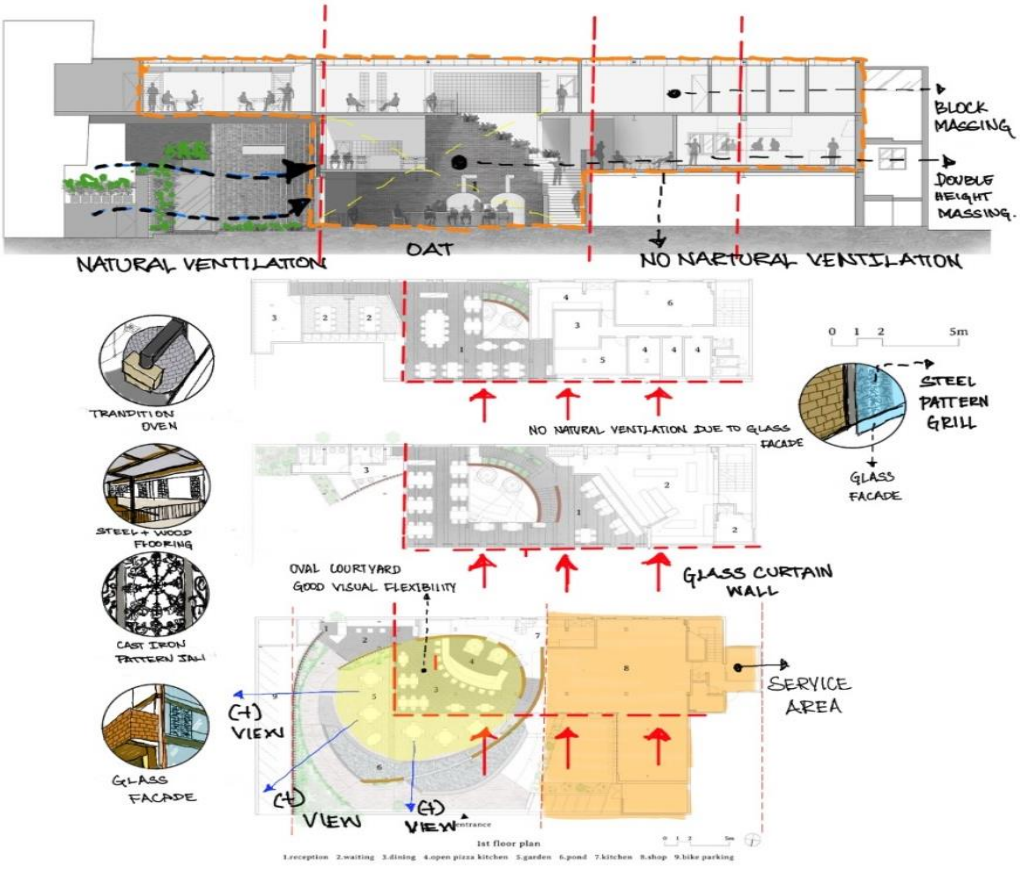



*Figure 13(b) Section for Ventilation and Sketches for Material details*

## 2.BETANIA ,HUE

- **Architects:** T3 Architects, Ho Chi Minh City
- **Location:** Ho Chi Minh City, Vietnam
- **Category:** Café + Bistro + Lounge + Retail store
- **Area:** 3000-5000 sqft
- **Project Year:** 2014

*Figure 14 Betania, Hue*

The structure of the building is reinforced concrete with painted bricks. The house is covered by a series of two-sided roofs. The given rhythm divides the emanating volume into smaller entities, recalling the vernacular structures that line the streets across the country. Hue's tropical climate necessitated special precautions against heavy rain and heat. These considerations shape the structure.

## PASSIVE DESIGN SOLUTION

The structure is intended to minimise the effects of solar radiation, wind, and rain on the interior spaces. Solar courtyard, mediating space, envelope shading device, air vent, and surrounding greenery are typical solutions in the Vietnamese vernacular, as seen in this building design. The solar two court yards, one open and one closed, play an important role in capturing enough natural lighting and cool breezes into the rooms. Due to plot area constraints, the court yard becomes a necessity in the urban context to avoid using active sources for cooling purposes. An internal courtyard, as a leeward element, directs natural air movement into the interiors from all wind directions, cooling the space.

