

SHODH SAMAGAM

ISSN : 2581-6918 (Online), 2582-1792 (PRINT)



Futuristic Creative Revolution of Fusion of Art and Architecture in Aesthetically Oriented Planning of Community, Residential and Urban Architecture

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ORIGINAL ARTICLE



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Received on : 16/03/2024
Revised on : -----
Accepted on : 17/05/2024
Overall Similarity : 10% on 09/05/2024



Plagiarism Checker X - Report
Originality Assessment

Overall Similarity: **10%**

Date: May 9, 2024

Statistics: 1387 words Plagiarized / 13243 Total words

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Abstract

Since primitive times, art and architecture have contributed significantly to meeting the housing needs of humans; and these creativity-oriented mediums are simultaneously both expressive and communicative. Various forms of art and architecture are strongly interconnected; as reflected in the architectural settings, decoration of buildings and unifying motifs. Self-expression, artistic creativity and practitioners of mediums such as architecture contribute to the fulfillment of architecture by collaborating in building with similar creative ideas, aesthetic elements and sensory involvement. This study confirms the important role played by different types of building materials in perfecting the essence of Indian art and architecture.

KEY WORDS

Architecture, Art Skill, Natural Materials, CNC Technology, Chip-Oriented Devices.

INTRODUCTION

The roots of art and architecture undoubtedly go back to primitive times; which was the first and very initial stage of human life on earth. In that primitive culture, then the human beings, using their artistic skills and architectural techniques, started building very simple hut-like residential shelters using the natural resources around them. This innovative tendency of his can be cited as the germination period of architecture and the first immature stage of development of residential buildings. Many evidences of which, along with the heritage of its past, can still be seen in many prehistoric caves and rock shelters like '*Bhimbetka*' and '*Isko*' located in different states of India respectively Madhya Pradesh and Jharkhand respectively. In this sequence,

'Lascaux' and 'Loxi' of France 'Altamira' of Spain, 'Santimamine', 'Ekain' and 'Altxerri', 'Cuevas del Drach' (these were discovered just a few years ago in 1905), In the African subcontinent, the prehistoric caves of countries like 'Twyfelfontein' of Namibia, 'Mammoth' of America and 'Sint Johns' (Jansberg) etc. also prove the architectural and artistic addiction since the early period of the existence of human civilization in the inter-continents. The gradual development, expansion, architectural planning of the early artistic and architecturally oriented human expressions of the above prehistoric period as well as the materials used in the internal and external decoration of buildings and the relevance of various art forms have been shown. In every stage of development of architectural planning and decoration techniques from the primitive era to the present day, there has been a



Figure 1: Mallachandram Krishnagiri in the Tamil Nadu state of India is the country's oldest architectural form, rock formation oriented megalithic dolmen, planned 2500 years ago.

rapid increase in new construction and decorative materials and equipment, etc.; which always provided the basis for the emergence of new architectural styles to give physical shape to the needs of contemporary buildings.

Etymology of Art and Architecture

Since the title of this research paper focuses on the integrated nature of the two art forms; therefore the etymology of the words "Art" and "Architecture" is very interesting. The word art is derived from the Latin word "Ars"; its original meaning was 'skill or craft', and the original meaning of the word is still preserved in many English language words, such as 'artwork' any artwork created by *human skill* and *artisan*, a person who uses his skill and creates artistic creations from. Similarly, regarding the etymology of the word "Architecture", it has different meanings in different languages like Architecture is translated from the Latin word 'Architecture', which means the art of building construction. In the same sequence, if the word "Architecture" used in the French language is underlined, then in French language this word is directly translated from Latin language; whereas in Greek language the word "Architecton" is used to address architecture. Which is basically a combination of two words 'Archie' and 'Tecton'; in which the word 'Archi' means 'Chief' or 'First' and the word "Tecton" means "Builder" or "Building Planner".

Review of Literature

With an aim to highlight various aspects related to the ancient indigenous architecture of India or other countries and the building materials used in constructing various types of buildings globally; many studies have been presented in the past, but those studies mostly focused on the ancient and contemporary and there seems to be a complete lack of documentation based on authentic facts about their practical utility, relevance, sustainability and their environmental friendliness etc. To expose it; Bruno Degens; Editor and translator, (1997) "*Mayamata: Treatise of Housing Architecture and Iconography*", published by Motilal Banarsidas Publishers Pvt. Ltd., Acharya, Prasanna Kumar; (1934) "*The Architecture of Manasara*", translated from the original Sanskrit Manasara Series: Vol. IV, published by Oxford University Press, London, Francis D.K. Ching, (2020), "*Building Construction Illustrated*", Edition-6, Published by Wiley Global Publications, California, and similar other literatures have been followed. This study reviews the trends in modernist and contemporary architecture in the context of the ideological dependence of architecture, which sprouted in the late 1930s and whose roots survive today, with a critical examination of the capitalist lifestyle and social environment in the current consumerist era.

Aims and Objectives of the Study

The basic objective of this paper is to document the traditional and synthetic building materials used over the centuries in aesthetically oriented architectural planning from the prehistoric era to the present period after industrialization.

Research Methodology

The following paper is based on exploratory and factual documentation focused on testing, evaluation and comparative case studies of various traditional and modern materials used in building construction in nature; and doing targeted literature review and comparative analysis on the related topic of research work is also an important part of its completeness. Relevant and authentic texts, research articles, contemporary information published in newspapers and magazines and online platforms as well as information from traditional artisans, artists practicing diverse styles of contemporary creative arts, architects, building materials and various other useful construction materials was collected from interviews with producers, dealers and consumers.

Emergence of Architectural Styles in Chronological Order and Construction Materials Used

From primitive times till today, the thousands of year's old integrated form of Indian art and architecture has continuously evolved and refined with contemporary innovations, becoming an integral part of the rich and innovative cultural heritage of our country. Emerging in a refined manner with innovation in different periods, these architectural styles reflect their respective distinctive elements; because the evolution of architectural styles is based on specific features and characteristics with adaptation, innovation and refinement to immediate human needs and his preferences in different time periods. As a result, buildings have been designed in a variety of architectural configurations in response to contemporary preferences. The elements of construction in which the overall forms, arrangement of components, method of construction, construction materials used, form, shape, structural design and regional characteristic adaptations reflect their characteristic uniqueness. Like the rest of the world, India has also seen the development of various contemporary architectural styles, each with its own unique distinctiveness. The chronological details of the specifications and construction materials of all these styles are as follows:

1. Ancient Period: In this period, three architectural styles emerged as Primitive Architectural Style, Harappan Architecture Style and Vedic Architecture Style respectively, the details of which are as follows:

1.1 Primitive Architectural Style (From 4,500 to 2,500 BC): This is also known as 'Post & Beam Pre-historic Architectural Style'. In this era, the early stage of human life on Earth, nomadic lifestyle was an integral part of their daily routine and they used natural caves and caverns as temporary dwellings from the Paleolithic to the Mesolithic era. By the time the Neolithic period (4,500 to 2,500 BC) was reached, Indian architecture had begun to take shape in an immature form. Many important changes also took place in this phase such as grouping of hunting, food gathering and agricultural production methods, the then humans started permanent residential settlements by constructing semi-underground, mud walls and thatched roofs using post-and-beam method. Settlement had begun as well as the practicality of pottery and polished stone tools for domestic use became common. In South India, several authentic evidences of early architectural planning style belonging to this phase have been found such as early residential settlements made of ash heaps and slabs of unconsolidated rock in Karnataka and Tamil Nadu. The architectural structural developments of this era became the basis for more complex architectural planning in the later Indus Civilization period; which developed as an advanced and well-planned architectural planning style in this stage of social development. Five common building materials were used in the Neolithic era namely *ash heaps, slabs of rough rocks, unprocessed tree branches, tree leaves and grass*.

1.2 Harappan Architecture Style (Approximately 3300 BCE to 1300 BCE): The architectural style developed during the Indus Valley Civilization of Bronze Age was originally identified as "*Harappan Architecture*"; and whose basic features were advanced urban planning, well-planned drainage and supply systems, residential and community architectural structures made of baked bricks. Along with this, individual residential buildings also began to be planned with a systematic and planned aesthetic appearance, often through relief sculptures made in terracotta and symbolically in stone. This Civilization is an important link in the chain of development of the world's first urban civilizations. Under which the first well-planned Indian rural and urban architectural planning was just beginning; the details of its notable features, construction materials produced and relevance of art in the decoration of buildings are as follows:

A. Town Planning Method: Major towns like Mohenjo-Daro, Harappa, Lothal, Alamgirpur, Manda, Daimabad, Surkotada, Ropar and Kalibangan, etc. were planned according to the rectangular grid according to

the plan of the cardinal points with wide roads and streets were constructed for smooth transportation and movement of goods.

B. Development of Technology and Building Materials:

I. Metal Casting Technology: Harappan architecture witness to the Bronze Age was essentially a sophisticated transformation of prehistoric culture and the first stage in the sequence of development of well-organized architecture, and was the result of the technological development of that era; and in that era, on the basis of “metallurgical technology”, the production of hybrid metals like bronze by mining, refining and mixing metals like copper and metal construction materials like tin and silver were developed. The ‘Dancing Girl’ sculpture, sculpted using the then “Lost Wax Casting Technique”, displayed in the Museum of Modern Art, New Delhi, is still reminiscent of the then contemporary casting techniques from materials such as metal; and this thousands of years old technology is still used by the tribal people of many states of India as “*Dhokara or Bell Metal Casting Technology*”.

