

Wonder of Sciences and Technology Behind Magnificent Indian Temples Which Leads These to UNESCO World Heritage list” A Review

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ABSTRACT:

From ancient time India has religious, spiritual and cultural heritage. Probably India was the land of engineering and artist. India has lot of marvellous temples from 6 to 7th century which indicates its rich culture as well as knowledge of science and technology of Indians. This is the reason why Indian temples are continuously added to world heritage list. UNESCO World Heritage list is compiled by United Nations Educational Scientific and Cultural Organization (UNESCO) through the world heritage committee according to the provision of the world heritage convention which was established in 1972.

As of November 2021, India has 40 world heritage sites including 32 cultural, 7 natural and 1 under mix category. In 2023- 24 more sites are added to the list..... Shanti Niketan (Ravindanath Tagore house) and Temples of Hoysael rulers in Helibid. In India there are lot of temples which are part of UNESCO World Heritage list from 1983 onwards.

Rock cut temple of Ellora 1983

Sun temple Konark 1984

Monument of Mahabalipuram 1984

Khajuraho group of monuments 1986

Group of monuments in Hampi 1986

Group of monuments in Pattadakal 1987

Chola temple (Brihadisawar temple Tanjavur) 1987

Mahabodhi temple Bihar 2002

Kakatiya Ramappa temple 2021

And recently in September 2023 Heysel rulers' temples in Helibid also added to the list.

Through this research paper we are going to know about the science and technology behind these marvellous temples which make these magnificent in structure and design also.

KEYWORDS: Ancient Indian Temples, Technology Behind Temple Architecture, Vastupurusha Mandala, Science Culture and Spirituality, USESCO World heritage Sites

INTRODUCTION

Hindu temples are symbol of sacredness and emphasize on segregation from the word outside and increasing concentration towards spirituality. These temples represent countries old yet prosper and splendid culture. In temple architecture religious motives was predominant. Most of the temples found the support of Royal patronage.

The Pallavas, Cholas, Hoysalas, Chalukyas, Chandelas were such royal dynasties who build marvellous temples. Ancient forts and temples have proven the efficiency of Indian architecture.

India's temples vastu are structural engineering marvels. In ancient architectural approach the proposed structure of site is measured and known as Vastu purusha. Garud Purana explain the place of different deities on site of structure as per Vastu purusha. On the North East the head of the lord Vastu and his feet towards the Southwest and hands at the south east and north west corner. The centre of this mandala is Brahma sthala. In temple construction of the Garbha Grah (the sanctum sanctorum) is placed in Brahma Sthala. In forts and palaces king's palace was established at Brahma sthala as described in Vastu Purusha. There are lot of temples which are thousand-year-old and their engineering is a wonder to the world. UNESCO is declaring these as world's Heritage site. Here we are going to go through of speciality of these temples one by one.

Rock cut temple of Ellora

It is the largest rock cut structure in the world. Kailash temple of Ellora (cave 16) was built by Rastrakuta Krishna I, is special in its vertical excavation. The temple was built by digging out a sloping basalt hill with two massive trenches. It has three storey Vimana.

According to UNESCO report "It is one of the largest of all cave Temples in India on account of its striking proportion, elaborate workmanship of architectural and sculptural treatment, furthermore this temple is decorated with some of the boldest and finest sculpture compositions to be found in India. In the Rang mahal of this, Sabha Mandapa are presented some beautiful paintings belonging to two different periods."

Sun Temple Konark

Sun temple in Konark was built by stone in 1250 CE. It is in the form of gigantic chariot dedicated to Sun God. There are 24 carved wheels which symbolize 24 Pakshas in a year. 7 horses are at front, symbolically pulling the chariot. Originally it had a Vimana of 229 feet which fell in 1837. The wheels of temples are Sundials which can be used to calculate time accurately to a minute. In main temples Sun God had aligned in such a way that the first ray of sun cross the Natuamandir and reflect from the diamond placed at the crown of the Sun. Its structure indicates that ancient artisan has good knowledge of science and architecture and knowledge of astronomy also.

