



An Exploration of Building Construction Aspects Related to an Ancient Indian Temple

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ABSTRACT

The legacy of ancient Indian architecture includes architecture, sculpture, and temple construction. Ancient Indian art and architecture have a vital role in civil engineering. It is necessary to plan, design, obtain approvals, educate, and improve. However, from this point forward, everything changes. Construction science and engineering are disciplines that research the engineering performance of structures, building materials, and building systems. The primary focus of this endeavour is the study of Indian ancient construction. The construction of Indian temples involves a variety of construction techniques and processes. It comprises the materials utilized, the layout, the equipment used, the masonry work, and so on.

This paper explains the type of Indian temple, architecture and architectural principles, material, material component parts, construction processes, Hinduism, Vaastu sastra, and mythical aspects.

Keywords: Architecture, Indian temples, construction techniques

1. Introduction

Indian Ancient construction is always a matter of curiosity. There is a huge development and changes occurred time to time in construction techniques of heritage structures. Indian Temples are not only places for worshipping Deities but also an enlighten source of Indian education. Temples are one type of buildings. In that building production is a technique that includes the shape of actual property. Traditional and modern constructions are very different from one another. Both conventional and modular production starts with inside an identical way. Planning, design, approvals, web page caching, and improvement are all required. But, from these factors onwards, the entirety changes.

Building technology and engineering are branches of study involved with the technical overall performance of buildings, building materials, and building systems. The subject may be visible because of the specialization of infrastructure engineering carried out to construct the systems. This paper mainly focuses on the study of Indian ancient construction (temples). It also includes various construction techniques & processes that are involved in the construction of Indian temples and includes material, layout, equipment used, masonry work, etc.

2. Types of Indian Temples

2.1 Indian temple style

In the north, the major temple-building style is Nagara, while in the south it is Dravidian. In our country, the most common types of temple constructions are Nagara in the north and Dravidian in the south. The Vesara Style, which is the third architectural style, combines Nagara and Dravidian forms.

A) Nagara Style –

- The Nagara fashion is connected with the region located between the Himalayas and the Vindhyas and is popular in Northern India.
- The shape in this style incorporates buildings, the main towering shrine, and a Shor neighboring mandapa.
- The fundamental distinction between those residences is the shape of the shikhara. A bell-shaped shape is added to the principal shrine.
- The temples are designed with four chambers. They are Garbhagriha, Jagmohan, Natyamandir Bhogamandir, and Natyamandir Bhogamandir.
- The Nagara fashion has two distinguishing features: planning and elevation.

B) Dravida Style –

- Dravida style was dominant in the South during the Chola Empire, between the 9th and twelfth centuries AD. It is noticeable in the neighborhood of the Krishna and Kaveri rivers.
- The most important characteristics of the Dravida temple structure are:
 - o The sanctuary of temples has more than four sides. Pyramids include the Tower and Vimana.
- The temple in Dravida style is located inside an ambulatory hall.
- The Vimana is a multi-story structure built over the Garbhagriha.
- This architectural style makes extensive use of pillars and pilasters.

C) Vesara Style –

- Vesara fashion is sometimes connected with the area between the Krishna River and Vindhya, which arose in the early mediaeval period.
- Many temples in Central India and the Deccan employed the Vesara style with local variations.
- It is a blend of every Nagara and Dravida temple architecture style.
- Temples were built, although later Chalukyas of Kalyani and Hoysalas are included because of examples of Vesara style.

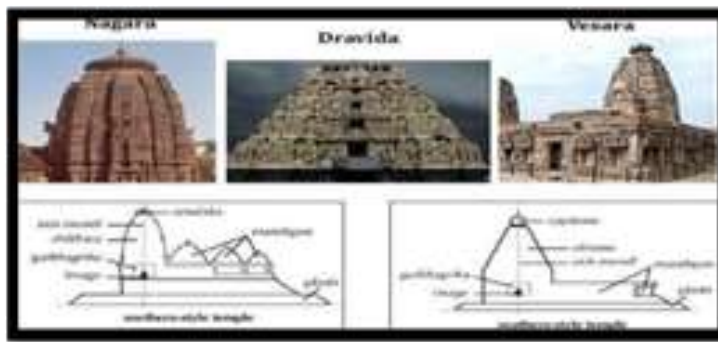


Fig no. 1- types of Indian temple

2.2 God of construction

Bhagwan Vishwakarma is taken into consideration to be the godfather of production and advent amongst all of the Gods within the Universe. Vishwakarma is the divine chippie and grasp craftsman who usual the guns of the gods and constructed their towns and chariots. He is the architect of the legendary town Lanka and is likewise stated to have made the fantastic photograph of Jagannatha at Puri (Orissa).



