

Forgotten Traditional Indian Architectural Techniques

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Abstract: *This research discusses about the forgotten traditional and vernacular Indian architectural techniques and the evolution of traditional Indian residences that had courtyards, ornamentation and were planned with social outlook of the community and more ergonomic interior compared to present dwellings. The approach would be to compare and analyse different case studies of three varying timelines (pre-colonial, colonial, and post-colonial) and the development of the residential architecture in the above discussed timelines of India and the modern residential complexes. Also analysing the timeline, when the architects of post-modern colonial times such as Achyut Kanvinde, B V Doshi, Charles Correa started to incorporate modern design ideas into the traditional architecture. The main focus of the research is to define a guideline on how the original useful techniques and solutions of traditional residences could appear in modern multi stories modules to make them sustainable and unique.*

Keywords: Indian vernacular architecture, Vastu shastra, architectural planning, modern Indian architecture, B. V. Doshi, Charles Correa, Achyut Kanvinde, architectural comparative analysis

1.Introduction

“Identity we are searching for is going to be pluralistic, it is not a single monocentric one”-Charles Correa Subcontinent of India, currently with an area of 3.287 million km² with varying climates, communities, and architectures. This research is intended to study about the evolution of Indian architecture. The timelines that will be discussed in this study will be three, pre-colonial, colonial, and post-colonial.

The first part of the analysis focuses on the introduction of the study of Vastu shastra, then learning about the first step of the planned architecture - temple architecture. Later, ending that timeline with architectural techniques developed with the reign of Islamic reign, which shaped a major role of architecture in India known as Indo Islamic architecture.

The second timeline discussed in the exploration will be colonial, an introduction to what architecture style was mixed with the traditional European architecture to the Indian traditional individuality which is now recognized as Indo Saracenic.

The final timeline in discussion would be post-colonial, when there was a need to find freedom in architectural identity and individuality, due to which the first prime minister of India Pandit Jawaharlal Nehru invited Le Corbusier, with a proposal to redesign the city of Chandigarh, which gave a reason to further educating Indians into learning from the invited architects in their ateliers or studying abroad and gaining the knowledge of European architecture, bringing those techniques back and adding the communities uniqueness into their architecture, some of the very well known architects are, Achyut Kanvinde, B V Doshi and Charles Correa.

By understanding the evolution of that architecture technique, the present-day situation for the general population, these techniques are a luxury. But it's a necessity to re execute them to bring back the practical

residential planning and uniqueness of those sustainable techniques.

Vernacular Architecture

“The term “Vernacular” is derived from the Latin word “vernaculus” which means domestic, native, indigenous”.¹ Conventionally, vernacular architecture means those structures which are built by using local technology and locally available building materials guaranteeing climatic comforts to the local habitants. Therefore, Vernacular architecture portrays the environmental, cultural, and historical features of a particular region as well as a specific period.

The different forms of vernacular buildings that are found all over India with different climatic conditions and locations are, Clay houses in deserts, Cave temples of Buddhist era, Hindu temples of Khajuraho, Mughal Forts and Palaces in Delhi, Havelis in Rajasthan, Floating houseboats of Kashmir, Bamboo construction in Bengal and Assam, Chettinad houses from Tamil Nadu etc.

The determination of a traditional residence has a significant use of symbols of culture, people and place. The characteristics are a sense of continuity with a connection to its past. It can be evident from reusing local materials and maintain details and elements of the culture. It is also obviously evident that a particular traditional architectural style is discovered in a specific region according to the locals needs combining resources, tradition, and climate sensitivity into the houses.

Vaastu Shastra

An interpretation of the Vaastu Purusha Mandala, 'Mandala' is the diagram or a plan that represents the universe.

