



## A Study of Consumer Behavior: Preferences for Vernacular and Modern Architecture in Hot and Dry Indian Regions

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### Abstract

Global warming and energy shortages have become major global problems, with the building industry being a major energy consumer. Vernacular architecture, which has been developed over generations, is more adaptable to changing environments, including building orientation, form, spacing, layout orientation, and climatic features. This approach considers the home's aesthetics, physical characteristics, and social purposes, resulting in unique designs in hot, arid climate locations. Examples include Rajasthan and Gujarat, which use locally produced sandstone and lime, Jaali screens, and courtyard designs. Modern architecture in these areas integrates advanced materials, shading technologies, passive cooling techniques, and sustainable energy systems. This study aims to examine vernacularism's climatic adaptation, focusing on climatic adaptive technology and its potential in house shape, construction method, building components, and materials. The findings have implications for architects, urban planners, and policymakers seeking to create resilient and sustainable built environments that respect cultural identity while embracing innovation and local knowledge. The essay will examine 23 previous studies and the work of architects who have adapted traditional and vernacular architecture to create a new identity in architecture, showcasing the blending of traditional and vernacular architectural knowledge with contemporary technology and materials.

**Keywords:** Vernacular Architecture, Modern Architecture, Hot and Dry regions, Sustainable Design, Cultural Adaptation, Architectural Evolution, Climate-Responsive Architecture.

### 1. Introduction

Hot and dry areas pose unique problems to architectural design because of their harsh climate, which is typified by high temperatures, intense sun radiation, and limited water supply. In these kinds of environments, the built environment is crucial to ensuring human comfort, energy efficiency, and cultural preservation. (Upadhyay V., 2017). Because of the architectural solutions to these issues across many centuries, vernacular architecture and contemporary architecture are two well-known paradigms. With an emphasis on hot, arid regions of India like Rajasthan and Gujarat, this study compares and contrasts these two approaches. The definition "native science of building" is quite appropriate because the word "vernacular" derives from the Latin "Vernaculus," which means domestic, "native." (Oliver, P., 2006). "By using the generally accepted phrase 'vernacular architecture,' I am embracing all the types of building made by people in tribal, folk,

peasant, and popular societies where an architect or specialist designer, is not employed," says Oliver in further explanation of his definition. (Oliver, P., 2006). Vernacular architecture is incorporated into sociocultural knowledge systems as a tangible and intangible legacy that is expressed in their physical realities and can be found in their rituals and beliefs. Glassie expands on this in his discussion of barriers and technology. "Architecture has happened with the act of physical alteration that calls into space, suggesting a past and a future, and with walls that divide space, simultaneously including and excluding." (Glassie, D., 2000). The existence of humans is the source of technology. The two basic relationships in existence that are always affected by technological growth are the one that unites the human and nonhuman realms and the one that was intended to unite humans. (Glassie, D., 2000). "Vernacular technology depends on direct

connections: direct connections to materials and direct connections between suppliers, suppliers and consumers who simultaneously shape landscapes, social orders, and economic arrangements while wealth circulates in the area." (Glassie, D., 2000). In order to construct structures that are a reflection of both the natural world and human civilization, vernacular architecture, such as that found in India, combines conventional structural techniques, profound insight, and locally available materials. Indigenous communities, like those in Rajasthan, demonstrate sustainable culture by ecologically designing habitats. "Vernacular architecture emphasizes well-thought-out construction techniques, enduring traditions, and steady progress throughout time in order to fulfill human needs and improve living standards. Owners need to be involved in every step of the construction process, flexible with the site, attentive to the local temperature and ecology, and unrestricted by philosophy or building principles. (Gartiwa, M., 2016). Three sustainable objectives are emphasized in vernacular housing: the environment, social aspects, and economy, with a special emphasis on energy consumption and efficiency. Meeting local requirements, making use of natural resources, and honoring customs are highly valued in traditional and vernacular architecture. These designs are typically created by regional craftspeople rather than licensed architects. While some vernacular features have aesthetic enhancements, the majority are practical. Even though modern sustainable design is more complex and measurable, understanding traditional and vernacular design can help one achieve sustainability. (Gangwar, G., 2016). The main features of these two architectural paradigms are examined in this paper, along with how they employ space arrangements, shading techniques, ventilation plans, and water management techniques. This research aims to determine the distinctions and points of convergence that arise when architecture evolves through time by examining historical vernacular architecture and contrasting it with modern design interventions. We can gain more knowledge about the difficulties faced by India's hot and arid regions, the integration of technological advancements, and the

significance of architectural adaptation through this inquiry. Figure 1 shows the Process Followed For the Research [11, 14].

