

EXPLORING ARCHITECTURAL ORNAMENTATION OF MUGHAL ERA BUILDINGS OF LAHORE IN THE ERA OF CLIMATE CHANGE CHALLENGES

Faiqa Khan^{*1}, Omer Shujat Bhatti², Rummana Khan Sherwani³, Saad Mujahid⁴

^{*1}Lecturer, Department of Architecture and Planning, University of Management and Technology Lahore, Punjab, Pakistan

²Associate Professor, Dept. of Architecture, School of Architecture & Planning, UMT Lahore

³Assistant Professor, Department of City and Regional Planning, University of Management and Technology, Lahore

⁴Assistant Professor, Department of Architecture, UMT Lahore, Pakistan

^{*1}faiqa.khan@umt.edu.pk; ²omer.shujat@umt.edu.pk; ³rumana.shirwani@umt.edu.pk; ⁴saad.mujahid@umt.edu.pk

Corresponding Author: *

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ABSTRACT

The adornment of the structures serves a central purpose of making the unforgettable image more pronounced. To identify and analyze the architectural embellishments of the Mughal Era and their present context, development and position. Cultural imagery during the Mughal Era in Lahore (16th-18th century) was flourishing illuminating modern architectural styles that accentuated beauty in structures. This ornamentation is a combination of Islamic Persian and Indian art, which specializes the Mughal architecture. This research centres on Mughal ornamentation techniques, structure and decorative materials in particular used for the Buildings of Lahore. This particular study used the qualitative research design, incorporating archival research, site observation and visual material evaluation to assess the architectural decoration of the Mughal Era buildings found in Lahore. For this study, 3 building samples were picked out for study. The researcher used photographs, sketches and field notes to collect data and thematic analysis was conducted to analyze that data. The findings of the study highlighted the unique and beautiful features of the buildings in Lahore that belong in the Mughal Era, from detailed marble inlay, profusely carved sandstone and marble, decorative tileworks to gaudy gold works. Further, the findings brought out the implied meanings and relevance of these decorative elements which showcase the artistic and cultural level of the Mughal Empire. Further, this study has focused on the preservation as well as restoration of the Mughal Era buildings in Lahore, mostly concentrating on enhancing and recovering the decorative elements of the structures. Additionally, it can be deduced from the findings that there is a need to formulate and implement culture-based tourism programs that seek to create awareness and appreciation of Mughal architecture and its relevance to the historical narrative of the city of Lahore. Lastly, the study also proposes additional investigations on how Mughal ornamentation can be utilized in detail, particularly with regard to the built environment, and what its cultural and artistic values are.

KEYWORDS: Mughal Architecture, Lahore, Architectural Ornamentation, Wazir Khan Mosque, Lahore Tomb.

INTRODUCTION

Mughal architecture was at its prime in the Indian subcontinent during the 15th and the 18th centuries and highlights the magnificence, art, culture and aesthetic sense of the great Mughal Empire. This

architectural style is highly beautiful with details and also massive in scale and remains one of the key legacies that remain from the Mughals (Abbas, 2023). It was one of the greatest ages of building,

and a number of what are now considered to be the world's finest structures were erected. Mughal architecture doesn't only have beautiful forms but it also emerged as beautiful form of binary social and political Mughal culture (Hussain & Fu, 2023). The Mughals originated from central Asia, but they ruled over the Indian subcontinent and hence have elements of Persian, Islam and Indian styles of architecture. This synthesis created a new style which was an icon of political, religious and artistic authority of the Mughal emperors. In this sense the Mughals employed architecture as a tool of power and as a means for legitimization (Sinha & Sinha, 2019). Thus, by funding grand constructions, they were in a position to avail imperial glory and the appearance of the backing of the pantheon. These structures were not only the temple and the homes; they were also the manifestation of the power and the consolidation of the empire. Erecting gigantic mosques, forts, palaces and tombs all over the empire ensured that the authority and dominance of the Mughals over a large and varied populace was well and truly established (Matloob, 2022).