¹Oliver Paul, 1997, Encyclopedia of Vernacular Architecture of the World, vol1 Cambridge university press, Cambridge.https://www.academia.edu/35542342/TRADITIONAL_HOUSING-accessed date 18.11.2022

'Purusha' suggests to cosmic man, energy, power, or soul. The Vaastu Purusha Mandala is philosophical planning of structure that includes the journey of supernatural forces and heavenly bodies, showing the settled form of Brahma (the Creator) within a square. "The concept of the mandala (cosmic diagram) is universal and can be applied equally to a temple, house, city, or indeed the entire universe. The centre of the mandala is the point of convergence of all energies. In temples, this corresponds to the position of the sanctum sanctorum, while in a residence; it is the central open courtyard".²

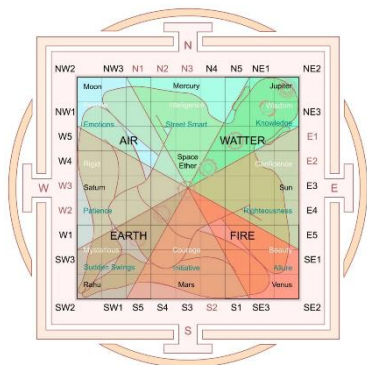


Figure 1: Vaastu Purusha Mandala

The study of Vaastu Shastra in house planning, is an architectural expression and design of the sacred space (in this context your home), were strictly arranged in the Vaastu Shastra on the science of house and orientation. It is based on the basic principle that on earth a living organism out of which other living creatures and organic forms materialize. Vaastu means "dwelling place", or indeed any planned building, and shastra means "science" or "knowledge." The Vaastu Purusha Mandala shows the position of Brahma or the Creator within a square.

The Vaastu Shastra is a highly complex set of rules and regulations that frame a system of orientation, site planning, plans and proportions of buildings, creating the harmony between natural and unnatural forces.

According to Vedic cosmology, the circle represents the chaos and irrational nature, while the square represents the order and rational thought. Each side of the square are further divided into 32 units. The sections indicate the four key directions, the position of the eight planets, the seasons of the year and the direction of the sun. The diagonals of the square divide the squares into triangles, and within the basic square more circles can be inscribed. The centre of the mandala, which represents harmony and equilibrium, is indicated by the Purusha's navel, and each part of his body within the mandala represents a part of the building to be designed.

Terms of Planning

"Vaastu Shastra in modern times is parallel from the one that was accomplished in the ancient period"³ To understand in simpler terms of a residential planning of Vaastu shastra. The following table lays out the intention and cardinal direction in plainer manner which shows the general rule to be followed or orientations to consider for the intention of prosperity and health.

Table 1: Vaastu Purusha Mandala

Directions	Effect	Function
North	Wealth & prosperity	Living room, seating, office, entrance
North-East	Religion & trinity	Puja room, well, underground water tank
East	Progress & growth	Entrance, guestroom, veranda, bathroom
South-East	Energy, vigour & strength	Kitchen, generator, power supply
South	Poor	Back yard and kitchen garden
South-west	Purity & cleanliness	Toilet/ washing area
West	Water	Overhead tank, study room
North-west	Air	Bedroom

2.Pre-Colonial Architecture

Temple Architecture

The start of built architecture started with religious buildings that include all the temples, churches, mosques etc. Depending on the structural system, vernacular buildings may be further divided into three categories, namely Pucca (solid construction), Semi-pucca and kuccha (construction with clay, wood, pebbles) houses. A Pucca structure is more durable, expensive and does not require constant maintenance. On the contrary, the Kuccha structure does not provide much strength or durability to the structure and requires continuous and heavy maintenance. The semi-pucca structure is a combination of the pucca and kuccha styles.

The application of study of Vaastu shastra into a planning was first executed in temples as the houses were mostly kuccha structures made for accommodation.