II. Terracotta Technology: Bricks played a central role in the construction of Harappan architecture and it would not be an exaggeration to say that fire was invented by rubbing stones together in the late primitive period; and at that time its practicality was limited only to cooking food. Using the same fire, the inhabitants of the Harappan civilization developed “*Terracotta Technology*” and started transforming the extremely common and widely available mineral substance ‘*clay*’ into a high quality and extremely durable building material. They did not limit its use only to the production of fixed shaped bricks produced through ‘*moulding casting technique*’ used in the construction of various city and community architectural structures excavated at Harappa and Mohenjo-Daro etc.; apart from bricks, it was also used extensively in the production of various types of utensils, toys, jewellery, seals of various shapes, sculptures, reliefs and sunken frescoes etc. The durability of this simplest building material and its practical relevance is proved by the fact that this building material developed in the Indus Valley period was used in building construction in almost all subsequent periods and has become exemplary in modern architecture.



Figure 2: Brick played role as a core building material in Indus valley Civilization

C. Fusion of Arts in Harappan Architecture: This phase had a completely indigenous and original architectural style of architectural planning developed without any external influence. As far as the practicality of art forms in the decoration of buildings is concerned, arts like sculpture and painting had no integral role in the architectural planning of that time; rather, contemporary Harappan architecture was focused on utilitarian functional utility rather than being purely aesthetically oriented, because the main basis of the cultural development of that time was the priority of agriculture, animal husbandry and trading activities. Nevertheless, ‘*Surkotada*’, an Indus Valley Civilization archaeological site located near and contemporary with Lothal and Kalibangan in the Kutch region of Gujarat, does contain some evidence of the use of art in the architecture of

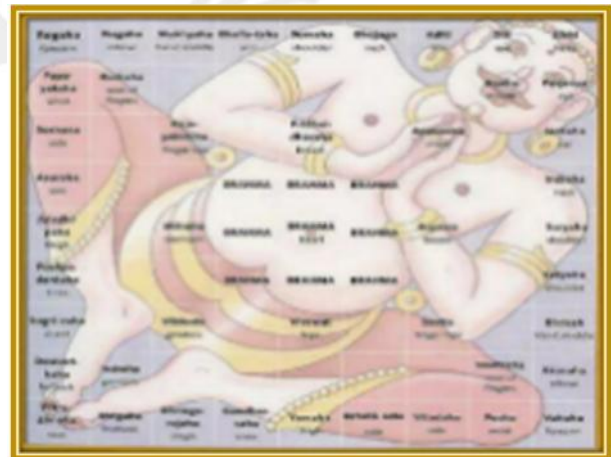


Figure 3: Rode map of Architectural Planning on the bases of ‘Vastupurusha’

that time. These archaeological sites, with their strong architectural structures, not only indicate the eastward expansion of the Indus Valley Civilization; in fact, along with the already used construction material, stone also started being used extensively in carving decorative forms for buildings.

1.3 Vedic Architecture Style (B.C. 1500 to 800): As the next phase of Harappan architectural style, it was the third phase of development of Indian architecture. During this period, social changes and priorities were once again undergoing new changes. In which the paramount priority in terms of architectural planning along with the adaptation of religious ritual systems is to establish a harmonious relationship with nature, cosmic forces and galaxies, the direction and velocity of winds, the influence of sunlight and heat, ultraviolet and infra-red rays, Special emphasis was to be given on the quantity and intensity of rainfall etc.; and architectural planning was to integrate ancient beliefs about the relative functions of different parts of an architectural structure and the practical utility of geometric patterns, symmetry and directional alignment. The details of important facts related to this are as follows:

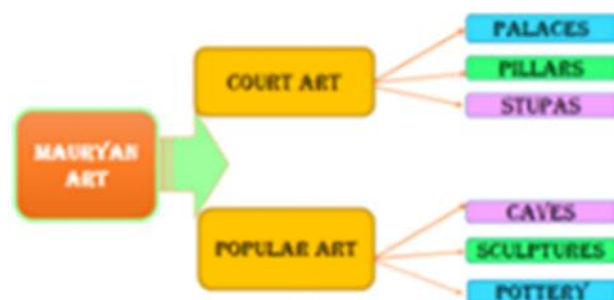
1.3.1 Concept of Vastupurusha: In this phase, the concept of “*Vastupurusha*” had emerged for the purpose of planning the layout of various types of buildings; it was developed with the aim of fusion of the positive energies of the “*Panchabhuta*” elements of nature such as the solar energy of the Sun, lunar energy of the Moon, wind energy and the positive effects of the Earth’s magnetic field. This was done with the aim of employing a positive mechanism; so that environmental impacts can be made beneficial for better health, wealth, prosperity and happiness.

1.3.2 Nomenclature and Harmony: The architectural style associated with this period is known as “*Vastushastra*”. Which is a traditional Hindu architectural style based on ancient texts and which focuses on the principles of building planning as well as the design, layout, measurement, ground preparation, cosmic influence and spatial geometries of the environment surrounding buildings; at the same time, managing the positive energy of the people living in it has been its basic foundation.

1.3.4 Building Materials: Vedic architecture, rooted in ancient traditions, emphasizes a harmonious relationship with nature and the universe. During this phase, many new building materials were developed and used by fusing them with earlier materials; whose details are such as: **Mud and Clay:** One of the most durable materials available throughout the world as building materials during this period included clay, wattle (fibre or husk) and daub (coating) and compressed clay bricks. These materials connect buildings to the land and climate, promoting ecological balance. **Wood:** Due to its strength, flexibility and aesthetic appeal; it was often used for structural framing, doors, windows and interior decoration by carving by the ‘*engraving method*’. **Stone:** In the early phase of architectural planning in the early Vedic period, materials made of wood and terracotta were used extensively; but in later phase, traditional building materials were generally replaced by stones such as sandstone, granite, schist and marble; and they emerged as a very suitable medium for precise carving, especially for the decoration of temples. **Materials for Natural Finish:** The use of materials like clay plaster, marble, ceramic tiles and natural fibers for natural finish of partitions and furniture etc. were also relevant in the architecture of the Vedic period; which acted as a supporting medium to establish harmony between the created environment and its surroundings. **Non-Toxic Paints and Binders:** To promote health and well-being, healthy, natural, non-toxic paints and binders (glues) were used for interior and exterior surfaces in Vedic building planning. **Lime mortar:** Lime mortar was used as a binder to join bricks and stones in residential buildings, whereas mortar was not used in old temples; because in temples, male and female boulders were integrated together using the “*Interlocking Method*”.

2. Early Period: In this period, the following three architectural styles of Indian architecture played an important role in the configuration of various types of architectural structures:

2.1 Shunga Architecture Style (Approximately from 187 to 73 BCE): During their rule of approximately 114 years, the rulers of the Shunga Empire in India witnessed remarkable developments in art, architecture and culture; and from the fusion of all these influences, the architectural style that emerged in this phase based on innovative architectural configuration and changes in construction materials is called “*Shunga Architecture*”. In this phase, stone became preferred over wood and brick for construction and stone became widely adopted in various architectural configurations.



Due to which many fundamental characteristics had emerged in the architectural structures constructed at that time; which gave this architectural style a distinct identity like the panoramic configuration of arched structures, the intricately carved archways adorning the stupas and the intricately carved sculptures employed in the stupas of Bharhut and Sanchi. This architectural style also played an important role in the advancement of Buddhist art and architecture in terms of its unique religious significance. Apart from this, the 'Mathura school of art' also emerged during this phase, which contributed to rich artistic expression by integration with contemporary architecture and left an indelible mark on the history of Indian architecture by fusing artistic excellence with intellectual activities.

2.2 Mauryan Architecture Style (From 322 BCE to 185 BCE): In 321 BCE, Chandragupta Maurya, under the guidance of Chanakya, defeated the Nanda dynasty and established the Maurya dynasty and thereafter; the great Mauryan ruler Ashoka converted to Buddhism and carried out large-scale Buddhist missionary activities during his reign to nurture and expand the religion, paving the way for the development of Maurya sculpture and architectural styles. As a result, this era ushered in the unprecedented and unique rock-cut architectural style; which was adopted and various Buddhist monasteries were built using exclusively wooden arches and geometric cut-outs. The architecture of the Maurya period developed in two different forms such as *court architecture style* and *popular architecture style*.



Figure 4: A glimpse of the Sanchi Stupa as an architectural structure of the Buddhist complex continuing the characteristics of the Mauryan

2.2.1 Court Architectural Style: Under this, a fusion form of art and architecture took shape under the patronage of the Maurya rulers to fulfil political and religious objectives and special emphasis was given on the fusion of art forms in the design of architectural structures. The palaces, pillars, stupas, caves, pottery and sculptures built with originality during that period are known for their uniqueness. The architectural configuration of the palaces built during this period reflected the deep influence of Persian architecture; because they were inspired by the architectural plans of the *Achaemenid palaces* in *Persepolis*, Iran. The Maurya period is marked as an important innovative phase in the subsequent development and promotion of Indian architecture; it was characterized by innovation, cultural exchange and artistic expression and sculpture, especially to ornament architectural structures, was adopted as an integral part of the Maurya architectural style.