Architecture proved the cultural and religious syncretism of the Mughal empire. The architectural features of the Mughals incorporated features of Persian and Indian design in their buildings, probably in an attempt to harmonise all the cultures under Mughal domain. This type of architecture, therefore, turned out to be a channel through which the Mughals demonstrated their appreciation of, and interaction with, the cultures of the regions they ruled, and thereby contributed to the development of a unified feel and provincial particularity within the empire (Beena & Chandra, 2023).

Mughal architectural style has its own definition by its majesty, ornate detailing and the architectural interaction of cultures. It is important for the society to grasp the development of Mughal architecture, meaning of this style as well as the significance of ornamentation in Mughal architecture (Durai & Durai, 2018). The development of the Mughal architecture can be explained by the political, cultural and religious situation of the empire. It started right from the time when Mughal, Babur himself came into the sub-continent in 1526 AD and carried the architecture from the Central Asia especially Timurid Tradition. Babur's tomb in Kabul (Afghanistan) was also an unpretentious

construction of early Mughal architectural experience, which was, however, much more Mughal than the previous examples (Jamil et al., 2017).

The ornamentation of the Mughal architecture is one of the highly developed carving, inlay work, inscription and tile work of the Mughal period and is apt to draw admiration and respect even in present time. But due to the external environmental, social and political factors and due to no importance given by the rulers at large these architectural master pieces are to lose their individuality and their importance as well. That's why there was a necessity to investigate the current stages of two wonders in the Lahore city and come up with strategies with current faced threats to avoid losing the attractiveness and uniqueness of the marvels belonging to Mughal Architecture.

REVIEW OF LITERATURE

Mughal emperors were lovers of art; they spent a lot of money on hiring efficient workers so as to come up with edifices that would not only serve the intended purpose, but also beauty to the eyes. This architectural feature a prominent in Mughal architecture is another evidence of the Mughals being orderly people because of applying symmetry, balance, and the application of geometrical shapes and patterns. Another aspect of Mughal architecture is the ornamentation; this takes up a very large part of each building. Others are carving in the interiors and out, designing insets and covers, making use of ornamental stones and tiles (Faber, 2016). Geometric and nature-inspired patterns, curvilinear and vine-like ornamentation, and foliate and calligraphic designs are typical: they may be depicted on the walls, ceilings, and domes. Taj Mahal is perhaps the most outstanding example of the Mughal architectural style and is authentic in its design elements and decoration. The white marble structure, the stonework done in semi-precious stones and the all spiking architecture of structuring with perfect equilibrium of balance has left a magnanimous beauty which has enchanted the beholder for centuries (Gulzar 2018). This was also true in the case of the Mughals who were equally good at garden design as they were in architecture, and most of the architectural projects they undertook involved the incorporation of gardens designed in the Charbagh, or fourfold style. These gardens being not only the places for

aesthetic pleasure and leisure but also had deeper associations and were considered as earthly paradises. Incorporation of both, the architecture and the nature in these gardens serves to beautify the Mughal structures. A major cultural element, which is rather characteristic for it, is its religious connotation. Not only the well-known and travelled to Mughal buildings were mosques and tombs but many of the building's details are symbolic of Islamic regions. Geometric patterns for instance are not just inspired by, or perhaps employed simply for the aesthetic value; they are religious, specifically Islamic since the religion places so much importance on the concept of order and infinity – attributes of God. Likewise, the elaborate writing, especially of religious sayings or surahs from the Quran, prove to be both a form of decoration as well as a form of constant reinforcement of the building's supposed functionality. Besides the religious motifs, most of the features that have been applied in the Mughal architecture reflect the cultures of the empire (Rehman & Akhtar, 2016).