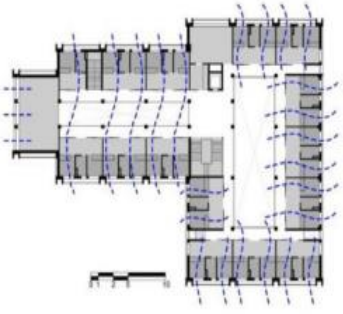


*Figure 15 Section Cross Ventilation*

The porch is one of the building's mediating spaces. Loggia or passageway with brick jaali façade These act as a barrier against direct sunlight and rain and connect the house to the surrounding nature.The use of a double skin facade with outside brick jaali and inside glazing provides flexible control in all weather conditions in this tropical climate. The north façade faces the building's front façade, while the south façade has buildings ined dosely. The brick jaali façade (double skin facade) is used on all facades, but the eastern and western elevations have a full length façade to maximise ventilation and light due to surface area. capture cool breezes The south façade, on the other hand, has a segmented jaal façade due to closely lined apartments. As a result, even when mechanical systems are not used, indoor air temperature is remarkably comfortable.Cool breezes can be directed through the building by using window fins, buffer spaces and court yards. Rooms are made more airy by using openings and air vents. Natural ventilation replaces stale, hot indoor air with a refreshing breeze. Ceiling fans in the home are sometimes combined with natural ventilation strategies to provide more comfort. To improve ventilation, openings and air vents are built into internal partitions that face the courtyards.

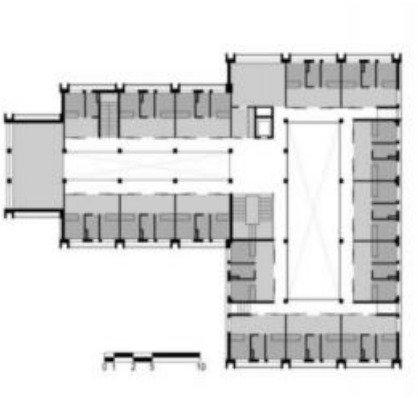


*Figure 16 Natural Light Intensity*

Natural ventilation is provided for roof spaces by installing air vents on gables and eave ceilings. Layout narrow single rooms for natural cross ventilation and heat avoidance. The air beneath common/mediating spaces naturally circulates, providing thermal comfort for occupants. As a result, the mediating spaces must provide enough volume, space, and shade for common activities. To avoid heat storage problems in the house, use lightweight structures such as timber rather than thermal mass construction.

*Figure 17 Stack Effect*

*Figure 18 Facades*

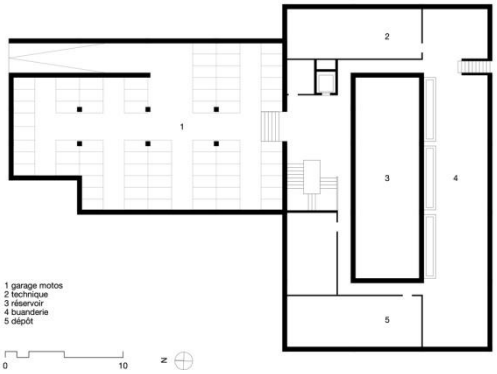
## MATERIALS

Despite the fact that high-tech materials are now imported and used in modern construction, the building used local natural materials such as brick and timber fused with reinforced concrete technology. Built with materials indigenous to the region, the structure contributes to the creation of a sense of place.

The structure of the building is reinforced concrete with painted bricks. Clay and earth materials, such as fired-clay bricks and tiles, were used to construct floors, walls, and roofs. Based on the orientation of the house, earth or brick work is walled to reduce cold wind impacts and provide more privacy. Interiors are protected from oblique sunlight by white-painted walls.

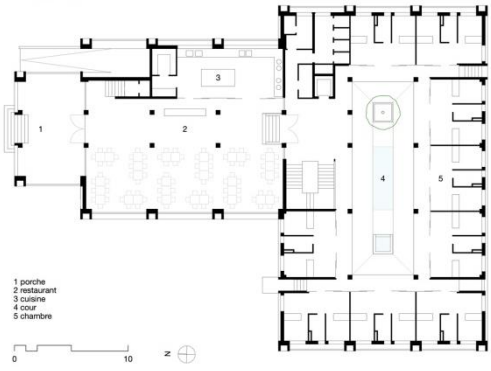

*Figure 19 Materials used*

The structural framework is filled with a thin cement triangular pattern, allowing for easy and efficient airflows throughout the construction.The structure is built on a sloping plot elevated on a high plinth to prevent flooding in Central Vietnam, which occurs every year. The given rhythm divides the emanating volume into smaller entities with pitched roofs, recalling the vernacular structures that line the streets across the country. Betania's structure is made of reinforced concreter and filled with painted bricks. The reinforced concrete ramework is formed in cross section by an arrangement of beams, columns, and concrete channels. Support a corrugated-sheet-covered pitched concrete roof.