2.2.2 Popular Art: Caves, sculptures and pottery were often produced in this category.

Building Material: Mainly the following five construction materials were used most in the architectural configuration of the Maurya period:

Wood: This was a major building material of this phase; and for its use in architectural design, various architectural structures planned in the Maurya capital at Pataliputra like Ashoka's palace at Kumrahar, Chandragupta Maurya's palace etc. can be cited as its best examples. A rich tradition of decorating the arches of buildings and palaces with wooden sculptures was also followed.

Sandstone: Chunar sandstone was used in abundance in the construction of pillars.

Brick: According to the prescribed architectural plan of the stupas, firstly the main part of the structure was made of raw bricks; which was used as a mould and later it was de-moulded and then the outer surface was made of baked bricks.

Medhi: A layer of thick plaster of Medhi (a mixture of lime and gravel) was later applied to the surface made of burnt bricks.

2.3 Kushana Architecture Style (1st to 3rd century CE): This Empire flourished in northern India from the 1st to the 4th century AD; whose rulers have left behind a rich legacy of footprints of art and architecture. The art and architecture of the Kushan Empire is a panoramic fusion of Greek, Indian, and Central Asian architectural styles; as a result of which a unique and diverse culturally oriented '*Kushan Architectural Style*' emerged; the factual details of the important components and construction materials used are as follows:

2.4 Rise of Gandhara Art and Architecture: Just as the fusion of elements of Persian architecture during the Maurya Empire led to the germination of a new phase in Indian architecture; similarly, under the patronage of the rulers of the Kushan dynasty, Gandhara art and architecture introduced a new dimension to the indigenous specificities oriented heritage by adding a new dimension to the canvas of Indian art formation and architectural planning with the addition of Greco-Buddhist influence. Essentially in this period, the art and architecture that developed was a blend of two major traditions; in which the *Greco-Buddhist art* of Gandhara, influenced by '*Hellenistic artistic principles*', was integrated with the highly indigenous Indian art of Mathura. Based on which an innovative version was developed to suit the Indian taste and Hindu deities were often carved from materials like grey schist and mottled red sandstone to embellish the architectural structures.

Architectural Building Materials: In this phase, the following types of building materials were extremely practical in architectural design:

- i. **Stone:** During the Kushana period various types of stones were used as a major component for beautifying temples, stupas and other architectural structures apart from carving sculptures.
- ii. **Terracotta:** During the period of emergence of Kushana art, sculptures made in terracotta technique were in vogue; this is confirmed by the presence of princes of the Kushana dynasty arranged in rows of circular terracotta statues at Khalchayan, whereas in the scenes of some murals, the Kushana are also depicted fighting the war with the Shakas.
- iii. **Plaster:** Later in the period of development of Kushana art and architecture, plaster construction medium came to be adopted as a highly useful and practical building material; because this newly developed material became increasingly popular due to its mouldable nature and ease of use. Sculptors and architects began using plaster instead of mica-schist stone for architectural planning and carving work.
- iv. **Bactrian Building Materials:** This was another unique building material introduced in the Kushana period; originating in '*Bactria*' (part of the Kushana Empire), these were mainly used in building architectural structures using '*sunbaked bricks*' and '*Paakhasa*' (a type of adobe). The use of beamed roofs was a common tradition during this period, and the pit-head vault, a densely patterned '*closed vault*' configuration designed for tall architectural structures, became an integral part of square buildings. The core of '*Bactrian Kushana architecture*' involved the planning of building free-standing pillars or wall pillars; these were often used in porticoes or as supports for roof beams.

3. Gupta Period (320 CE and 550 CE): The Architecture style developed in this phase is recognized as Indian Classical Architecture Style. The Gupta was the first dynasty to build permanent free-standing Hindu temples, beginning a long tradition of Indian temple architecture. During the reign of the Gupta dynasty, the '*Hindu Temple Architectural Style*' emerged and a fusion of sculpture and architecture began to be used in architectural configuration. The characteristic features of this unique architectural style can still be seen today in Raisen district of Madhya Pradesh state of India; the semi-circular architectural layout and brick structure established by Emperor Ashoka can be seen in the grand Buddhist Stupa at Sanchi. Similarly, all other architectural structures established by the rulers of this dynasty mostly temples were built using materials such as sandstone, granite, brick and wet clay (a lump of which was used to form high relief sculpture panels) and high-relief mural tiles created through terracotta technique.



Figure 6: Unique architectural features of Classical Architecture of Gupta Period

3.1 Architectural Features: In the early phase of the Gupta period, pitched roofs were often constructed for the roof of temples and flat slabs were used for this. However, there were changes over time; and then the temple roofs were replaced by horseshoe-like pinnacles, arches and distinctive curved spire towers made of brick and stone. To further embellish the Shikharas, disc ornamentation was used on their top portion; which is called '*Amalaka*' in architectural terminology (this amalaka is often interpreted as a lotus). The Gupta architectural

style left an indelible mark on Indian temple architecture and contributed significantly to the architectural styles of the subcontinent. To enhance the beauty of the temples, horseshoe-shaped portico arches, curved spire towers with ribbed disc ornamentation, T-shaped doors, and door frames decorated with carvings, sculptural panels with high-relief figures, laurel wreaths and acanthus were added. Its notable characteristic features are the harmony of motifs. In addition to the aesthetic design of temples, their walls and interiors were decorated with high-relief sculptures of deities, their wives and other divine beings and also sometimes Buddhist deities. Apart from this, this architectural style was influenced and developed in a fusion of Kushana, Mathura and Gandhara architectural traditions.

3.2 Cave Pavilions: The earliest evidence of religious architectural structures far beyond the Hindu temples during the Gupta period appears in the form of various cave pavilions that still speak of their glorious past; and which can be confirmed from the caves like Ajanta, Ellora, Bagh, Badami, Sittanavasal and Udayagiri, etc. The exterior of these cave pavilions is usually planed with relief sculptures and a single wooden carved door; while in the sanctum sanctorum inside the pavilions, religious statues or Buddhist sculptures, including Shiva Ling, were often installed. The distinct identity of these caves is that to further enhance their visual beauty; by fusing both painting and sculpture with architecture, a large number of scenes from Jataka and mythological tales focused on mythological or Buddhist births and rebirths, in a series of narrative forms, began to be emotionally painted on their walls.

3.3 Integration of Terracotta High Relief Tiles in Gupta Temples: The rulers of the Gupta dynasty were the first to establish a well-organized tradition of Indian temple architecture; which gave priority to the construction of permanent independent Hindu temples. Almost all the temples planned early were dedicated to Hindu deities and terracotta, like other relevant building materials, used sculptures in the form of molten high-relief tiles and elaborate carvings on the wall surfaces of brick temples. It played a role as a major construction material. There is much evidence available today to support this, such as the Dashavatara temple of the sixth century BCE at Devgarh in Madhya Pradesh, the terracotta temple associated with Gaudiya Vaishnavism built in the 17th century at Bishnupur in the Bankura district of West Bengal, and the fifth century CE Terracotta temples formerly associated with Gaudiya Vaishnavism; and similarly, the seventeen hundred year old, Bhitargaon Temple of Lord Jagannath, located on the outskirts of Kanpur, built with bricks and high-relief terracotta tiles, etc.

4. Architectural Configuration with Regional Influence in Post-Gupta Phase:

This phase (6th to 8th Century CE) also witnessed a remarkable development of Indian Religious architectural configuration; however, compared to the Gupta period, very few temples configured in this period are now left in good condition. The influence of the Gupta architectural style is clearly and unquestionably reflected in the architectural planning of Indian temples built after the Gupta rule; and often the same traditional construction materials were used. This order was continuously followed till the medieval period. In the post-Gupta period, King Harsh made a notable contribution in the field of architectural planning. He got many stupas and monasteries built in this phase. Essentially, this period saw purpose-oriented changes in Hindu and Buddhist temples in the form of cave pavilions, which left a lasting impact on the Indian temple architectural tradition; as a result, in the post-Gupta period, according to the geographical location of the land, its structural nature and the availability of local building materials, three main regional architectural styles emerged namely *Nagara* (in North India), *Dravid* (in South India) and *Vesara* (in Deccan region).

4.1 South Indian Dravidian Architectural Style: After the Gupta period, Indian architecture continued to evolve with different regions having their own original identity; in which, especially for the purpose of temple



Figure 7: Architectural features of the temple, one of a series of sea-coast temples built in Dravidian Architectural Style under the patronage of the Pallava kings in the 7th and 8th centuries.

planning in South India, it germinated in the form of Dravidian architectural style and spread its form on a large scale. A clear glimpse of which can be seen in the architectural structure of the “*Mahabalipuram Temple*” built in the shape of a chariot by carving rocks under the patronage of the ‘*Pallava Dynasty*’. The temples built under the patronage of this dynasty display intricate carvings and unique architectural features. In this context, the Mahabalipuram Temple, also known locally as ‘*Mamallapuram*’, is currently a UNESCO World Heritage Site in the state of Tamil Nadu; the site comprises a vast complex of rock-cut temples, cave pavilions and high-relief sculptures. Similarly, the coastal temples located along the Bay of Bengal, dedicated to Lord Shiva, are an excellent example of Dravidian architecture. The Dravidian style flourished in South India for a long time and left an indelible mark on the temple architecture of the southern region of India.