It has also left a great influence on the growth of the styles of architecture in South Asia. Persian and Central Asian with Indian admixed style of Mughal architecture became a benchmark for the subsequent architectural style in the region. The British colonial style in India for instance had adapted Mughal styles to form a style perfect for colonial India (Rehman et al., 2016). Thus, the role of Mughal architecture in the context of Pakistan important for the following reasons: It is an emblem of the political, religious and the ruling culture of Mughal Empire that stretched their control over the most part of Indian sub-continent. The style that developed from the imperial period in what is today Pakistan was about much more than displays of power; it was also about assimilation and the harmonisation of various cultures and arts which was a distinctive feature of the Mughal Empire (Mujahid & Saeed, 2021).

In a manner of speaking Mughal architecture provided the binding link in a region that was very clearly multi-cultural and multi-religious. The Mughals who had migrated from Central Asia adapted to the regional trend of the Indian subcontinent with splash of Persian and Islamic integration to architecture. This synthesis is observable at Pakistan with such buildings existing as those which possess influences from Persian,

Islamic as well as aspects of native Indian ones (Zulfiqar & Altaf, 2023).

Many of the architectural projects commissioned by the Mughal emperors were therefore monumental in conception, as well as metaphorical. They were intended also for explaining power of the emperor, for expressing religious and cultural concepts. Most of these architectures especially the mosques and the mausoleum were erected to express power of Islam and serve as a shrine and a praying place. At the same time, they were planned to be beautiful and to be decorated with complex ornaments and proportions that would correspond to the aesthetic of the Mughal Empire (Saqib & Ali, 2023).

The characteristic features of Mughal architecture in Pakistan include delicate ornamentation and symmetry, and the combination of rich materials. The Mughals were lovers of beauty, and so they made sure they used the best of artisans and materials and the best that the kingdom could afford in erecting structures that were not only utilitarian but aesthetic as well; the architectural designs favored symmetrical proportions (Salahuddin et al., 2024). They are arranged around a main axis; both exteriors and interiors of buildings are as often as not highly balanced with similar corresponding sides. This layout is elegant and is also representative of Mughal world view in regards to universe as a perfectly balanced whole, which is based on Islamic cosmology (Dahlan & Manan, 2021).

Another typical feature of Mughal architecture is the employment of ornaments as both, the interior and exterior of buildings were adorned with diverse stuccowork designs and paintings. Mughal constructions are borne with an artistic using wood carvings, inlay work and using gem stones and tiles. By their nature, Islamic art includes flowers and plants, patterns in the shape of plants and flowers, ornaments and literary calligraphy as one of the most famous ornaments, which can be seen on the walls, ceilings, and domes. One is compelled to notice that in these decorations every detail has been thought out and to the best of aesthetic possibility, everything is perfected. During Mughal reign certain of the best constructions in Pakistan came into being; every one of these structures defines a structure and architectural style. These features are not only architectural but also

archeological; such structures have a certain cultural and historical value (Khan et al., 2021).

The Badshahi Mosque

The Badshahi Mosque is also one of the largest mosques found in Lahore and a perfect example of Mughal Architecture in Pakistan. Construction of this largest mosque of the Mughal Empire started by the emperor Aurangzeb Alamgir in 1673. Like most Mughal architecture, the mosque has perfect geometric alignment, constructed around a vast central courtyard where four tall minarets are located and three large domes. What remains characteristic to it is stunning Aesthetics; wall embellished with frescoes, it has beautiful marble work and Arabic inscriptions. Lahore Fort forms a large complex, which comprises of palaces, gardens, mosques and the hall of private audience. The layout of fort is similar to Persian and Islamic architecture with some elements of Indian architecture that constitutes the Mughal architecture. The Sheesh Mahal or known as the Palace of Mirrors which was constructed by Shah Jahan is one of the popular areas in the fort. It has very fine mirror work where light is reflected from the floor up to the roof of the house. The fort also has geometric gardens, water channels and the pavilions, exhibiting the importance of the geometry that Mughals always embraced. Fortification artwork and embellishment also gave it an irresistible seductive appeal, which befit the royal style of the Mughal Emperors and signified the imperial audacity of the imperial structure (Reki et al., 2018).