Group of monuments at Mahabalipuram – Tamilnadu

These monuments or temples are built by pallav kings in 7th and 8th century. These includes Panch Rathas, Shore temple, Arjun's penance, cave Temples etc. In these some are monolithic temples which are made of one stone by carving and some are giant open air rock cut temples. Significant contribution of these temples is creation of temples first time without traditional material, material like brick timber metal mortar and plaster. Pallavas created temples using hard rock like granite.

Khajuraho group of monuments

There are lot of temples built by Chandel rulers. Kandariya Mahadev temple of Khajuraho build in 1025 during the Vidyadhar Chandel reign, is the Pinnacle of the early medieval India temple architecture which represents the intricate vastu art. It has magnificent construction. Khajuraho group of monuments have rich display of intricately carved statues, specially they are famous for their erotic sculpture, sexual themes

cover less than 10% of the temples sculpture. Sculpture of temple wells indicates efficiency of iconographic knowledge and skills of technicians of those times.

Group of monuments at Hampi Karnataka

There are lot of marvelous temples like Virupaksha Temple, Lakshmi Narsimha temple, Achyutaray temple, Vitthala temple, Hazara temple etc. Vinay Vitthal temple stands with a special feature with musical pillars. Several Indian temples have musical pillars. This technique required carving the stones so that the sound frequency is properly established. The pillars of the Hazara temple produce different melodious sounds on being hit. Kalyan Mandapa (for divine marriage) is also a striking feature of the Vijaynagar temples.

Group of monuments at Pattadakal Karnataka

These temples belong to Chalukya Dynasty. These include 9 Hindu temples and one Jain temple. These are the examples of unique blend of architectural form of Northern India (Nagara) and Southern India (Dravid) that is called Besar style. Sangameswar temple is the oldest. All temples are beautifully carved with various stories and scenes of the great Hindu epics Mahabharat and Ramayan. Virupaksha temple is a masterpiece made by Queen Loka Mahadevi which has gopuram (Tall tower entrance) as gateway to the inner sanctum. Mallikarjun Temple is another famous temple in the group made by Queen Trilokya Mahadevi.

Chola temples (Brihadeswar temple Tanjavur)

Chola temples are famous for their marvelous structure. 11th century Brihadeshwar temple of Lord Shiva design not only to enlighten the human brain but also to elaborate with cosmic, spiritual and scientific causes in addition to the science of structural building and a clear cut construction code of human body and our mysterious universe. Its Viman tower is a 99 feet structure in Dravidian style. The Shikhar of temple is a Domb of 25 tons rest on a single block of granite weighing 80 tons. It was supposed to be largest monolithic place on a tower in structure in the world. Most surprising thing is that there was no supply of granite near 60 km area of temple. So how they manage to carry and carved on top 28 feet high tower and place it safely. There are musical Pillers also in the mandapam of temple. It is also famous for its strong structure in thousand centuries. Comparatively Minar of Pisa begin to lean during its construction in the 12 century. It prove the efficiency of Indian architecture and technology in temple building.

Mahabodhi Temple Bihar

These are one of the earliest Buddhist temples entirely made of bricks still standing and had significant influence on brick architecture which shows architectural genius of Indian people.

Kakatiya Ramappa Temple

This is the temple devoted to Lord Shiva. Main charm of this Temple lies in its unconventional construction. Its foundation was laid using the sandbox technique. The main structure is in red sandstone, the grand temple floor composed of sturdy sandstone slabs and beams, boldly defied traditional methods by resting directly on this sand bed, without the support of mortar. Pillars are made up of black basalt. Temple has 6 feet height star shape platform as base. This different approach of temple architecture

and engineering Marvel make the Ramappa temple special. As this sand box technique helps as cushion in the case of earthquake. So Ramappa Temple has earthquake proof architecture. This temple is a historical gem which was crafted during the rule of Ganpati Dev.