4.2 Eastern Indian Bengali Temple Architecture Style: After the Gupta period, Indian architecture expanded on a regional basis and followed the earlier architectural planning tradition in eastern India; but it continued to develop mainly in the Bengal region as a regional architectural style with its distinct flavour and fusion of local characteristics and was recognized as ‘*Bengali Temple Architecture*’ as a unique temple architectural style. The main features of these temples built following this style were their curved spires, intricate terracotta ornamentation and sloping roofs. ‘*Rasmanch Temple*’ located in Bishnupur, West Bengal is full of these characteristics; an excellent example of this style. How widely this architectural style was influential can be gauged from the fact that eleven terracotta temples built in the late medieval era in Bangladesh are still preserved in good condition, which are evidence of Hindu social and religious heritage. Among these temples, the Kantanagar Temple, commonly known as the ‘*Kantaji Temple*’ (Kantaju Temple also), was built in the 18th century (1704 AD to 1722 AD) in Dinajpur, Bangladesh; which is dedicated to Krishna and his wife Rukmini.

4.2.1 Influence of the Pala Dynasty on Bengal Architectural Style: The rulers of the Pala dynasty in eastern India between the 8th and 12th centuries played an important role in giving a new dimension to Indian architecture; and in this sequence, the planning of Pala temples started with the fusion of elements of Bengali and Gupta architectural styles. Whose structural configuration can be estimated by looking the Mahabodhi Monastery at Bodhgaya. The wall decoration of these monasteries places special emphasis on Buddhist tradition with panels of intricate carvings and high relief sculptures.

4.2.2 Kalinga Nagara Style: Under this style, the construction of temples incorporating local architectural characteristics according to the Nagara style began in Orissa during the Kalinga Empire between the 10th to 12th centuries; which is mentioned under the name of ‘*Kalinga Nagar Architecture*’ or ‘*Orissa Temple Architecture*’ under temple architecture. The Nagara style has been commonly used for North Indian temple architecture. It has been a very important and famous style; because while following this style of temple planning, there was a fusion of some regional subtleties and diversities in the pure Nagar style of temple construction in different regions from the Himalayas to Northern Karnataka and from Gujarat to Odisha. ‘*Rekha Deula*’ (high spire) and ‘*Pidha Deula*’ (rectangular sanctum) are the main components of this style. Lingaraja Temple of Bhubaneswar and Jagannath Temple of Puri are the best examples of this architecture style.

5.0 Northern Indian Architecture Style Patronized under Harshavardhana: After the decline of the Gupta Empire, the political scenario in the northern Indian region became quite complex. The vassals of the Gupta rule had established their independent existence in the north; whereas the roots of many powers had become strong in Deccan and South India. The Pushyabhuti ruler, Harshavardhana, ruled from Kannauj and is celebrated as the last ‘Hindu ruler’ in North India after the Gupta era. The post-Gupta phase in North India saw significant developments in temple architecture and the architectural style of this period took physical shape inspired by the Gupta style. Harshavardhana patronized Nalanda University and built many stupas and monasteries. Apart from this, the temple of Lakshman made of bricks in Sirpur (Chhattisgarh) is also an excellent example of the architectural style of the Harsha period. In conclusion, temple architecture in North India continued to take shape with continuity and innovation after the Gupta period and laid the foundation for future development in North India.

6.0 Central Indian Architecture Style Patronized under Chandel Dynasty: After the Gupta period, Indian architecture gradually evolved, especially in the unique Khajuraho temple chain spread over an area of 20 square kilometers in Madhya Pradesh, consisting of about 85 temples, the design of which led to the emergence of the Khajuraho architectural style, which was constructed during 900 and 1130 AD by the rulers of the

Chandel dynasty; which are famous on the global stage for its mature Nagara architectural style and erotic sculptures; and it was recognized by UNESCO as a World Heritage Site in 1986. The architectural configuration of these temples usually consists of a sanctum, a narrow inner chamber (antaraal), a transept (mahamandapa), additional auditorium (ardhmandapa), a pavilion or middle part and a circumambulation path and the tradition of employing large windows for adequate transmission of light can also be seen. The walls of the temples are mainly carved with scenes from Hindu deities and mythology focusing on the attainment of the four goals of human life as per Hinduism namely Dharma, Kama, Artha, and Moksha. As far as architectural construction is concerned, only locally available sandstone has been used and mortise technique has been adopted to join them together.

7.0 Western Indian Architecture Style Patronized under three Different Dynasty: After the Gupta period, several regional architectural styles emerged in Western India, the major styles of which are described as follows:

7.1 During Chalukya Dynasty: from the 12th to the 16th century, made significant contributions to Indian temple architecture in western India. Meanwhile, the Pattadakal group of monuments in Karnataka highlights the peculiarities of the Chalukya architectural planning style and during this period, many intricately carved temples dedicated to Hindu deities were built.

7.2 Western Architectural Styles of Post-Gupta Period: Gujarat emerged as the center of development of a specific type of architectural style; in which the birth of Hindu, Jain and Islamic architectural styles and at some places the mutual fusion of architectural styles also became the basis for renewed architectural planning; the *Sidi Sayyid Mosque* in Ahmedabad, known for its exquisite lattice work, is an excellent example of an architectural structure employing this fusion.

7.3 Maratha Architectural Style: The Maratha Empire left a deep mark on Western India from the 17th to the 19th century. During this period, monumental architectural structures like Shaniwar Wada, a palace fort, huge gates, courtyards etc. were the major characteristic features of Maratha architectural style in Pune.

8.0 Era of Islamic Ascendancy: Three architectural styles can be mentioned under this phase:

8.1 Indo-Islamic Architecture Style

during Delhi Sultanate Period: In this phase, India was ruled by sultans from five dynasties, under the Delhi Sultanate. First, the *Ghulam dynasty* was in power from 1206 to 1290; whose first ruler was *Ghulam Qutb-ud-din Aibak*, who expanded his empire to the entire North India, the second name comes from the *Khilji dynasty*; whose rulers were in control of Central India from 1290 to 1320, but they were unsuccessful in organizing the entire Indian subcontinent, the third name comes from the *Tughlaq dynasty*, which ruled here from 1320 to 1414 and here the Indo-Islamic architectural style is visible, the next in phalanx was the *Syed dynasty*, who ruled from 1414 to 145; during this period, women also held power for some time and in the last phase, the *Lodi dynasty* was in power from 145 to 1526; and whose rule ended with the defeat of Babar with the rise of the Mughal ruler. Parallel to the development of Indian ancient architecture over the above three centuries and two decades of the Sultanate period, “*Indo-Islamic Architecture*” had emerged from the fusion of elements of Islamic architectural styles. Many historical architectural structures were built in this period of 320 years, such as Kuwait-ul-Islam Mosque, Qutub Minar, Ilahi (Alai) Darwaza, Tughlaqabad, Hauz Khas, Lodhi Gumbad, Ferozshah Kotla etc.; which reveals the artistic and architectural interests of the Sultans of the Sultanate period.

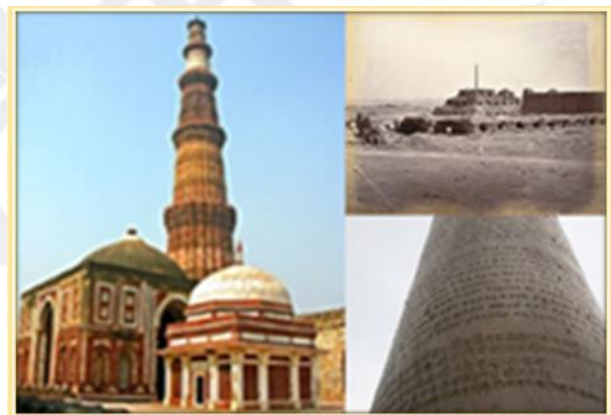


Figure 8: On the left side, Alai Darwaza and Qutub Minar Ghulam as architectural structures during the Khilji dynasty, on the right side, the mosque with minaret in the upper panel and in the lower panel, the architectural monument of the Tughlaq dynasty period.

Building Material: Architectural structures inspired by Indo-Islamic architecture were built after the Arab conquest of Sindh in 712 AD and the subsequent rise of the Delhi Sultanate in 1206; a unique fusion of India's medieval architectural styles and building materials can be seen in them, at that time the ancient traditional Indian building material *red sandstone* was used extensively in various architectural structures; this is also confirmed by the *Qutb-ul-Islam Mosque* built by Qutbuddin Aibak in 1192, which used the demolished remains of 27 Hindu and Jain temples. Apart from red sandstone, two more new building materials started being used for the flow of air and light, especially for public residences, royal buildings and public architectural structures such as carved, latticed curtains (dividers), white marble (white marble lattices) for carving orders or religious sermons etc. Similarly, metals like *iron* also started being used in the planning of many skyscrapers to disseminate information among the public.