²Introduction to Indian Architecture by Bindia Thapar, Surat Kumar Manto, Suparna Bhalla-Ebook | Scribd. Scribd, n.d. <https://www.scribd.com/book/335925191/Introduction-to-Indian-Architecture>.-accessed date 19.11.2022

³<https://www.squareyards.com/blog/vastu-shastra-vastu>

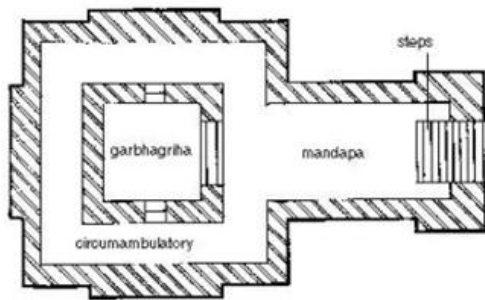


Figure 2: Temple architecture

Nagara architecture in the 6th century, “the Nagara, or the North Indian style of sacred Hindu architecture, which developed after the Dravidian style, is exemplified in the temples of Madhya Pradesh in central India, Orissa along the east coast, and some parts of western India, including Rajasthan and Gujarat. The distinguishing characteristics of this style are the shape of the shikhara, the roof of the mandapa and the plan of the Garbha Griha”.

Traditional characteristics discovered that can still be seen in a modern outlook. The interior plan of a shrine or the place where the deity is placed, or in present context our bedroom, is always square, in the private section of the plan. The exterior is defined by a series of extensions which, as they increase in number, may transform the plan till it becomes cruciform in shape.

Based on the complex mandala of the Vaastu Shastra, the placement altar only the outer face of the sanctuary, giving the entire superstructure a distinctive form. The shikhara, standing over a cubical garbha griha, is distinguished by its tower profile. The planar estimates occurring on the walls of the cells continue along the height of the shikhara, emphasising the analogy of the mountain peak leads to a clear division of places and its heights. The mandapa, especially in the later examples of the Nagara style, has the height lower than the shikhara, which is characterised by its public accessibility which in modern times can be seen as the public spaces of the residences.

Indo Islamic Architecture

“Islamic architecture can be broadly divided into three styles, which are defined by the historical events and the succession of Muslim ruling dynasties that shaped the destiny of India. Five successive Mughal emperors took a significant interest in architecture: Babur, Humayun, Akbar, Jahangir, and Shah Jahan”.⁴

⁴Introduction to Indian Architecture by Bindia Thapar, Surat Kumar Manto, Suparna Bhalla-Ebook | Scribd. Scribd, n.d. <https://www.scribd.com/book/335925191/Introduction-to-Indian-Architecture>.-accessed date 19.11.2022



Figure 3: Mughal architecture

“The Mughal architecture highlights the Mughal tombs of sandstone and marble which reciprocate the Persian influence”⁵The Mughal period exhibited a stunning revitalization of Islamic architecture in northern India. Under the support of the Mughal emperors, Persian, Indian, and various regional styles were fused together to produce works of extraordinary quality of architectural work. The architectural techniques that were displayed in the juxtaposition of Islamic architecture and Indian architecture.

The characteristics that were invented large bulbous onion domes, sometimes surrounded by four smaller domes.

- As a contradicting significance to the architectural styles.
- Start of use of materials such as white marble and red sandstone.
- Delicate ornamentation work, including jali-latticed screens for privacy and ventilation.
- Monumental constructions enclosed by gardens on all four sides.
- Mosques with large courtyards.
- Arabic calligraphic engravings, including verses from the Quran.
- Large gateways leading up to the main building.
- Vaulted walls on two or four sides.
- Use of decorative chhatris or pavilions.

3.Colonial Architecture

“Now, to begin with colonial buildings were built in a pure rendering of different classical styles where clear lines, imposing pediments and white surfaces reflected the power and dignity of Greek and Roman originals”.⁶

In England, the Gothic style was being restored, which was eventually the chosen style for most civic buildings made in the mid-1800s in India, necessitated the use of imported glass. Climatic conditions of India, however, made it crucial for them to adapt the forms and styles of medieval Europe to the functional requirements of the subcontinent. This variation indicated the beginning of a hybridisation of Indian

⁵Sebastián, Sofia and Krish Ravi Ravishankar. “POST INDEPENDENCE ARCHITECTURE IN INDIA : A Search For Identity in Modernism.” Journal of emerging technologies and innovative research (2018): n. pag. Accessed 22.11.2022

⁶Introduction to Indian Architecture by Bindia Thapar, Surat Kumar Manto, Suparna Bhalla-Ebook | Scribd. Scribd, n.d. <https://www.scribd.com/book/335925191/Introduction-to-Indian-Architecture>.-accessed date 19.11.2022

and European elements, leading to the creation of what is now referred to as the Indo-Saracenic style.