The Tomb of Jahangir

The Tomb of Jahangir at Shahdara Bagh, near Lahore, is another architectural splendor of the Mughal period. The tomb was constructed by Jahangir's son known as Shah Jahan in the early part of the seventeenth century in honor of his father. The architectural features of the tomb are disposed in a manner systematic to the Mughal architectural order; it has a central dome and a square plan with four minarets at each corner. Mughals opted for detailed ornamentation; the sarcophagus and walls of the tomb are accordingly decked with marble inlay work, frescoes and kufic inscriptions. The gardens in the tomb are developed in the Charbagh style and water courses and fountains help in enhancing the quality of

peace and serenity. Looking at the Tomb of Jahangir as one of the most popular rests of the emperor but it is also the best example of the Mughal style and workmanship (Abbas, 2023).

Decorative work is found to be prominently used in the designs of Mughal architecture. The Mughals loved to beautify structures and they bought structures through patronage and the beauty that they sought was most often physical beauty. The decoration of the buildings of Mughal taste is elaborate, graceful, and different types of materials and forms of decoration and embellishment are employed. Probably, the most used elements of designing and imagery in Mughal architecture are carved and set designs (Hasan 2013). Architecture of Mughal is strikingly marked by sophisticated designs carved out of a stone, most predominantly in red stone, white marbles and stucco. Of these, floral patterns or motifs, arabesque and geometric shapes are used in the carving of walls, ceilings, and other facades. Inlay work mais especially pietra dura in which gem stones of various kinds are placed in the marble to form pictures and designs. This technique was used to the maximum in the Taj Mahal where calligraphic, floral and stem like decorations were placed on the walls (Azmat et al., 2018).

Another part of Mughal ornamentation is calligraphy. One can observe that even now Arabic inscriptions, quotations from the Quran, and other elements of Islamic ornamentation as a kind of a calligraphic drawing are used not only in designing religious constructions but also as an artistic motif. The term is usually applied to writing executed in fine styles, Naskh and Thuluth especially, and commonly done on the arches, domes, and entrance passes of the Mughal structures. It is clear that besides the ornamental function calligraphy in Mughal architecture contributes to the religious dimension of the buildings. Tile work and painting are also the shared elements of Mughal ornamentation (Zahra & Shahir, 2023). Kilims, mosaics of tiles or stones, ceramics mostly paint lively colored glazes on geometric designs or representations of plants and flowers: mosques and palaces are decorated with them when new. The use of tiles brings color and texture on the buildings thus beautifying the buildings. Moreover, frescos and mural paintings are less frequently observed in Mughal architecture where they are found in palaces and rooms meant for private use; painting

are mostly from nature and royal lifestyle, and traveling theme are painted (Khaskheli et al., 2022).

Contemporary Mughal ornamentation characterized by vibrant colors, carved details, and exquisite workmanship are in critical danger from harsh climate conditions in Pakistan. These cultural icons have also suffered the same fate due to effects of climate change, increased pollution and poor maintenance. The impacts of climate change have posed fresh problems for the conservation of Mughal ornamentation. The recent and attended climatic fluctuations, including excruciating rains and flood incidences, have compounded effects in degrading the structural character of the pre-colonial edifices (Chida-Razvi 2019). Frescos, kashi kari, and detailed stonework have been common features in the Mughal monuments, and are very much prone to dampness. These kinds of decorations are climatically sensitive because they are composed of limestone and marble; when there is too much rain or humidity the material weakens and erodes. Likewise, expansion and contraction of building material affect the formation and cracking and in the worst case the ornaments are disintegrated (Hashmi 2018).

PROBLEM STATEMENT

Pakistan has been the hub of Mughal Architecture over the last few centuries through its diversified and timeless beauty but due to recent environmental challenges including climate change, pollution, global warming and allied, these historical master pieces are at verge of destruction. Hence the need for documentation, observational study and sensitization has increased. The current study addressed this issue through observational study with focus on ornamentation of two selected Mughal Architectural wonders in the Lahore city.