8.2 Mughal Architecture (Mid-16th to late 17th Century): The rise of Mughal architecture in India was essentially a more sophisticated and comprehensive extension of the Islamic architectural style after the Delhi Sultanate; which took shape under the patronage of the Mughal emperors during the ever-changing extent of their empire in the Indian subcontinent during the period from 1526 to the 18th century and was a fusion of architectural styles from places such as Persia, Turkey, Central Asia, Gujarat, Bengal and Jaunpur. Mughal buildings follow a similar pattern in architectural design and character, featuring large bulbous domes, slender minarets at the corners, vast halls, large domed gateways, and delicate ornamentation. Many evidences of architectural structures of this style still exist in modern Afghanistan, Bangladesh, India and Pakistan, such as *Kabuli Bagh (Babur)* in Panipat, *Fatehpur Sikri Palace*, *Jodha Bai Mahal*, *Jama Masjid*, *Buland Darwaza*, *Salim Chishti (Akbar) Sikri*. *Akbar's Tomb* in Agra, *Itmad-ud-Daula's Tomb*, *Taj Mahal*, *Red Fort Delhi*, *Lahore Jahangir's Tomb*, *Badshahi Mosque* etc.

Building Materials: There is a wide range of building materials used in Mughal architecture; Whose details are such as: **Red Sandstone:** This stone was most commonly used since the emergence of this architectural style; whose abundance can be gauged from the various Mughal period architectural structures present in Agra, Fatehpur Sikri, Delhi etc. **White Marble:** It has been used extensively in the architectural planning of the *Taj Mahal*. **Pietradura Marble:** To carve and set coloured precious stones by carving planned design motifs into the surface of the stone through inlay technique; apart from the *Taj Mahal*, it was also used extensively to create water flow systems for cooling tombs and luxurious buildings, as well as to make carvings and lattices. **Wood:** It was used for moulding and internal structure of buildings.

Stone-Wood (Bamboo): It was used to climb buildings and perform various tasks. **Terracotta:** It was used for decoration of roofs, walls and buildings. **Glass and Mirrors:** These were used to decorate the walls of buildings. **Fresco:** This painting technique was used to decorate the walls of buildings. **Plaster and Stucco:** It was used to join stones together. **Precious Stones and Gems:** These were used in inlay artwork for wall decoration like after carving white marble stones, flowers, leaves, vines and gems were inlaid into them. **Gold and Silver Colours:** These were used for inlaying the wall surface.

8.3 Rajput Architecture Style (From 7th to 12th AD): Rajput style of architecture: This architecture mainly emerged from the fusion of elements of Mughal and Hindu architectural styles; based on which, the traditional architects of Rajasthan used *jharokhon* (a type of hanging balcony), *chhatariyaaon* (high and dome-shaped pavilions), *chhajjon* (projecting cornices supported on large carved brackets), *jaaliyon* (perforated stone or latticed screens Architectural structures like grand havelis, palaces and stunning forts, *baavadee* (step-wells), *chhatris*, temples with exquisite carvings were prominently planned. Evidence of some such architectural structures can still be confirmed from the forts located in Chittorgarh, Jaisalmer, Mehrangarh, Amer, Jaigarh etc.



Figure 9: design of *jharokhon*, *chhatariyaaon*, *chhajjon*, *jaaliyon* of architectural structures oriented towards Rajput architectural style.

9.0 Colonial Architecture Style during Post-Mughal Period (From 1619 to 1947 AD):

All such architectural styles come under the ambit of colonial architecture; which emerged during the colonial period on the basis of the fusion of local conditions and the influence of European colonialists. Thus colonial architecture was characterized by the independent existence of several architectural styles, resulting in a style of architectural planning that was crowded; and the scope of creative expression had narrowed a bit. Therefore, at that time, many types of architectural styles were born under the influence of different countries; whose details are as follows:

9.1 British Influence: The “*Indo-Saracenic Architectural Style*” emerged under British colonial rule in India; and it was a fusion of elements of Hindu, Islamic and Western architectural styles. Victoria Memorial (Calcutta), Gateway of India (Mumbai), Parliament House (Delhi), BST Railway Station (Mumbai), BT Railway Station (Calcutta), Kanpur Central Railway Station, Lucknow Railway Junction, thousands of brick arch-shaped railway bridges etc. are confirmatory evidences of its architectural structural features.

9.2 Portuguese Influence: This architectural style emerged as a new architectural style from the fusion of local elements with Baroque architectural style especially in the churches and old residential architectural structures of Goa.

9.3 Dutch Influence: This architectural style germinated in Tamil Nadu with its original architectural layout; ‘*Fort Ransburg*’, planned within the framework of colonial architecture, is part of the Dutch colonial architectural heritage.

9.4 French Influence: French colonial architecture in India has a rich history; and from the Portuguese shores of Goa to the bustling ports of Kolkata and Pondicherry, the footprints of French architecture are still visible today in several places of India. If we contextualize the historical context here, so that Pondicherry was ruled by the Pallava dynasty in the 4th century AD, subsequently many different southern dynasties like Chola, Pandya, Vijayanagara kings and later the Madurai Sultanate also ruled here, over time, Pondicherry was a center of attraction for Portuguese, Dutch, French and British traders. Finally, it came under French rule in 1673, thereafter until 1954; during his long reign of 281 years, French rulers created various marvels architectural buildings like French bakeries, bohemian stores and others by fusing the influence of French architecture with Indian elements. That’s why Pondicherry exudes a bohemian feel as a tapestry of past French civilization and colonial influence through many architectural structures. Wrapped verandas, pitched roofs, high basements, vaulted ceilings, morphological symmetry, French double doors, French design oriented exterior stairs, casement windows, gable facades, cast iron balconies, courtyards and gardens, colonial mansions, louvered windows, flat smooth stucco, arcades, house’s elevation decorated with bougainvillea, roof gardens, colonnades and French tiles are common features of French architectural structures with French influence; and Pondicherry’s ‘*White Town*’ is an excellent example of French architectural influence with Indian elements.

9.5 Assimilation of Regional Architectural Characteristics: In view of seasonal climatic changes, many bungalows were planned in places like Shimla and Darjeeling during the colonial period. These architectural structures have been a strong link in the colonial period architectural configuration of India.



Figure 10: Inspired by British influence in India, examples of Indo-Saracenic architectural style oriented architectural configuration during the colonial period; Railway Stations 01. Kanpur Central, 02. Lucknow Junction, 03. New Delhi, 04. BST Mumbai, 06. Chennai and multi-storey complex architectural configuration planned for Kalka-Shimla hill railway line.



Figure 11: Architectural configuration of colonial period Indian architectural structures inspired by French architectural style.

9.6 Building Materials Used in Colonial Period: With the integration of foreign architectural influences and Indian architectural elements, the following building materials were used in abundance in the architectural structures built under various architectural styles that sprouted with their own unique configurations during the colonial period: Stone: Mainly red sandstone, rough limestone, besides marble, granite, sandstone etc. were used in the construction of buildings. Timber: It was used to make doors, windows, furniture, roofs, stairs and other parts. Brick: During the colonial period, bricks of different sizes and types were used in the construction of buildings. Glass: Glass of various types and colors was also used in windows, doors and other artistic embellishments of modernist buildings. Binders: Apart from cement, lime-slaked mortar was used as important building materials for joining bricks in the construction of buildings. Concrete: This also started being used partially. Cast Iron: It was used to make window nets, doorknobs and handles for the grills of balconies and parks.

10. Modernist Architecture (1730 to 1925): The details of architectural structural changes under Modernist Architecture since the mid-18th century are as follows:

10.1 Tudor Architectural Style: this style of architecture refers to classical architectural elements and was popular in England during the Tudor period (1485–1560); which was inspired by storybook cottages and the physical aesthetic appeal of the old world. Signature half-timber detailing (decorative wooden beams placed vertically over long lengths), a fusion of elements of the Renaissance and Gothic styles characteristic of Transitional design, Tudor Revival homes often feature ornate design configurations around windows, chimneys, entryways with key features being the use of red bricks, this architectural style remained relevant for a long time. Over time, in the middle phase of the 16th century, the fusion of classical architectural elements, adaptation of traditional old building materials and some newly artificial building materials evolved into ‘*Contemporary Architecture*’ in place of other classical architectural styles such as Tudor; and in the next phase, the neoclassical architectural style came into existence in the early 18th century.

10.2 Neoclassical Architectural Style (1730 to 1925): The term “*Neoclassical*” combines “*Neo*” (in Greek meaning “*New*”) with “*Classical*”. From an architectural style point of view, inspired by visual elements discovered in the buried cities of Pompeii and Herculaneum by artists and architects in the mid-18th century; it is a re-appropriation of the aesthetically oriented simplicity and geometric configuration inherent in ancient Greek and Roman architecture. The East India Company’s pursuit of the new classical architectural style that originated in Italy in the mid-18th century during the European Renaissance period, from a fusion of ancient Greek and Roman architectural influences, was an attempt to connect Indian public sensibilities to India; and this architectural style continued to flourish in India during the colonial period. Over time, Neoclassical Architecture evolved into Modernist Architecture. The buildings planned in India were inspired by neo-classical architecture, with grandeur, drama in design, attractive designs used to connect columns and beams, planning of large blank walls with simplicity without ornamentation, clarity of detail-oriented decorations, wooden floors, spiral staircases, complex design configurations have prominent features such as oriented window panels, ledges and doors, and this can be confirmed by the ‘*Asiatic Society of Mumbai Town Hall, Mumbai*’ designed by Colonel Thomas Cowper, ‘*Sir Puttanna Chetty Town Hall, Bengaluru*’ and others also.



Figure 7: Belvedere Palace, Vienna

10.3 Modern Architectural Style: This architectural style developed over the course of about five decades from the early to mid-20th century; and clean line layout, functional architectural design, open floor plans, planning of built-in storage space were its key features and it used building materials like steel, concrete, glass, wood and stone with abundance, precision and practicality.