## 2. Method

The methodology of the paper is as follows:

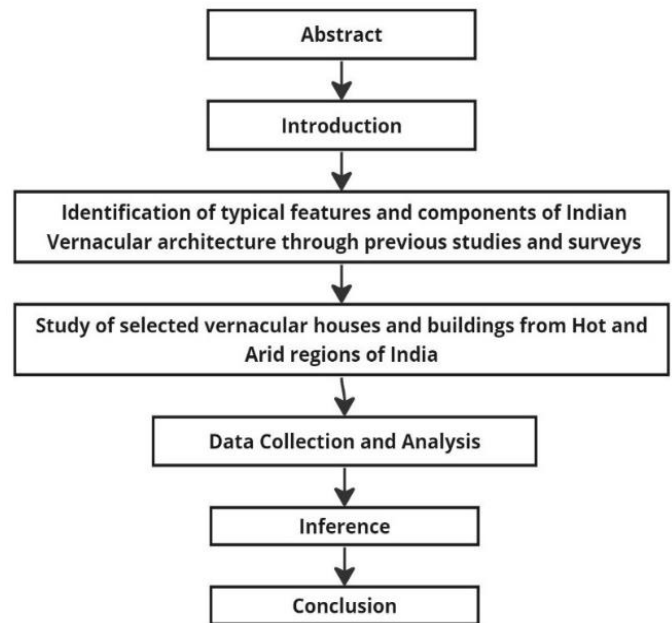


Figure 1 Process Followed For the Research

### 2.1. Vernacular Architecture and Regions of India

Vernacular architecture includes the use of locally available materials and resources, holistic approaches to form and orientation, and low-energy, basic, sustainable solutions that promote human comfort. It is closely linked to social customs and culture since it coexists peacefully with the environment, human habitation, and architectural forms. (Dili, et al., 2010; Darus, et al., 2009). As per Koppen's Classification of Climatic Zones, India is divided into various zone as shown in the following map:

Characteristic Elements and Elements of Indian Vernacular Architecture in Dry and Hot Climates:

**Thick Walls:** Mud, stone, or adobe are common building materials used to build strong walls in hot, dry areas. By gradually absorbing and releasing heat, these walls act as thermal mass, assisting in the regulation of interior temperatures.

**Flat Roofs:** Flat roofs are common in hot and arid climates. They increase the amount of outdoor living

area and provide a fun activity for cool evenings.

**Courtyards:** A lot of historic buildings have courtyards within. These open spaces provide natural ventilation, lighting, and seclusion. They serve as gathering spots for communities and families as well.

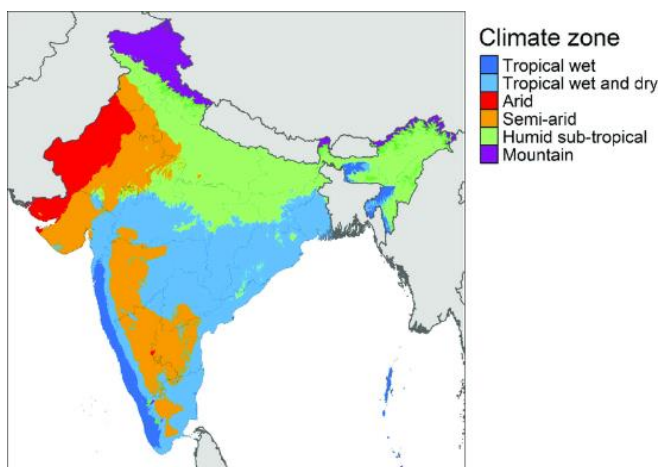
**Wind Towers or Windcatchers:** Certain regions use wind towers or windcatchers to direct the prevailing winds into buildings, allowing for natural cooling and ventilation.

**Shade Devices:** Shaded verandas, pergolas, and overhanging eaves are common architectural features that protect building occupants from direct sunshine and reduce interior heat gain.

**Mud or Adobe Construction:** Mud and adobe bricks are commonly utilized because of their availability and beneficial thermal properties. They help maintain comfortable interior temperatures.