RESEARCH METHODOLOGY

In order to continue forward, the overall research process has been broken down in manageable phases and steps. Overall Qualitative approach towards research exploration was adopted with focus on combining archival research, site visits, and visual analysis. The two main sites selected for the research exploration mainly included Lahore Fort, Wazir Khan Mosque with focus on the ornamentation and its existing conditions along with major challenges faced at hand.

DATA COLLECTION & DISCUSSION

Site 01: Lahore Fort

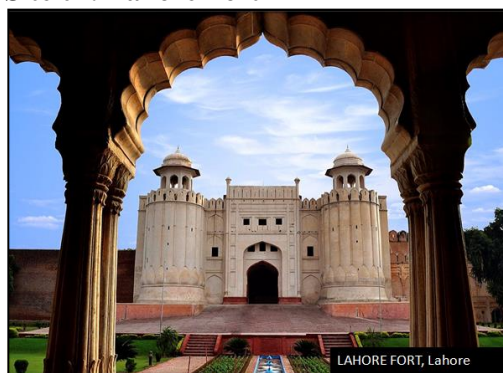


Figure 1 Lahore Fort Main Entrance Gate

Details of Project are shared below:

Overview: Lahore Fort in Lahore, Pakistan, a UNESCO World Heritage site, dates to the Mughal era, primarily under Emperor Akbar in the 16th century.

Significance: It served as a royal residence, administrative center, and symbol of Mughal power.

Ornamentation Features: Examples: Intricate carvings in red sandstone and marble reflect Persian and Mughal artistic influences.

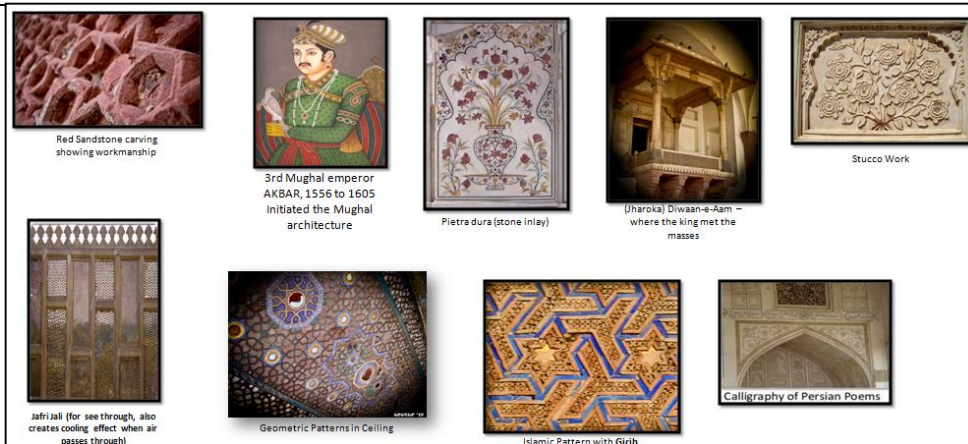


Figure 2 Details of multiple Ornamentation work in Lahore Tomb

Materials: Locally sourced red sandstone and imported marble were used for carvings and inlays.

Techniques: Mughal craftsmen used pietra dura (stone inlay) and stucco work for elaborate designs.

Symbolic Meanings: Motifs of flora, fauna, geometric patterns, and calligraphy symbolize prosperity, power, and religious devotion.