10.4 Functionality and Minimal Aesthetic Decorative Oriented Configuration: All the architectural styles mentioned above, ranging from classical architectural styles to modern architectural styles, represent some of the rich and diverse tapestry of architectural designs with their own original identity; they have each contributed to shaping the creative and useful man-made environment over time and each architectural style reflects cultural, religious, historical, indigenous and regional influences. It represents the integrated skills

and creative vision and application of artists and architects, and echoes a fascinating mosaic of different types of shelters.

11. Modern Period after Industrial Revolution (17th Century to Mid-20th Century): After the Industrial Revolution, unprecedented changes in the aesthetic appearance of architecture and buildings are seen globally, including in India; for this, the architects adopted the Metals as building materials with utmost importance; because, the Industrial Revolution resulted in new materials produced in factories, whose resistance, elasticity and in-flammability proved to be the most effective material for architectural design. Due to these qualities of metals and other artificial materials, architects and civil engineers started adopting them prominently, the details of their respective specialties are as follows:

Cast Iron, Iron and Steel: These metals proved to be suitable for planning of high span, elaborate and multi-storey architectural structures. As a result, preference was given to the employment of pillar oriented structures with the fusion of high load bearing metals like iron beyond the dependence on the load bearing capacity of the walls; and now the relevance of walls was reduced to mere curtains supporting large openings on the facade; this can be confirmed by unique architectural structures like *Iron Bridge* designed by Abraham Darby in England, *Vienna Station* in Austria, wrought-iron lattice *Eiffel Tower* in Paris, France and *Howrah Bridge* in India etc.

Hybrid-Oriented Solutions: Architects like *Henri Labrouste* pioneered architectural design by fusing hybrid materials. In Paris, his *Bibliothèque Sainte Geneviève* attempted to blur the lines between earlier traditional and avant-garde architectural planning by fusing stone and iron.

Relevance of Innovative Materials in The Planning of Skyscrapers: After the massive fire in Chicago, USA; in 1892, the '*Chicago School*' emerged for the study of urban sociology and for the development of the symbolic interactionist approach and based on its resulting studies, to prevent the recurrence of catastrophic accidents in buildings, New construction materials began to be given priority in skyscraper planning. As a result, *William LeBaron Jenney* pioneered the use of metal structures in skyscrapers with the planning of the *Marshall Field Warehouse*; as a result, its configuration employed a metal framework, glass showrooms and stone pillars emphasizing verticality.

Glass: Now the easy availability of textured, semi-transparent, tinted and in various coloured large glass panels provided a new platform for transforming architectural structures into highly panoramic aesthetics; the abundance of usage of which has become more relevant today in modern oriented and futuristic buildings configuration. That is why now architects have started experimenting more and more with huge glass *skylights, windows, doors, partitions, building facades, household accessories* and many more ways in architectural design; because this type of architectural configuration not only creates pleasing appeal from aesthetic point of view, rather they also prove their usefulness in energy efficiency as a source of natural light to spread in the interiors.

Terracotta: If terracotta is mentioned regarding architectural planning, it has been used extensively in various phases of architectural configuration or beautification of the walls of buildings and temples. In order to underline its practical utility and if we refer to the traditional Indian architectural styles of the earlier period, be it Harappan architecture or Gupta architecture and in the post-Gupta period under the Bengali Temple Architecture Style, high relief terracotta panels were used to beautify the walls of temples. Similarly, under the Mughal architectural style Terracotta was used for decoration of roofs, walls and buildings; and during Post Mughal Architecture, in Colonial Architecture, aesthetic oriented design patterns were created with terracotta bricks at appropriate places in architectural planning. In the present times, terracotta is once again proving its relevance as a favorite medium of architects and art lovers

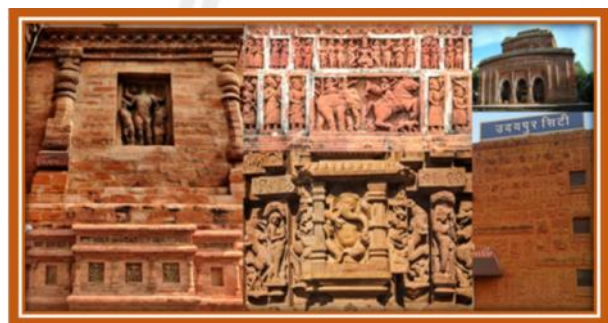


Figure 12: Mural panel of Bhitargaon temple on the left, parts of murals of Kantaji Hindu temple in Bangladesh in the middle and upper right and Molela terracotta plaques employed in fontage of Udaipur Railway Station in the lower right corner.

for the decoration of residences, offices and community places. In Uttar Pradesh, the Gupta period terracotta temple of Bhitargaon in Kanpur district or the late-medieval Kantaji Hindu Temple, located in North Dinajpur district, about 338 km northwest of Dhaka, the capital of Bangladesh, and others can be cited as an examples of eye-catching terracotta architecture; and in this sequence, the entire front elevation of Udaipur Railway Station adorned with Molela terracotta plaques proves the usefulness of this contemporary construction material.

12. Materials Used in Architectural Planning and Decoration before the Industrial Revolution with Chronological Western Architectural Development:

12.1 Building Materials used in Greco-Roman Period (From 5th to 3rd Century): The rise and development of Greco-Roman culture, with the conquest of Greece by the Romans in the 2nd century BC, led to the germination of “*Greco-Roman Classical Architecture*”, the next stage of fusion of Greek and Roman (from 5th century in Greece to 3rd Century in Rome). It began with the founding of the city of Rome by the first Roman king ‘*Romulus*’; which is a reflection of the mixture of their culture, ideological thinking, social traditions and customs. It was essentially a Greco-Roman Western cultural tradition and the initial phase of a new architectural style; over time, it gained prominence on the global stage as Greco-Roman architecture and over time, this classical architecture originating in ancient Greece and Rome deeply influenced architectural styles around the world. Materials such as marble, brick and concrete were used in the planning of the pillars; whose main characteristics were symmetry and proportion with Doric, Ionic or Corinthian details. Its classical design motifs such as interior mouldings, medium-pitched roofs, boxed roofs, decorative door surrounds, and broken pediments over entrances also emerged as its fundamental identity.

12.2 Building Materials used in Parametricism Architectural Style of Current Era: In the current digital and communication revolutionary era (1997 to Present Day), the current priorities are people’s aspiration oriented and innovative parametric architectural configurations to adapt to the wide range of available building materials using the latest technologies in contemporary architecture such as ‘*CAD*’ (Computer-Aided Design), ‘*BIM*’ (Building Information Modelling) and *360 Fusion*; developed on “*Algorithmic Equations*”, state-of-the-art tools are used to explore an infinite number of possible designs. The term ‘*Parametricism*’, coined in 2008 for this emerging architectural style, is derived from the name of the theorist and prominent architect of the *Zaha Hadid Architects*, Patrick Schumacher. Today’s architects create apparently impossible forms and configurations of simple structures through influential and relevant computational tools such as CAD and BIM; which was never in practice before the present time. More than a culmination of material aesthetics and principles, this style represents the fullness of infinite architectural possibilities, with a fusion of fluidity, blending complexity and diversity and defining artistic architectural structures inspired by nature. Guangzhou Opera House built adopting this latest architectural style, Galaxy SOHO by Zaha Hadid, BMW Welt by COOP HIMMELB, Beijing National Stadium by Herzog & de Meuron, etc. are some of the phenomenal examples of ‘*Parametric Architecture*’. This current era’s ‘*contemporary architectural style*’ ranges from architectural structures ranging from the late 20th century to the present day; whose architectural design often prefers unconventional forms, fusion of the latest sustainable building materials.

7. Significance of Fusion of Art and Architecture: Based on the very naïve and immature art and architectural knowledge of the very early stage of development of residential architectural system during the period of primitive lifestyle, the next stage of the world’s oldest civilizations was that of the Indus Valley, Mesopotamia (Sumerian civilization, Babylonian, Assyrian) had emerged in the form; and in this sequence, the Egyptian, Roman, Persian, Yellow River civilization of China and the civilization of Greece developed with well-organized social fabric, residential and urban architectural planning in contrast to the primitive lifestyle; and during this period the fusion of art and architecture also emerged with great clarity and environmental adaptation. In this context, if the development of Indian art and architecture is clearly contextualized, then we find the architectural and structural transformation of the Indus Valley Civilization at the first stage; and with the then ‘*Rural and Urban Architecture Management*’; it developed with a “*Matriarchal*” and classless social system around 5325 years ago (3300 BC to 1300 BC) in the western part of South Asia, in an area extending from northern India to the Sindh province of Pakistan.

From the beginning of human existence on earth and throughout the step-by-step genetic progress, humans have had to fulfil their most basic needs like food, shelter and clothing to maintain their existence. In

short, the relevance of various forms of art and architecture in the context of architectural planning is as relevant today as it was in ancient times. The integration of art, architecture and creative mediums brings useful and aesthetic configurations to perfection, and massively positive outcomes; and psychologically it creates a strong foundation for consumer-oriented addiction.