British took control of the neighbourhood like haveli, mansion housing, and divided them to form introverted 2 courtyard houses. To create social differences within people with power. The term "bungalow" is conceptually derived from 'bangla', the vernacular thatched roof hut of Bengal. The concept was a rectangular house on a raised plinth, with sloping roof projecting out to form a balcony supported on wooden pillars. The word was broken into bungalow and came to mean any single-storied house with a veranda.

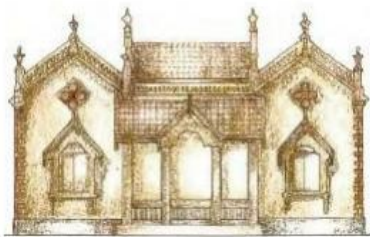


Figure 4: Typical bungalow elevation

The plan of the bungalow was basically rectangular, with a projecting colonnaded porch that led to a balcony/veranda on raised plinth, opened from the portico by shallow steps. The veranda covered the entire stretch of the house. The centrally placed living room was the largest room in the house, opened off directly from the veranda and was connected to the dining room behind through an open archway. The dining room opened out on to a rear veranda, which overlooked the back garden. The drawing and dining rooms led off on either side to the other rooms. Windows and doors were arched, in the neoclassical style.

Hill Stations - "The concept of the hill station was a result of the overwhelming needs felt by the British to escape from the burning summer heat of the plains. Between 1815 and 1947, the British created over 80 hill stations or small towns nestling amongst the mountains of India."

The architecture of the colonial house in the hill stations was based more on vernacular housing traditions of a bungalow. These houses were constructed from local stone, cut into squares, which were laid with mortar to make thick walls. Roofs were slanted, over a shallow pitched form.

The bungalow incorporated many traditional techniques such as cooling devices, apart from thick walls, high ceilings and a deep veranda, to keep it cool. Doors and windows had louvered shutters and lattice screens to shut out the summer sun while letting in air.

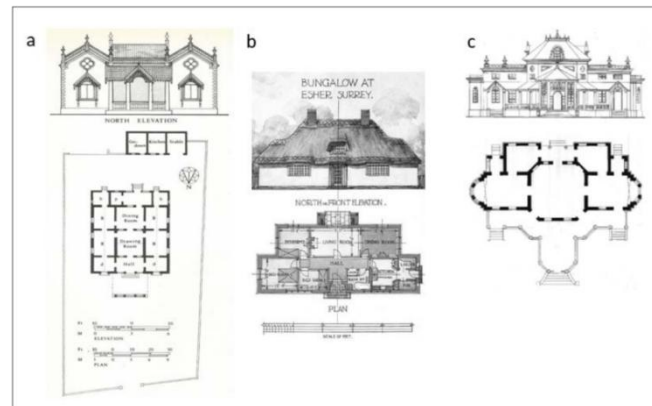


Figure 5: Bungalow floor plan and elevation

A) A colonial bungalow (Pott, 1977); B) a bungalow in Britain; c) a bungalow built by a middle-class native Indian in India "The bungalow and its compound varied according to the position and ranking of the resident, showing hierarchy within the British establishments"⁷ This was the initial move taken to plan a lodging that was not intended for religious purposes or for royalty. These techniques to keep the home ventilated vernacularly using passive solar designs.