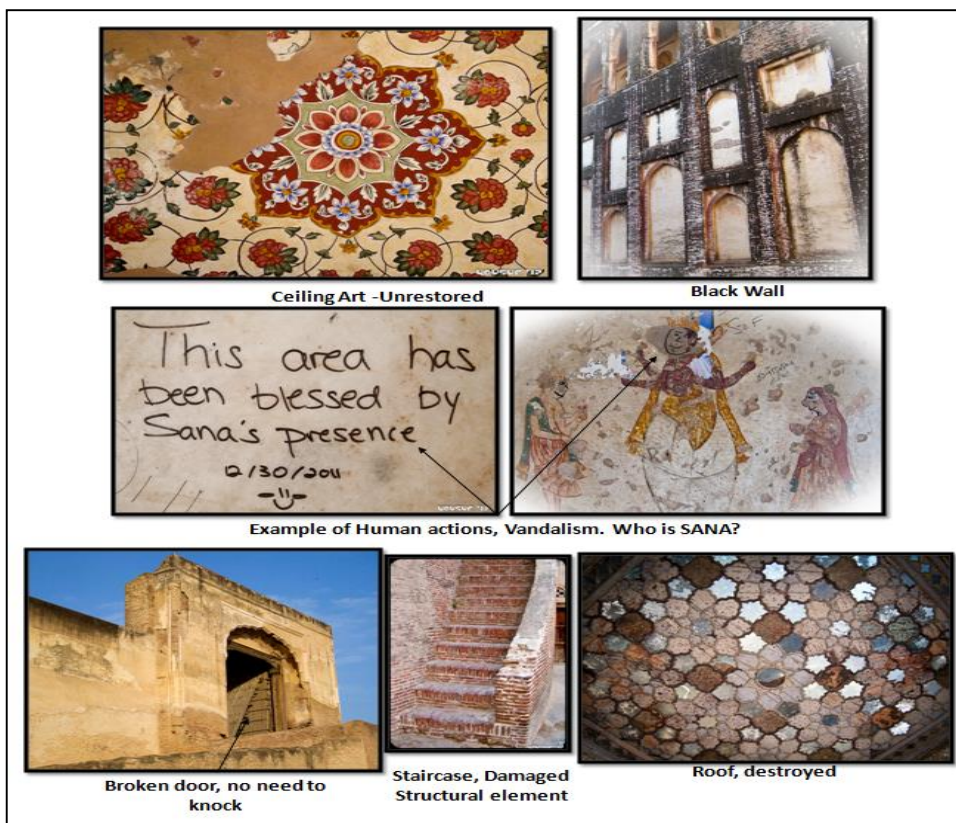


Figure 3 Existing challenges faced on site with respect to ornamentation and detailed elements

Conservation and Preservation Efforts:

Materials Deteriorated:

Stone carvings and marble inlays weathered due to pollution and neglect. Structural elements weakened over time from environmental factors and lack of maintenance.

Restoration Efforts:

Stonework Repair (2006): Under UNESCO supervision, craftsmen restored damaged carvings using traditional techniques, cleaning and re-carving eroded details.

Marble Inlay Restoration (2010): Projects replaced worn marble inlays with traditional techniques to match original patterns.

Structural Stabilization (2012): Elements reinforced to ensure stability, including walls and foundations.

Cleaning and Protection (Ongoing): Regular cleaning and protective coatings prevent environmental damage, with periodic inspections and maintenance for fort preservation.