The fusion of arts in architecture has been relevant since ancient times as a catalyst to shape architectural structures into the ultimate aesthetic aura; during the Mahabharata period, the ‘Kauravas’ want to killed the ‘Pandavas’ by burning them in fire, for example the “Lakshagriha” can be quoted. Which was built by using a completely naturally pure eco-friendly substance like ‘lac’ as a construction material, that not only represents the pinnacle of harmony between art and architecture; but it is also a testament to India’s phenomenal architectural and artistic creativity across the world. Similarly, Gwalior Fort built by Raja Suraj Sen in the third century, Sun Temple of Konark, Hawa Mahal of Jaipur, Sun Clock of Jantar Mantar, Lotus Temple of Delhi, Taj Mahal of Agra; and the stupas of Sanchi, Jogimara, Ajanta, Ellora, Bagh, Badami, Udayagiri caves also represent the culmination of architectural planning, which has been done by the highest skill of man; the hills were carved out of rock without any joints. In this sequence, some attractive architectural structures of other countries of the world also have notable importance such as the Parthenon of Athens (Greece), the Sagrada Familia of Barcelona (Spain) and the Guggenheim Museum of Bilbao (Spain), the Opera House of Sydney (Australia), the Great Wall of China. The relevance of the integrated form of the wall, art and architecture such as the various Gothic cathedrals of Europe (including Notre-Dame de Paris, Chartres Cathedral and Cologne Cathedral; known for pointed arches, ribbed vaults and intricate stained glass windows), gardens in France Falling-Waters of Versailles, Pennsylvania (USA) and street art and graffiti etc. are often created around the world to convey social messages.

Finally, in the present times, architecture is being shaped on a well-organized futuristic plane, influenced by various periodic changes like industrial revolution and communication revolution etc.; in the era of modern communication and digital, it has entered the era of giving physical form to new needs. Which means that various arts have often inspired post-Indus Valley Civilization architectural creativity, enriched spatial richness, and contributed to the cultural fabric of our built world; and continuity in changes in building materials according to contemporary needs provides a strong foundation for new architectural designs.

8. Utility of Art and Architecture in Daily Existence of Human Life: The integration of these two creative mediums is an integral part of daily existence, deeply influencing various aspects of human life; its factual details are as follows in *Table*.

Sl.	Area	Utility of Various Influencing Various Domain
a.	<i>Impact of Integrated Combination of Arts and Architecture on Various Aspects of Human Life</i>	
1.	Functionality And Comfort	Residential, office and community type buildings or man-made architectural structures such as monasteries, temples and caves have been built to meet the daily needs of human beings; its efficiently planned layout, ergonomic furniture and climate control systems enhance human comfort. Similarly, infrastructure such as roads, bridges and public transportation systems facilitate and improve human performance choices and efficiency.
2.	Aesthetics Oriented Configuration	Buildings planned with a variety of aesthetic forms help in enhancing enthusiasm and human efficiency; be it a spacious and well-lit café, intimate living space, office or a tranquil picturesque park, all these aesthetic factors influence the mood of human beings with positive energy. Similarly, colour harmony, texture and light all positively influence human emotions and social well-being.
3.	Health & Wellbeing	In multifunctional buildings, adequate amounts of natural light and circulation of fresh air have a positive impact on human circadian rhythms and their overall health. Thus, natural light and air in every part of the buildings not only ensures coordination of physical activities but also reduces physical and mental stress.
4.	Safety and Security Means	Fire exits, emergency escape routes and safety protocols ensure that any type of buildings are planned according to the basic principles of architectural planning in order to ensure safety and security to the consumers during emergency. Therefore, such safe buildings protect humans from external or sudden threats.

5.	Symbolic Cultural Identity	Historic architecture symbolically reflects the cultural, religious heritage and utility-oriented identity of the community, which is based on the practical utility of architectural structures, such as whether a building serves as a school, hospital, bus stand, railway station, temple, mosque or Church etc. are being used; similarly, modern architectural design takes shape by fusing the characteristic elements of our contemporary culture with modernistic approach.
6.	Social Interaction	Community halls are indicative of socialization and also encourage that type of character; If the focus is on utility and community identity of community centers like parks, plazas, hospitals, temples, courts, hospitals, auditoriums, hospice etc.; so architectural planning has a deep impact on their appearance.
7.	Environmental Impact	Buildings planned for diverse purposes reduce energy and other resources as well as their consumption by adapting the principles of sustainable design control and appropriate architectural design to reduce human ecological footprints.
8.	Economic Basis	Iconic building structures attract domestic and foreign investment, while enhancing tourism-oriented local employment resources. A living example of which is the construction and its inauguration of the grand Ram Temple in Ayodhya , Uttar Pradesh (India) on 22 January 2024, which has emerged as a long-term basis for strengthening the economic side of thousands of local small and big traders and workers. The relevance of its architectural workmanship and characteristic design etc. are being proved on the global stage; Similarly, urban planning with its unique identity and attractive layout also gives impetus to economic growth.
9.	Creativity & Inspiration	The innovative creativity of architecture and meaningful fusion of various art forms in the form of decoration inspire innovation. That is why architectural configuration and consistent, inspiring artistic decorations encourage and inspire humans to think beyond the ordinary.
10.	Characteristic Sense	The fusion of various art forms and architecture not only balances the daily experiences and behavior of human beings but also provides a positive direction as specific types of architectural spaces vibrate with a sense of belonging; and local architecture also physically defines the distinctive character traits of a place.
b. Energy Consumption, Greenhouse Gas Emissions and its Solutions in Architectural Configuration		
11.	Environmental Downsides & Solutions	The role of architects will be very important in saving humanity to a great extent from the threat of greenhouse gas emissions and the basic foundation of this will be energy conservation-oriented architectural planning and the use of compatible sustainable environment-friendly building materials. The Paris Agreement to tackle greenhouse gas emissions had the main target of reducing energy consumption per square meter globally by 30% by 2030; while by the year 2050, emissions from buildings are expected to double compared to 2017 standards due to continued population growth and the need for more residential buildings. According to the latest international standards, globally buildings consume an average of 36% of and building construction accounts for 82% of energy consumption; among other solutions, modernistic approach architects planning buildings using innovative sustainable energy efficient architectural designs and eco-friendly building materials is proving to be a good way to control greenhouse gas emissions.
12.	Climate Protection Oriented Configuration	From the point of view of eco-friendly and energy-efficient architectural planning; architects can actively contribute to energy conservation based on energy-efficient architectural configurations using passive design, insulation systems and renewable energy sources. With this effect, by using sustainable and eco-friendly construction materials, carbon emissions can be reduced. Similarly, city planning focuses on efficient transportation, green space and mixed-use development, and in addition, architects focus on the impacts of climate change; side effects can be mitigated by planning resilient buildings.

9. Fusion of Art and Architecture for Expressive Aesthetic Configuration in Contemporary Futuristic Architectural Planning:

In the present era, based on the ever-changing dimensions of building planning and contemporary priorities, a unique and dreamlike innovative transformation is taking place; under which unprecedented fusion of art and architecture is also being done with full force. Which blurs the configuration of buildings centered on straight line-oriented architectural planning, rejects expectations, and transforms the character of urban layout into utilitarian and aesthetic forms. There was a time in ancient times; when all over the world, art and architecture were considered as separate fields of creative creation. Although, if we refer to the ancient Indian architectural texts like ‘*Samveda*’, ‘*Samaranganasutradhar*’ and ‘*Mayamata*’, then the architectural tradition described

in them has always been given practical importance in an integrated form of painting, sculpture and architecture. In response to changes in contemporary social tastes and contemporary priorities, greater emphasis has been placed on the fusion of art forms in architectural planning than ever before. Resulting in buildings being configured that go beyond simple functionality; and become picturesque pieces of art.

Focused on futuristic thinking, this type of innovative architectural configuration seems to take a tour into the interesting world of unique designs of contemporary picturesque buildings; where the chains of previously established barriers are broken and thereby a new era of aesthetically oriented artistic architectural expression emerges. The 57,500 M² ‘*Heydar Aliyev Centre*’ in Baku, Azerbaijan is designed by Iraqi-British architect *Zaha Hadid*. View from different sides of the building complex, an unmatched blend of art and architecture, with its distinctive architecture and avoidance of sharp angles; this architect is famous for his flowing and well-shaped architectural designs. This can be confirmed by a glimpse of the ‘*Heydar Aliyev Centre*’ configured in Baku, Azerbaijan., designed by Iraqi-British architect ‘*Zaha Hadid*’, who is famous for unique blend of art and architecture, its distinctive architectural style and its flowing, graceful style that avoids sharp angles.

10. Explosion of Creative Revolutionary Oriented Fusion of Art and Architecture with Redefining of Spaces in Architectural Planning: Today, as we reach the final quarter of the 21st century, unprecedented architectural innovations have taken place involving the mutual fusion of art forms and architecture; as a result, a fundamental transformation in the concept of existing architectural configuration is rapidly taking physical shape across the field of architecture. There was a time in the past; when the focus of architectural planning was on the fusion of contemporary and traditional architecture to serve functional purposes, and such tendencies had long been dominant among architects; but breaking the shackles of the traditional trends of previous architectural planning, a new era of architecture has emerged in the first two and a half decades of the present century, which gives priority to architectural configuration based on the dynamic fusion of various forms of architecture and art. This change marks the beginning of an unprecedented entry into the ocean of architectural planning oriented innovative strategies; which redefines the way we view the world we create and engage with the relevant.