**Mashrabiya or Jali Screens:** Windows and openings are adorned with wooden or stone screens known as Mashrabiya or Jali. They permit airflow while maintaining security and privacy.

In addition, other factors like Form and Massing, Spatial Organization, and Open-Built Distribution have an impact on overall performance. (Gulati R. & Pandya y., 2014) Together, these elements show how generations of people have wisely responded to the difficulties posed by hot, dry conditions, all the while producing environmentally friendly and culturally meaningful architectural expressions. Figure 2 shows the Map of India Showing Koppen's Classification.



**Figure 2 Map of India Showing Koppen's Classification**

## 2.2 Case study

### Patwahaveli:

Situated in the center of Jaisalmer, Rajasthan, Patwa Haveli is a well-known architectural marvel that perfectly captures the splendor and extravagance typical of Rajasthani havelis. This case study explores Patwa Haveli's rich history, distinctive architectural elements, cultural relevance, and ongoing preservation initiatives. (Tilloston, G.H., 1999) The havelis served as both public and staff quarters, and were essentially massive homes. These light-filled structures were constructed around one or more courtyards. The front face of the havelis included small openings to keep out the hot sun and wind and to maintain the privacy within. [17-19] the front façade of the havelis is the only exterior window, symbolizing the introverted nature of society's conventional expectations. There's usually a courtyard designated for women and one for males and the general public to provide privacy. (Singh, M. & Kaur, H., 2019) The havelis is oriented from northwest to southeast and has a rectangular shape. The six stories of the havelis consist of two wind pavilions, three major levels, and a basement level. There is a central courtyard. [20-22] A wind shaft is formed by the two stairways that connect them. The inside areas, walls, and roof of the haveli were all made of stone. For shade, the lower stories have Jharokha and balconies. Stair shafts and thin vertical ducts are there to divert wind away from the built form. (Singh, M. & Kaur, H., 2019)

### Bhunga of Kutch:

Bhunga of Kutch acquired notoriety after the 2001 earthquake, when it was discovered that the majority of the Bhunga houses had survived the earthquake despite being too close to the epicenter. The Bhunga people are mostly found in Gujarat's Kutch region. A Bhunga is a cylindrical building with a circular shape at the point where the building experiences lateral loads from an earthquake. Whenever an earthquake wave strikes a building, half of a Bhunga reacts as an arch against the impact. Bhunga has a circular design to effectively withstand lateral seismic forces. (Choudhary, M. et al., 2002) The walls are only a tiny bit tall. This contributes to the house's stability in the event of an earthquake. The roof's conical shape



provides stability while producing a high ceiling in the middle and a relatively low ceiling outside. Thatch is used in the construction to keep the roof light. It is very helpful against the lateral stresses of the earthquake and considerably lessens the amount of damage caused by it. (Shrivastava, T. & Choudhary A., 2016) The weight of one structure does not affect any other structures because these residences are independent circular buildings without shared walls. [23] During desert storms, the streamline created by the cylindrical shape permits air to flow without exerting undue strain on the building. (Shrivastava, T. & Choudhary A., 2016)

### Conclusion

In hot and arid regions of India, the decision between vernacular and modern architectural paradigms reflects a careful balancing act between tradition and innovation, practicality and aesthetics, and sustainability and modernization. These conclusions draw attention to the wide range of architectural strategies that have been developed in response to the particular opportunities and problems presented by the climate and culture of the area. The Pearl Academy of Fashion repurposes historic structures into stepwells and jails. Rajkumari Ratnavati School, for example, defines itself through a characteristic of Jali. The examples in this essay demonstrate how these elements are modified by architects to suit a modern environment, rather than being copied in the same manner as they were in the past. LEED principles, conventional building techniques, and locally obtainable materials are crucial for rural development. Conventional buildings and vernacular architecture create the best conditions. Climate change affects socioeconomic and ecological systems, thus it's important to preserve established ones while judiciously integrating new technologies. In conclusion, vernacular architecture values tradition and regional adaptation, while modern architecture shows that these aspects are not replicated in the same way as they were used in the past. Rather, the architects have used their ingenuity to change these elements in modern context, emphasizing modern aesthetics and cutting-edge technology. These architectural paradigms in India's hot and arid regions demonstrate the vast range of

design, materials, and techniques. It is our duty as designers and architects to combine modern methods with sustainable rural building practices in order to increase the acceptance of vernacular architecture.

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