Site 02: Wazir Khan Mosque

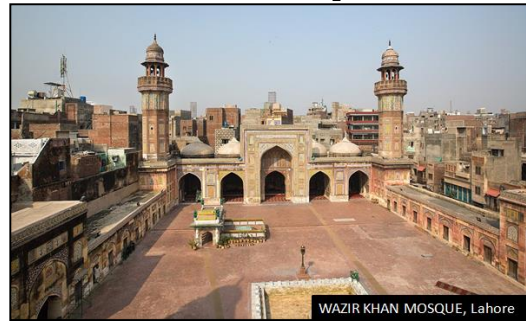
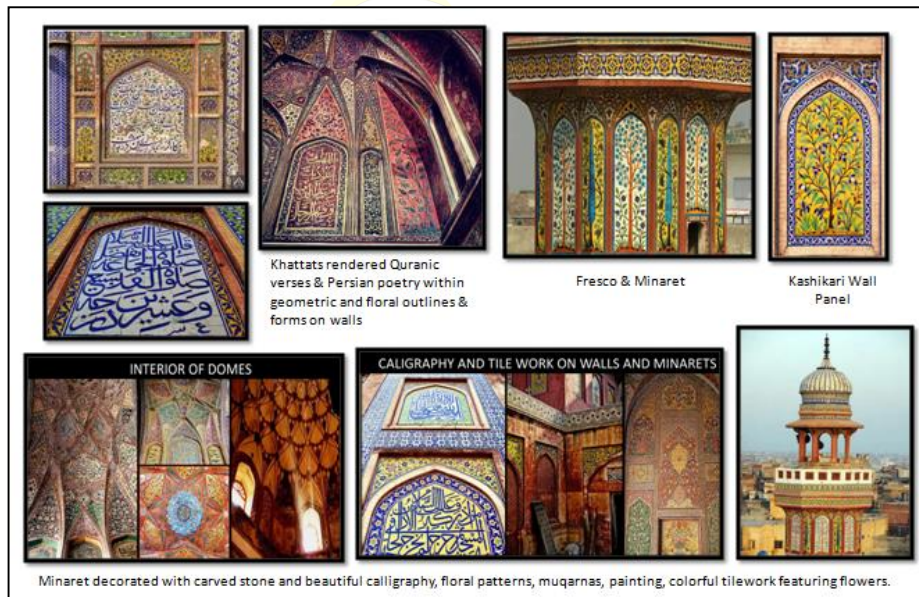


Figure 4 Wazir Khan Mosque, Lahore

Historical Background:

Overview: Built in the 17th century under Emperor Shah Jahan's reign, Wazir Khan Mosque exemplifies Mughal architecture in Lahore.

Importance: It is a significant religious and cultural site, showcasing Mughal artistic and spiritual values.



Ornamentation Features:

Tile Work (Kashi-Kari): Detailed ceramic tile work with colorful geometric and floral patterns in blue, turquoise, and yellow.

Frescoes and Paintings: Interior adorned with frescoes and paintings of flowers, calligraphy,

and intricate designs, adding vibrant color and depth.

Marble Inlay and Stonework: Use of marble inlay in the prayer niche and other details, featuring intricate carvings and semi-precious stone designs.

Architectural Details: Domes, minarets, and arches adorned with carved stone and calligraphy, showcasing Mughal symmetry and grandeur.

Symbolic Meanings: Decorations symbolize spiritual devotion and cultural pride. Floral motifs signify paradise and renewal, while Quranic inscriptions emphasize the mosque's role in worship.