4. Post Colonial Revival of Modern Indian Architecture

"Nationalism was a widespread and understandable statement" ⁱpost-independence a movement of revivalism of creating and enhancing the culture and art of Indian architecture started from 1950s. After independence, India wanted to create its own independent identity that would set it apart from the past of being a British colony. This was also known as Modern Movement, to educate and introduce the future of India to the theory of developed modern architecture that was widespread in the world.

To introduce the art of modern architecture to India, two renowned international architects were invited - Le Corbusier and Louis Kahn. To plan two cities and design structural buildings, majorly in Chandigarh and Ahmedabad.

Distinct approaches of architectural expressions in India to showcase the balance of vernacular and modern architecture.

"Two of those distinct features executed in the followed works of the mentioned architects are;

- 1) Geometric forms exploiting the potential of concrete
- 2) Harmonizing microclimates"ⁱⁱⁱ

Indian Modernism is not just about form, function, materials, and structure but it adds another "fourth dimension which is the feel of fresh air and nature inside the

⁷Varghese, Paul. "The Anglo-Indian Bungalow | TU Delft Repositories." The Anglo-Indian Bungalow | TU Delft Repositories. Accessed November 22, 2022. <http://resolver.tudelft.nl/uuid:789c2c10-94d7-4e23-ba35-199b7fa11add> accessed date 22.11.2022

aesthetically profound spaces.”ⁱⁱⁱ the essence of Indian-ness, the tradition and culture story telling with the mix of constructed spaces.



Figure 6: High Court, Chandigarh

Corbusier planned the capital city of the state of Punjab, Chandigarh; he also designed Legislative Assembly, Secretariat and High Court. The figure above is presented because it was a statement of being a powerful symbol of the New India which would in future inspire generation of architects, the vision of Modern Architecture in Post-Independent period.

“The city of Chandigarh was the first holistic expression of modern urban planning in India. It implemented urban principles like multi-layered circulation systems, residential sectors, landscaping and tree planting, pedestrian walkways, etc.”⁸ The attempts made previously, all the assembles components were in an unparalleled model for a modern city designed around Le Corbusier’s four main concerns: comfortable, sensible living, work movement, the circulation of the residents and care for the health. Thus, Chandigarh is not just a city, but a system of thought symbolizing modernity. It opened the path to modernization that was at once social, economic, and cultural. Chandigarh city plan left an unforgettable mark on urban planning and architectural design in India. He helped this developing country to join the practice of modern architecture and urban planning.

Case Studies

“The year 1947 saw the freedom of India from British rule, and the traumatic partition of the subcontinent into two nations-India and Pakistan. Despite the wounds caused by the division of the country, Jawaharlal Nehru, the first Prime Minister, articulated the dreams of the Indian people at large when the spoke of a new India, free of the shackles of colonial rule, which would "awaken to new life and freedom: ”

Table 2: Old vs. new building materials

	List of old building materials	List of new building materials
Wall	Brick, Rammed Earth, Rubble, lime, or clay plaster	RCC Block, Cement Plaster, Paint
Roof	Madras Terrace Roof, Filler Slab	Reinforced Cement Concrete slab
Floor	Red oxide or Mosaic	Vitrified Tiles/Granite/Marble
Windows	Wood frame with Jaali Mesh or Iron Bar Grill with double Glaze	Timber Frame with Single/Double Glaze
Wood	Teak	Teak, Sal, Oak

⁸<https://lecorbusier-worldheritage.org/en/the-influence-of-the-architectural-work/india/>

Charles Correa - Tara Group Housing

“By the late 1970s, more complex housing projects started getting developed through the regionalist approach. The Tara Group Housing (1978) by Charles Correa at New Delhi consists of 160 double-storey units clustered around a central landscaped space. ”ⁱⁱ



Figure 6: Tara group housing

Free water has been enhanced to the mix of lawn, paving and trees in this significant space to regulate the micro-climate of the housing complex. Large projections have been provided to further mitigate the harsh hot and dry climate of New Delhi.