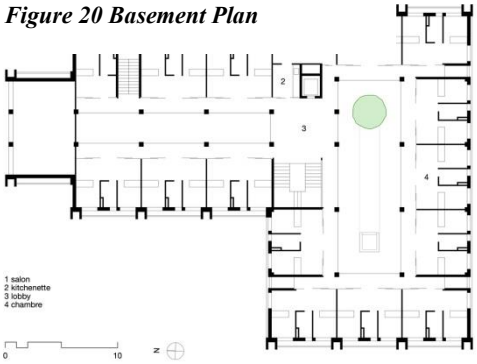

*1.Motorcycle Garage 2.Technical 3.Tank 4.Laundry Room 5. Deposit*

***Figure 20 Basement Plan***




*1.Porch 2.Resturant 3.Cuisine 4.Yard 5. Bedroom*

***Figure 21 Ground Floor Plan***



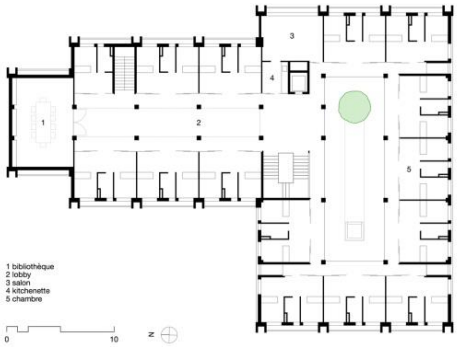




***Figure 27 South Facade***

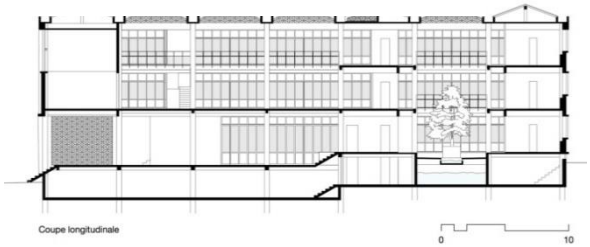



***Figure 24 Cross Section***

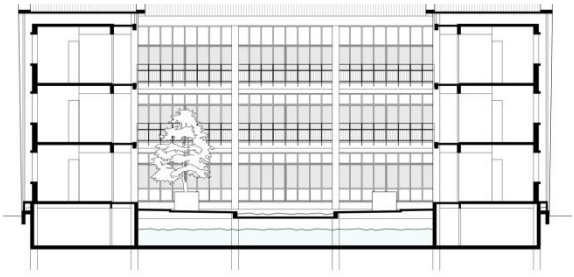


***Figure 26 Longitudinal Section***

*1.Library 2.Lobby 3.Salon 4.Kitchenette 5.Bedroom*

***Figure 22 First Floor Plan***

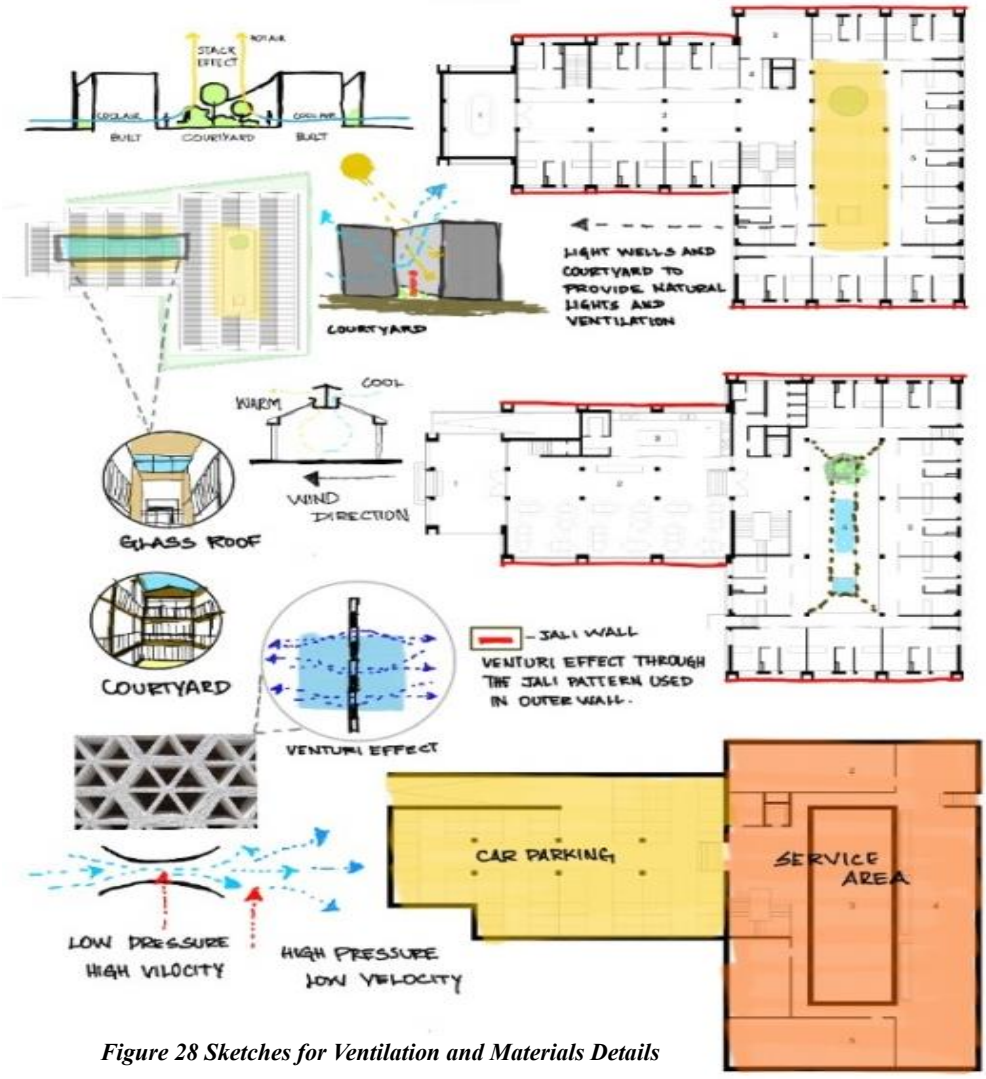



*Figure 28 Sketches for Ventilation and Materials Details*

## QUALITATIVE INVESTIGATION OF VERNACULAR PRACTICES USED IN SELECTED CONTEMPORARY BUILDINGS

| Vernacular Features | Description of the Strategies used | Used for aesthetics(-), For its principle(+) |
|---|---|---|
| Site Planning | Use of open spaces around for natural ventilation and lighting. | +, - |
| Passive Design Solutions | 1. Use of façade for Shading and lighting.<br>2. Use of trees for shading. | +<br>+ |

| | | |
|---|---|---|
| Materials | 1. Use of differentre cyclable material for affordability.<br><br>2. Use of Steel structure for easy and fast construction.<br><br>3. Use of openable door window for flexibility interms of thermal comfort and activity. | + , -<br><br>+<br><br>+ , - |
| Structure | Use of steel structure for easy and fast construction and brick. | + |

**PIZZA 4PS, HANOI**

| **Vernacular Features** | **Description of the Strategies used** | **Used for aesthetics(-), For its principle(+)** |
|---|---|---|
| Site Planning | Use of open spaces around for natural ventilation and lighting | + |
| Passive Design Solutions | 1. Use of doubles in façade for heat protection and lighting.<br><br>2. Use of trees for shading<br><br>3. Use of Sloping roofs with water channels for rainwater collection.<br><br>4. Courtyards for light and Ventilation<br><br>5. Vents for light and ventilation. | +<br><br>+<br><br>+<br><br>+<br><br>+ |
| Materials | 1. Local materials for affordability.<br><br>2. Painted jaali walls for Shading and for passive cooling<br><br>3. Use of openable door windows for flexibility in terms of thermal comfort and activity.<br><br>4. Use of timber as lightweight construction and thermal insulation. | +<br><br>+<br><br>+<br><br>+ |

| | | |
|---|---|---|
| Structure | Use of local labour and materials for fast construction and for affordability. | + |