Hoysael rulers temples in Helibid

Hoys rulers temples in Helibid are famous for their Marvelous architecture. Recently these temples become the part of UNESCO world heritage list in September 2023. Finest example of Hoysael Architecture is Keshav temple, built by Somnath and Arjakanachari in 1268. Its walls are perforated for ventilation and lightning. Temples exterior walls are inclined and highly carved. Whole temple is systematic in its design. All the three shrine of temple are 16-pointed stellate (star shaped plan) its grey pillars are cylindrical in shape with cubical capital. The ring like grow is along the land and the lower portion has a bell. After observing the uniformity finishing of pillars design it was supposed to be made by some machines because so much uniformity and finishing in design are not possible by merely human efforts. Telescope depiction on temple walls, rocket Warfare depiction and ancient astronaut pics also depicted on the Hoyseswara temple which shows their knowledge towards architecture science and astronomy.

OBJECTIVES:

Objectives of this research paper is to highlight the ancient science and technology which was used in Indian temples due to which they are still standing like a marvellous structure. Day by day more numbers of Indian temples are getting added to UNESCO list.

LITERATURE REVIEW:

1. Prathmesh Gurme and prof Uday Patil gives the details of all Hindu temple architectural style and Vastupurashamandala in their research paper.
2. K.J. Ojjevaar, gives the details of south India temples Architecture style in their research paper.
3. Aditya kumar singh, Vinay Mohan Das, Yogesh Kumar garg and Mohammad Arif Kamal gives the details of Hindu temple patterns in their research paper.
4. Dr.N Neela, Dr.G Ambrosia gives the details of Different kind of temple Vimans.
5. Subhash kak mentions astronomy knowledge of ancient Indians and how they used it in architecture.

METHODOLOGY:

This study is based on secondary data which has been arranged from reference books journals and Internet sources.

CONCLUSION:

In ancient times making temples was considered a good deed and through this a person can get rid of his or her sins. Rulers made temples in their memories or for religious purposes.

Ancient Indian temples was the source of Sanatan Dharm and these indicates the greatness of our ancestors and their knowledge towards science and technology also.

The works and designed depicted on temples contains contemporary style and technology. Basic features of Indian temples architecture are same in all temples as follows...

Pradakshinapath(circumambulatory), Mahamandap (Prayer / Activity hall), Mandapa(Assembly hall), Mukhmandapa (Threshold), Ardhamandapa (Annexe) . Beside this all group of monuments have different kind of speciality. We will get to know through this research paper the specific features of science and technology used in our temple's architecture.

Brihadeshwar temple **Thanjavur indicates the construction code of human body in its** architectural style. Our ancestors established this type of temple architecture to connect human to spirituality as temples were the important part of life and represents the sanatan dharm. It's marvellous structure of granite was another special feature of this Temple. Ramappa Temple architectural structure was different. As it was made of **sandbox technique so it was earthquake proof** and it shows the knowledge of ancient artisans. Musical pillars of different temples in India shows that ancient artisans have deep knowledge of astronomy and science and **technology behind sounds frequency**. Another example of good knowledge of our artisans towards science and technology is Sun temple Konark. It was constructed in such a way that first day of sun will reflect on the temple and they can measure every single minute of the day through 24 wheels of temples. Kailash temple Ellora was the world's **largest example of Rock cut temples**. Hoysael ruler's temples in Helibid indicates the advance architecture of temples. It's iconography and pillar architecture is Marvelous. Mahabodhi Temple Bihar was the most ancient temples made by bricks and still standing after so many years. Khajuraho group temples are also famous for its iconography. So this is the history of our Marvelous temples. Such Marvelous structures were rare in contemporary time. Our ancestors defined and presented the good examples of combination of science, technology and spirituality through these temples. This is the beauty of Indian culture which is mixture of science, technology, spirituality at one place. These temples are as well as the symbol of our rich heritage which makes us feel proud.

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