With this study we can understand that the modern architects tried to execute the traditional architectural techniques of openness and uniqueness that is much more practical and aesthetic. Adding the essence of ornamentation of landscaping and mixing it with orientation of the housing complex. Adding the veranda projections by keeping the traditional architectural techniques which also creates a ventilation cooling system.

B V Doshi - Kamala House



Figure 7: Kamala house-Private residence

“It is the marriage of western and Easter influences that best characterizes much of Doshi’s work.”⁹ In the design for Kamala House (1958-63), private residence in Ahmedabad, if it evident that you can find a blend of modernity with the traditional techniques. They are seen as one, the planning of the housing and its material form takes inspiration from living in the sub-continent. Even using materials that are

⁹Bahga, Sanyam & Raheja, Gaurav. (2018). An account of critical regionalism in diverse building types in postcolonial Indian architecture. *Frontiers of Architectural Research*. 7. 10.1016/j.foar.2018.09.001. accessed date 19.11.2022

low cost yet vernacular, locally available, brick and Kota stone. Doshi reinterpreted this element in the form of a veranda - a typical feature found throughout the geographies of warm climates.

“The architect's search for identity culminated in the story of "four columns and a staircase" in a brick kiln.”¹⁰ This house has an economical outlook using local brick as building material for construction and has proper orientation for climate control. Grid of the square plan is held by four square columns with load bearing brick-walls and brick cavity-walls on the boundary. Dynamic square volumes within the cross plan change spaces into living, dining and bedroom which open to the garden that serves as views and ventilation.

Achyut Kanvinde - Harivallabhdas Residence



Figure 8: Harivallabhdas Residence

“Our architectural expression is in a most confused state as there is neither clear thinking nor definite ideology”¹¹ His ideology of planning was traditional yet very modern with cleaner volumes and forms. He followed Vaastu shastra. The distinct exterior forms also clearly illustrate the core operation of the building, with exposed circulation spaces. Different living modules have been perfectly situated in a beautiful garden. The functional spaces are well achieved in the interiors along with the bold look from the outside.

His idea of design was simplification of form and creation of ornament from the structure by eliminating unnecessary details. Use of modern building materials mixing with traditional techniques, Kanvinde achieved modern outlooks in his design. His design style focuses on designing with natural light, asymmetry (brutalist style), cube forms with cross grids, exposed materials.

Comparative Analysis

By understanding the case studies of each of the post-modern Indian architects. We can figure out the modern Indian individuality that they tried to discover and create. By mixing modern European architecture with traditional passive strategic design techniques of India.

Their design style focuses on designing with natural light, asymmetry (brutalist style), cube forms with cross grids, exposed materials, forms are balanced, proportionate, slender, and neat, keeping the local climate in mind, with local building materials, simple blocks, elimination of unnecessary details, landscaping with greenery.

5. Present Situation What Is Lost?

“The loss of identity that was one of the results of Modernism has led to yet another trend”¹²

The public housing sector was in the domain of critical regionalist architecture until the economic liberalisation of the 1990s. As large number of people was migrating from rural centres to urban India in the decades after India's independence, regionalist architecture catered to their rural lifestyles. Due to which people adjusts to the contractors passed plans homes that are turned into complex that are just inhabiting the people who need houses but don't have the opportunity to turn their houses into their planned and decorated homes. The general population live in houses that are made of second grade materials. Losing the traditional practical techniques, such as orientation, ventilation, light painting, landscaping, and shading elements. That if reincorporated could bring a lot of health improvement also bring back the sense of community and individuality.

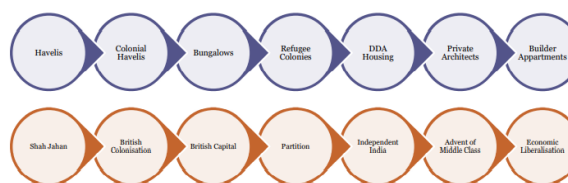


Figure 9: Changes in house typologies

Re-Execution of Techniques

Present state, of residential buildings, adding these techniques discussed above will bring back the lost architectural identities that were- ornamentation, floor to ceiling height, vernacular materials, thick walls, sun orientation, courtyard, veranda. Compactness in planning allows light but not heat radiations through the buffer courtyard which creates good air flow by density difference creating a draft pulling air either upwards or downwards.