11. Art and Architecture Fusion Oriented Symphony of Functionality and Aesthetic Configuration: In the present times, such a utopian world is emerging; in which the buildings being planned on the basis of fusion of art and architecture are not only becoming examples of art, but also seem to tell their own completely different visual narrative story. Now such transformative architectural planning-oriented approaches of architects are gradually transforming the urban concrete jungle into unique architectural forms. This effort of architects is moving towards that goal; where artistic and aesthetically oriented buildings are taking shape with the fusion of art and architecture and environmental friendliness. In the current global circumstances, the pressure of increasing population on the earth and the aesthetic-oriented preferences of today’s generation have inspired architects to create futuristic architectural configurations. As a result, the pursuit of all these parameters has resulted in



Figure 13: Aesthetically oriented views of various sides of the ‘Heydar Aliyev Centre’.

unprecedented and revolutionary creativity in the field of architecture. To confirm this; three artistic buildings from different countries are being referenced as examples as follows:

12.1 Futuristic Canadian-American architect ‘Frank Gehry’ built the “Guggenheim Museum of Modern and Contemporary Art” as a cultural gem in Bilbao, Biscay province of Spain; and after its completion, recently, about five years ago, on 18 October 1997, it was dedicated for the use of the general public. The building’s functionality as a museum is a stunning work of art in itself, a delight to the eyes. Its ethereal dome appears to float with effortless ease, a result of the integration of architectural talent and creative vision.

12.2 Shri Ram Temple in India: Peering into the window of the past of Indian architectural history indicates that the concept of Indian temple planning had emerged with clarity and elegance from the Gupta dynasty in the 4th century AD. Since then, thousands of temples with unique architectural designs have been built across India. In the same sequence, the chief architect Chandrakant Sompura, in collaboration with his sons Nikhil Sompura and Ashish Sompura as co-architects, followed the indigenous traditional ‘Nagar architectural style’ and built the same structure at the birthplace of Shri Ram in the city of Ayodhya in Uttar Pradesh, India. The architectural configuration of the wonderful temple dedicated to him has been given completeness. Dedicated for public viewing on 22 January 2024; this architectural structure is also an example of the pinnacle of beauty in terms of fusion of art and architecture. Undoubtedly this architectural structure is not only a confluence of ancient temple architectural traditions in accordance with the norms of religion; rather, innovative elements of art and architecture include vigorous use of space and the use of amenity, symbolic elements, environmental considerations, and such building materials; which have remained relevant for centuries like pink sandstone, granite stone, white and coloured Makrana marble, Ram Shila (special bricks). Similarly, its unique and notable features are that its construction has the ability to resist corrosion prone materials like iron rods, cement and concrete; due to which this architectural structure appears like a unique artefact of faith, art and architectural excellence.



Figure 14: Visual panels of various parts depicting the fusion of innovative building materials resembling artwork focused on redefining spaces in planning at the aesthetically pleasing Shri Ram Mandir, Ayodhya.

12.3 Futuristic Architectural Configurations Focused on Redefining Spaces: In the present era, architects focus on the visionary approach to firmly face future constraints arising from nature-cyclical changes such as environmental challenges, cosmic impacts and climatic changes; and along with its coherence, they now also strongly emphasize on the fusion of art forms and architecture by focusing on the idea of making the architectural plan imbued with ultimate beauty. At the same time, they are not only beginning to challenge the principles of traditional and classical architectural planning, but they are no longer just architectural planners, they are also displaying their potential as architectural storytellers and sculptors. The result of which is that architects all over the world, including India, are active in giving physical shape to unique and unusual buildings, which are becoming more like finely carved sculptures that tell their own captivating story than a building. When the audience spontaneously sees such unique buildings full of rare beauty; then they are left speechless due to their forgetful state of mind. To confirm this, many types of buildings around the world can be cited such as the egg-shaped building in Mumbai, Burj Khalifa in Dubai or the underwater ‘Water Discus Hotel’ under construction in the future and similar architectural structures in the world such as West 57, New York City, Atomium, Brussels, Bullitt Center, Seattle, Palazzo Lombardia, Milan, Galaxy Soho Building, Beijing, Absolute World Towers, Toronto, The Crystal, London, Spaceport America, New Mexico, Al Bahar Towers, Abu Dhabi, etc.; whose architectural structural configuration is completely different from each other. Whereas, upcoming architectural projects are taking shape with even more oddities like floating swimming pools, revolving skyscrapers, indoor parks. These include jerseys for skyscrapers, blow-up concert halls, interiors designed with

3D-printed technology, etc. These are all architectural structures that are undoubtedly more relevant than ever within the scope of future-oriented contemporary architecture.

13. Basic Characteristics of Futurist Architecture: The Futurist avant-garde art and social movement was first announced on February 20, 1909, when the Paris newspaper '*Le Figaro*' published a manifesto by the Italian poet and editor '*Filippo Tommaso Marinetti*'. He coined the term "*Futurism*" to achieve his goal of abandoning the art of the past and embracing cultural and social change, originality and innovation. This manifesto enthusiastically glorified the automobile's new technology, tremendous speed, power, and utility. While promoting violence and conflict, proponents of this art movement also called for a widespread denial of traditional human values and the destruction of cultural institutions such as museums and libraries; because he believed that taking inspiration from past art hinders original creation. As a result, prominent artists associated with various genres of the Futurism art movement had completely abandoned nature and ancient traditional compositional principles and considered their own established principles and artistic ideals to be of utmost priority. It was his creative nature that changed the nature of art and architecture and paved the way for modernizing the creative fields. Gradually, by the second decade of the 20th century, its influence spread to most of the countries of Europe and the Futurist ideology left an indelible mark on literature and painting as well as sculpture, architecture, industrial design, music, film, dance and fashion.

However, the first germination of the futurist creative, experimental and conceptual approach, regardless of the limitations of previous traditions as well as abandoning them altogether, occurred in Italy at the beginning of the 20th century; but especially in the field of architecture the present century has advanced with great clarity; the result is an explosion of architectural structural configurations based on the captivating mix of futuristic architecture, art and design developed in Italy in the last year of the first decade of the 20th century into the 21st century; whose original and challenging features, which are completely different from the ancient tradition, are as follows:

- 13.1 Rhythmic Flow of Sharp Dynamic Lines:** Now architect's preference in future-oriented architectural configurations is to pursue network-like textures of endlessly extended, continuous lines; due to which speed, energy, immediacy and eye-pleasing lyricism are born. These characteristic features reflect the rapid changes taking place in the architectural configuration in the modern era, the eagerness and enthusiasm for progress.
- 13.2 Geometric Shape Oriented Architectural Configurations:** In this era of revolutionary originality-oriented architectural design, architects are using geometric shapes such as triangle, oval, sphere, tower-like, rope-like, lotus flower and bud, parallel, parallel and sharp edges to determine the form of buildings; and thus they are not afraid to push challenging boundaries to change the way the world looks. The architectural structures employed along this trend are a radical departure from vertical and horizontal lines; which were the original foundations of traditional buildings. The tradition of employing such geometric form-oriented architectural structures has its roots in ancient Indian architecture dating back several centuries, evidence of which can be seen in the cylindrical architectural structures decorated with Lippan art; Residential buildings of such shape are known locally as '*Bhungas*' (circular shaped mud huts).
- 13.3 Fusion of Modern Construction Materials:** Futurist architects are pioneers in using industrial materials like glass, steel and flexible character. Although building materials like glass have been used practically for many centuries by native artisans of remote areas like Kutch and Ran of Gujarat province of India in the Lippan era for the decoration of the walls of their houses; The only difference is that in the absence of glass pieces they used mica, but with time mica was replaced by glass pieces. These smooth textured surface materials have changed the images of future communities and are also echoing the technological advancements of their time.
- 13.4 Rejection of Neoclassical Architecture:** Architects, who nurtured the Futurist architectural planning, boldly rejecting the Neoclassical-inspired architectural styles associated with ancient Egypt; instead, the emphasis is on strongly adopting the existing elements oriented towards nature, science, innovative movements and new technologies.
- 13.5 Out of the Box Hypothesis:** In sharp contrast to the strict tradition of traditional architectural layouts, employing square and rectangular shapes with strict adherence to horizontal and vertical lines, architects immersed in futuristic thinking have now dared to think differently; and they started designing architecture

oriented towards unimaginable forms like oval lines, upward sloping roofs and uneven curves. They are challenging earlier traditions by doing various types of curve-oriented architectural planning.

CONCLUSION

In the present times, the practice of architectural planning is on the verge of tremendous change, which raises a big question as to what extent this change will extend in the future; and if the answer is delved deeper, it can undoubtedly be said that architects are now increasingly pushing the boundaries of innovation by influencing diverse art forms and architecture, which inspires them to imagine the impossible. The result is that at present there is a race to build such skyscrapers in many cities around the world; where each architectural structure appears to be a unique piece of art in itself. Which are structurally aesthetic, energy efficient, eco-friendly oriented and also fully integrate all the parameters of utility friendly and practical utility. Such buildings respond to their environment and adapt like living organisms. This innovative need-oriented architectural transformation of the present and future period in the field of architecture; encourages humans to create utopian worlds and imagine a future where the architectural environment will not be limited to mere functionality, but gives the impression of a symphony of unlimited imagination.

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