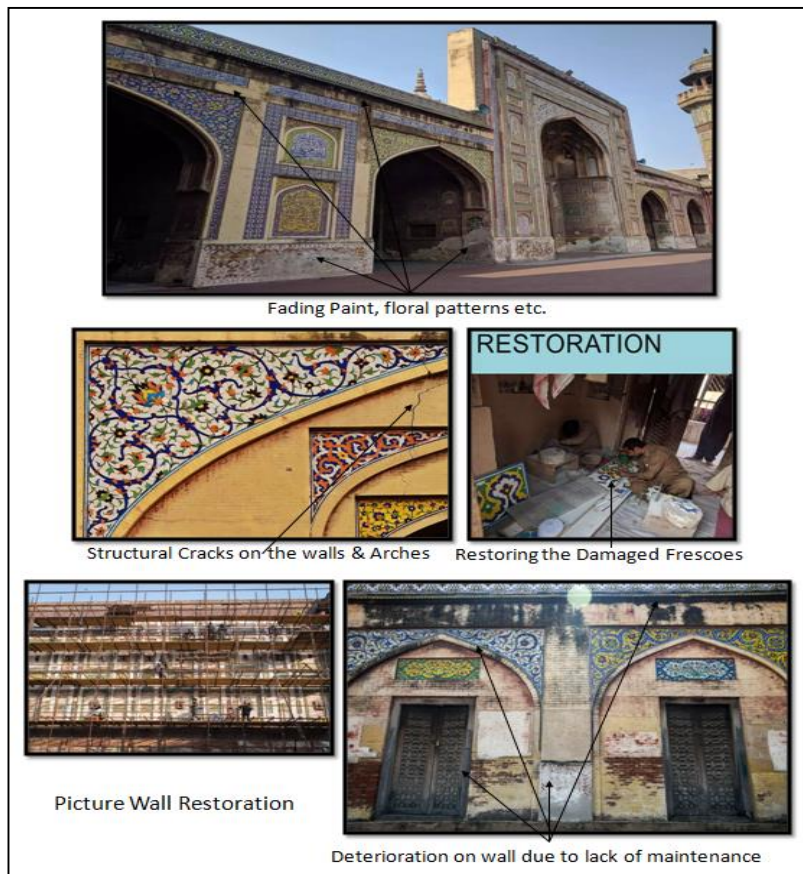


Figure 6 Existing challenges faced on site with respect to ornamentation and detailed elements

Conservation and Preservation Efforts:

Materials Deteriorated:

Tile work (kashi-kari) and frescoes were affected by pollution, weathering, and neglect. Structural elements faced deterioration due to environmental factors and insufficient maintenance.

Restoration Efforts:

Tile Work Restoration (1986-1988, 2009): The Aga Khan Trust for Culture and other organizations replaced damaged or missing ceramic tiles with replicas created using traditional methods, ensuring color and design fidelity.

Fresco Preservation (1991, 2012): Faded and damaged frescoes were carefully cleaned and

restored by skilled artists. Techniques included consolidating loose plaster and retouching faded areas.

Structural Repairs (2009-2013): A comprehensive restoration project addressed structural weaknesses, including the reinforcement of foundations and walls. The project also included repairing domes and minarets.

Regular Maintenance (Ongoing): Regular upkeep, including cleaning and protective measures, ensures the longevity of the mosque's decorations and structural integrity. Periodic assessments are conducted to address emerging issues.

CONCLUSIONS & ANALYSIS

Following are the major aspects highlighted through observational study and documentation of the existing challenges:

1. Ornamentations like intricate carvings and colorful tiles preserve the artistic legacy of past civilizations.
2. They maintain connections to our ancestors' customs and traditions.
3. Ornamentations reflect cultural identities, showcasing unique designs and patterns specific to regions and eras.
4. They symbolize societal values, beliefs, and religious practices important to communities.
5. Studying ornamentations provides insights into historical periods, technological advancements, and artistic techniques.
6. They illustrate the evolution of societal norms, architectural styles, and cultural exchanges over time.
7. Ornamentations evoke pride and appreciation for cultural achievements and artistic expressions.
8. They reinforce a sense of belonging and attachment to cultural roots.
9. Ornamentations highlight diverse cultural influences and cross-cultural interactions.
10. They celebrate differences while promoting mutual understanding and respect among communities.
11. Ornamentations attract tourists, contributing to local economies through heritage tourism.
12. They generate income and employment opportunities, supporting conservation efforts and community development.
13. Mughal ornamentation defines Lahore's cultural identity through intricate carvings, vibrant tile work, and frescoes, showcasing its rich artistic heritage.
14. These features symbolize the city's historical significance as a hub of Mughal architecture and cultural fusion.
15. Climate change has been a great threat to public at large but with respect to these architectural marvels of Mughal era must be conserved and ensure their sanctity and identity be retained for sustainable future usages.

FUTURE DIRECTIONS

Enhance Craftsmanship: Ensure skilled artisans are trained in traditional techniques to maintain authenticity.

Promote Sustainable Tourism: Encourage responsible tourism practices to minimize impact on historical sites.

Preserve Originality: Avoid alterations that compromise original ornamentation, preserving historical integrity.

Climate Change Sensitization: Specialized experts in the domain of climate change and its implication on the built environment must team up with conservation experts and develop teams which may address these challenges in the local context of Pakistan.

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