The new identity that could include the modernity with traditional techniques can be solar passive design method. An example of a house designed with SPD-

¹⁰<https://architectuul.com/architecture/kamala-house> accessed date 19.11.2022

¹¹Varma, Rohan. (2018). Doshi: A Life in Architecture. Accessed date 19.11.2022

¹²India International Centre Quarterly Vol. 24, No. 2/3, Crossing Boundaries (MONSOON 1997), pp. 203-218 (16 pages) accessed date 21.11.2022

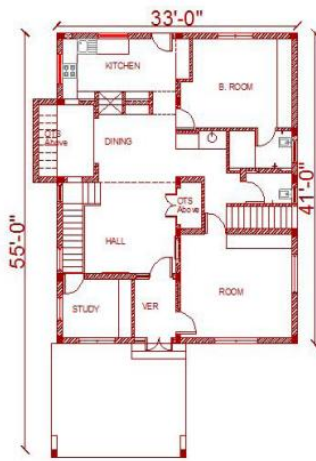


Figure 10: Plan of a house made with SPD



Figure 11: View of the designed house with SPD

“Orientation and Planning-North-South orientation is adopted with minimum exposure to habitable rooms. The aspect ratio of the house plan 1: 1.6 (55' x 33') which is in ‘golden proportion’ is pleasingly harmonious.”¹³ Designing by linear arrangement of two rows of rooms, front row being shaded by portico. Shaded area avoids heat radiations and lets cool air to flow in.

Light Coloured Painting White or lighter shades-that have higher emissivity are most effective for warm humid climate making it more relaxing and reflective.

Shading Elements-All the openings have shading elements to block solar radiation incident on the exposed surfaces of a building, consequently reducing heat gain. Such shading elements are projected four feet on southern direction casting complete shadow on the walls facing south. Such overhang projection is made on north direction which allows cool air and reduces heat radiation.

Landscaping Planting of trees-strategic locations and shadow casted improves the indoor thermal comfort of buildings.

High Ceiling Roof-For tropical countries with hot weather, if ceiling heights are increased it causes a small decrease in indoor temperature of atmosphere.

¹³C.V., Subramanian & Ramachandran, N & Kumar, S. (2017). Design and Analysis of Solar Passive Architecture for Thermal Comfort of Residential Buildings in Warm-Humid Climate of Thanjavur Region. Indian Journal of Science and Technology. 10. 10.17485/ijst/2017/v10i9/103647. Accessed date 20.11.2022

6. Conclusion

As population of India grows and migration continues, there is an exceedingly low amount of housing for people that reminisces with the ideas of having their own home which they could design, and plan is a luxurious idea. Not many people can afford the affiliated designers or the materials.

“Contemporary architecture in India thus reflects the bewildering choices provided by a rich architectural heritage as well as both the necessity and difficulty in finding solutions to the larger problems faced by the country.”

The critical purposes whenever designing:

- Contextual - the design should relate to its urban context by focusing on site specific factors
- History - design should interpret lessons from traditional architecture of the location and mix them with modern language
- Climate - the form and organisation of building should respond to the local climate
- Ecological sensitivity - design should minimise impact on natural environment
- Local materials - design should make use of local materials and construction techniques
- Technology sustainability - design should be adaptable to modern technological needs
- Culture - the architecture should take care of the way of life of the people inhabiting the building
- Therefore, thermal comfort achieved by re executing techniques in the modern way, which are termed as passive solar design techniques can fulfill a basic requirement of any residential building. Hence these designs of such energy efficient houses play a major role to save energy which in turn gives an impact on national and global economy giving a modern solution which does not forget the traditional architectural techniques.

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