**BETANIA, HUE**

**INVESTIGATION OF CLIMATE DESIGN STRATEGIES USED IN CONTEMPORARY ARCHITECTURE**

| | **Pizza 4 p's, Hanoi** | **Betania, Hue** |
|---|---|---|
| **Climatic Features** | Description of the strategies used | Description of the strategies used |
| High Solar Radiation, especially on West andHorizontal Surfaces | 1. Use of vertical metal patterened grills as extra shading device<br><br>2. Deep overhangs for protection from the Sun. | Use of Double skin façade with brick jaali Wall to control the inner temperatures.<br><br>Large, well ventilated attic acts as a well insulated roof.<br><br>Shade tree in the Courtyards provides more Shade.<br><br>Minimization of heat absorption by the facades by painting them white or light color. |
| High average Temp.and Humidity | Strategy is NOT available. | 1. Room height 3.2m and many large openings generating flexible spaces with jaali façadeimprove ventilation.<br>2. Large and long courtyard helps enhance natural ventilation and reduces humidity. Sidecorridor induces wind into the courtyard. |
| Heavy Rain | 1. Use of Sloping metal roof and Drains.<br><br>2. use of brick pavement for water absorption | Pitched roof with water channels helps to drain away the rain. High bases of the wall prevent humidity from the ground. |
| Sun path on the SouthSky | Building orientation Strategy is NOT available due to its location in city center | 1. Strategies NOT clear due to the location in city centre |
| | Folable window provide flexible and operatable | Front Street, large courtyard and backyard improve cross |

| | | |
|---|---|---|
| Two different seasons(hot and fairly cold) | control of openings during hot and cold periods. | ventilation.<br>Use of water body in the courtyard for cooling. |
| North Cold Wind, South-East Cool Wind | Building orientation Strategy for prevailing wind is NOT available due to its location in the city centre | Vents allows natural wind to go through. |
| Low DiurnalTemperature Humidity | All louvres windows and doors an "open" architecture, connecting the indoor and outdoor environment | Light and porous wooden partitions allow wind to go through. |
| Others | Indoor lighting is very good due to many large openings and light from the courtyard | Expect the front yard, trees have been planted around the buildings, providing effective shading and cooling down the air temperature. |

## INFERENCE

Vietnam's modern buildings are creatively adapted to the local natural conditions and employ a variety of climate-responsive strategies. Such practises are not implemented in cities where sustainability is a major concern. The practises are observed on the city's outskirts, where there are no environmental challenges. Even so, the practises observed are not being used to their full potential. The current study has limitations because only two structures were quantitatively assessed. As a result, a more extensive investigation is required. In conclusion, this study has emphasised the importance of climate-conscious building design for a healthy living environment that does not overuse natural resources.

## CONCLUSION

In conclusion, vernacular practices continue to play a significant role in contemporary building design and construction. Vernacular architecture refers to the traditional, indigenous building techniques and materials that have been developed over generations in a specific region. While modernization and globalization have introduced new materials and construction methods, vernacular practices offer numerous benefits in the context of contemporary building.

In terms of passive design strategies, because the region is hot and humid, Pizza 4P's did not prioritise ventilation and thus ignored this strategy for sustainability. The use of a fixed glass façade necessitated the use of active cooling sources. Projects such as Betania, were excellent examples of using passive design strategies.

### PASSIVE DESIGN SOLUTIONS

In conclusion, incorporating vernacular practices into contemporary building design allows for the preservation of cultural heritage, sustainability, and economic benefits. By recognizing the value of vernacular practices and blending them with modern approaches, we can create buildings that are environmentally responsible, socially relevant, and economically viable in today's world.

### MATERIALS

Except for Pizza 4Ps, which used materials primarily for aesthetics, the rest of the project used local materials and techniques combined with modern technology to achieve a better fit.

## STRUCTURE

In terms of structure, the majority of the cases chosen were unique and responded well to context. Despite being contemporary, it did not ignore the surrounding context, whether it was the character of the area or the immediate surroundings.

Vietnam's modern buildings are creatively adapted to the local natural conditions and employ a variety of climate-responsive strategies. Such practises are not implemented in cities where sustainability is a major concern. The practises are observed on the city's outskirts, where there are no environmental challenges. Even so, the practises observed are not being used to their full potential. The current study has limitations because only two structures were quantitatively assessed. In conclusion, this study has emphasised the importance of climate-conscious building design for a healthy living environment that does not overuse natural resources. Vernacular implemented modern structures. Vietnam demonstrates that humans can live in harmony with nature without the need to implement vemacular architecture to reflect its distinct characteristics.