Fig no. 2 - God of construction

3. Site visit to Shri Mahalakshmi Ambabai temple Kolhapur, Maharashtra.

3.1 Vaastu shastra

This temple's main garbhagraha, where the deity is installed, is currently quite small and has a ratioproportion of 1:1.25. The length is 57.5 angula, while the width is 46 angula. (This Garbhagraha uses a Dhanurmusti angula). The Garbhagraha has a 207-angular circumference. According to the temple authority, the main temple was made of wood and burned down between 6 and 7 A.D. The primary deity, Mahalaxmi, stands one Kishku Hasta tall. Maharishi Mayaan of South India typically measures things in this way. We believe that kishku hasta was used in the construction of the original temple, which was made of wood in ancient times. However, following reconstruction, the hasta had to be replaced. Photographing the Garbhagraha was no longer permitted by order of government. By keeping the modular area for foot traffic around the main Garbhagraha, the second Garbhagraha and its third kosh are built. The Kolhapur Mahalaxmi temple's Second Garbhagraha is 111.66 angula (dhanurmusti) wide and 152.41 angula long from wall to wall. The Garbhagraha door measures 48.95 kishku angula in width. Around the main Garbhagraha, there are intermediate walking areas. The internal top of the square, protracted Sabha Mandapa is 6 modules, or 140.95 kishku angulate Sabha Mandapam's peak, or 73.12 Prajapitam angula, is where the Abhishek vidhi is conducted.

3.2 Kirnostava

The temple is facing West by virtue to an 18-degree deviation from true West towards the Southwest. The architect has very cleverly preserved the apex of the roof and basement in such a way that the sunshine reaches the Deity immediately. It is known as "Mahalaxmi Kirnostava" this phenomenon. If we pay close attention, we can see that the Meenakshi temple in Madurai is also 18 degrees oriented towards the northeast, which is directly opposite the Kolhapur Mahalaxmi Temple in Kolhapur. The most significant technical commonality between the temples is in this area. The size of the temple's components is also the same. We might conclude from this that the architect of each of the original temples had to be the same individual. While in communion or rhythm with the individual standing in front of the Garbhagraha, he clearly senses the Goddess's bliss and peace with prosperity. This is the Ayadi sutra's Secret in Vaastu shastra.



Fig no. 3 - Kirnostav

4. Indian temples as Educational resources

4.1 Praveen Mohan (Youtuber, Author, Researcher)



Fig no. 4 - Praveen Mohan.

Praveen Mohan is a famous YouTuber, researcher, and traveler who is known for his research the ones. He is likewise a content material author who stocks his findings and theories on numerous social media and content material sharing systems like Reddit. His designated studies on archeology, historic history, and extraterrestrial theories won him huge popularity. One of his YouTube channels has over 30 million perspectives and 1,00,000 subscribers. His number one Facebook web page has over 1.1 million followers.

4.2 Singrikudi temple Tamil Nadu



Fig no.5- Singrikudi Temple

- The temple you are about to see is very ancient, it was built around 250 A.D which means the temple is 1750 years old, but the details in this temple are mind-boggling and will make you question if the temple was built by supernatural means.
- This temple is located in a small village called Singrikudi and at first sight it looks like almost like a modern-day temple with beautiful and colorfully painted statues. It is so special about these carvings and statues. Look at this statue, it has a shirt, with a collar, and appearance there are even buttons and you could even see the wallet on each side. He is posing as though he is holding up the weight of the temple.
- Now, Hinduism is all about symmetry, so my eyes are naturally going on the other side of the tower and look, again, the statue on the other side is also shown with a dress shirt with collar, pockets and buttons. This is shocking, because all historians agree that buttoned shirts got hereto India handiest in the last few centuries, but this temple is at least last few centuries, but this temple is at least 1750 years old. Yes, the painting on it is fresh, because they do repaint the temple time and time again, and some even claim that these shirts were done by a quirky painter in recent times.
- However, many locals declare that those shirts have been at first carved on those historical statues, and the painters simply paint diverse colorations on them. Now, remember I spoke about symmetry. Let us go to the other side of the tower and see what kind of statues exist there. This side is also beautifully carved with so many stories from Hinduism, and again we see more figures with dress shirts with buttons, collars and pockets. The faces are a little bit different from the faces on the front side of the tower, but now we have a total of 4 statues wearing dress shirts. We are not done yet! Because temple towers actually have 4 sides, so I decided to see what is on the sides as well. Most people do not see the sides of the towers at all, and I was able to see more statues with shirts. If we go around the tower, flying like birds, then we can see 4 more statues on the sides of the towers as well.

5. Comparative study of Ancient Temple and Advanced Temple construction

Points	Ancient construction	Modern/Advanced construction
Life	The life span of ancient construction is min 80 to 100 years and max 1000 years/above.	The life span of modern construction is min 30 to 50 years and max is 100 years.
Material	The material used in ancient days we are available resources in environments are Stone, Timber, Lime, Clay, etc.	The material used in modern construction day we are man-made resources Brick/Masonry, Steel, Concrete, Wood, etc.
Design	The ancient Indian constructions are classified into three types, i.e., Nagara or the Northern style, Vesara or Mixed style, and Dravida or the Southern style.	Modern construction is classified into types, i.e. Nagara or the Northern style, Vesara or Mixed style, and Dravida or the Southern style.
Tools	Tools have used a hammer, chisel, hand axe, pebble chopper, adze, hoe, etc.	Tools are used bolster, concrete mixer, brick hammer, circular saw, drill machine, plumb bob, etc.



6. Rehabilitation of Temples

Maintenance, restoration, and renewal of structures or components play a major role in terms of their expected lifetime. Renovating historic homes has become a hot topic around the world. Conservation and restoration are necessary to keep the form in proper condition to serve its purpose. Maintaining structure, if done well and regularly, will protect your form from flaws and then save you from any resets that come up. It is found that many systems fail prematurely due to improper maintenance. Therefore, proper care is the most important thing for a perfect working form that offers all its features for the expected life. India, a country rich in cultural heritage, is a treasure of ancient houses and monuments.

6.1 Evaluation techniques

1. Visual Examination:

The extent of the damage can be seen from the appearance of the structure. Surface whitening indicates sulfate attack. Any discoloration or staining indicates that the crack has been present for some time. The widest crack type on the surface indicates the most ductile strain zone. The crack width can be measured with a device called a crack comparator. Cracks, rust, surface deterioration, and chipped areas can be seen. A thin film of electrical resistance is also used to trip crack motion. Evaluate ground cracks at the atomic level, sub-micro level, micro level, and macro level. A visual inspection of the locations revealed discoloration along with dirt particles in many locations. This proves that the defect has existed for a long time.

2. Non-Destructive Testing:

These tests do not harm the structure. The NDT method is the most powerful test method used to assess the strength, durability, and elastic parameters of materials. Parameters are obtained from tests performed on material properties such as penetration resistance, hardness tests, rebound hammer, and ultrasonic pulse velocity tests. However, looking at the effects obtained and the analyzes obtained in hardening houses of materials, we find that it is one of the most effective approaches for estimating the energy resistance of houses. In addition, we study crack strength, microcrack Formation etc. very carefully.

7. Conclusion

India is the country widely known for country of temples which are standing with unconditional beauty, style architecture against all forces of nature. the ancient temples describe the architecture, techniques, sculpture, masonry techniques, and many more. The architectural style of the temple shows the different nations. Indian temples' structures are not only the location of worship; but also, they are additionally a vital source of education, art, structure, and culture. The things explored in this project are, in this project the analysis of various construction technics& processes involved in the construction of Indian temples. It includes material, layout, equipment used, masonry work, Vaastu sastra, etc. In India, mainly three types of structures which include Nagara which is known as the north Indian temples, and Dravidian which is known as the south. The last style is the Vesara Style, which is a combination of Nagara and Dravidian styles of architecture. The stone masonry techniques, joints (mortise and tenon). Traditional and modern constructions are very different from one another. Although modern constructions are advanced and easy to build or require less time to build, the life span of the structure gets decreases. Vice versa the ancient construction had taken more time to build but after thousands of years of age, they are standing with same as our ancestors had left.

Today's generation should know the importance of ancient temples because heritage sites and buildings represent the history and culture of a nation, therefore, the damages of the structure must be rehabilitated through evolution techniques and also need to be awareness related to storing the ancient Indian heritage.

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