



CHANGING FORMS AND FUNCTIONS: THE TRANSFORMATION OF MOSQUE ARCHITECTURE FROM THE EARLY ISLAMIC PERIOD TO THE PRESENT

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ABSTRACT

This article examines the evolution of mosque architecture from the early Islamic period to the present. Mosques hold a significant place in Islamic art and architecture and symbolize the cultural, social, and political life of Muslim communities. Over time, mosque architecture has undergone significant changes, evolving from the modest structures of the early Islamic period to the monumental and technologically advanced designs of modern times. In the early Islamic period, mosque architecture was characterized by simple and functional designs, such as large open courtyards and covered prayer areas. The Prophet's Mosque in Medina, built in 622 CE, is a notable example of this architectural approach. With the spread of Islam, essential architectural elements like the mihrab, minaret, and geometric decorations emerged. During the Umayyad and Abbasid periods, mosque architecture became more complex. The Umayyads, influenced by Roman and Byzantine architecture, constructed grand structures. The Abbasids integrated educational and social functions into mosque complexes. The Ottoman Empire developed a unique style that combined Islamic, Byzantine, and Persian elements. The Sultan Ahmed Mosque and Süleymaniye Mosque in Istanbul are striking examples of this style. In the modern era, mosque architecture has evolved by incorporating contemporary design principles and materials. The use of reinforced concrete, glass, and steel has enabled innovative structural designs. The Faisal Mosque in Pakistan and the Sheikh Zayed Grand Mosque in Abu Dhabi blend traditional Islamic architectural elements with modern aesthetics and technologies. This study analyzes the changes in mosque architecture concerning form, function, and ornamentation. The transition from traditional to modern materials and construction techniques has allowed for the creation of complex and visually impressive designs. The ability of mosque design to adapt to local climatic conditions and cultural contexts highlights the dynamic nature of Islamic architecture. In conclusion, the evolution of mosque architecture demonstrates significant changes in aesthetic, structural, and functional aspects. Modern mosques offer spacious and multifunctional areas. This evolution illustrates how mosque architecture has been shaped by historical and cultural dynamics and contributes to social integration and the preservation of cultural heritage. This research provides valuable insights into the evolution of mosque architecture and serves as a reference for future architectural design projects.

Keywords: Traditional Mosques, Modern Mosques, Mosque Architecture

1. INTRODUCTION

The evolution of mosque architecture from the early Islamic period to the present day represents a significant narrative in the history of Islamic art and architecture. Mosques are not only places of worship but also symbols of cultural, social, and political life within Muslim communities. From the humble structures of early Islamic mosques to the grandiose and

technologically advanced designs of modern times, mosque architecture has undergone substantial transformations. This study aims to comprehensively map these changes, focusing on the form, function, and decorative approaches that have defined mosque architecture through various historical periods.

The early Islamic period marked the establishment of foundational architectural elements that would influence mosque design for centuries. The Prophet's Mosque in Medina, built in 622 CE, set a precedent with its simple yet functional design, featuring a large open courtyard and a covered prayer area. As Islam spread rapidly across the Middle East, North Africa, and parts of Europe and Asia, so did the construction of mosques. This period saw the introduction of key architectural features such as the mihrab (prayer niche), minaret (tower for the call to prayer), and the use of geometric and arabesque decorative elements, reflecting the aesthetic and spiritual values of Islam.



Figure 1. Prophet's Mosque

During the Umayyad and Abbasid Caliphates, mosque architecture became more elaborate and sophisticated. The Umayyads, for instance, introduced monumental structures like the Great Mosque of Damascus and the Al-Aqsa Mosque in Jerusalem, which incorporated Roman and Byzantine architectural influences. The Abbasids continued this tradition, with significant contributions such as the Al-Mustansiriya School in Baghdad, which functioned as both a mosque and a center for learning. This era emphasized the integration of educational and social functions within the mosque complex, highlighting the mosque's role as a multifunctional community center.



Figure 2. Great Mosque of Damascus



Figure 3. Al-Aqsa Mosque

The Ottoman Empire further revolutionized mosque architecture with their unique style that combined Islamic, Byzantine, and Persian elements. The Blue Mosque and Süleymaniye Mosque in Istanbul exemplify this blend, featuring grand domes, minarets, and extensive use of tiles and calligraphy. The Ottomans also developed the külliye concept, a complex that included a mosque, madrasa (school), hospital, and other public buildings, underscoring the mosque's central role in urban planning and community life.



Figure 5. Sultan Ahmet Mosque



Figure 6. Süleymaniye Mosque

In the modern era, mosque architecture has continued to evolve, incorporating contemporary design principles and materials. The use of reinforced concrete, glass, and steel has allowed for innovative structural designs that were previously unimaginable. Modern mosques, such as the Faisal Mosque in Pakistan and the Sheikh Zayed Grand Mosque in Abu Dhabi, showcase this trend, combining traditional Islamic architectural elements with modern aesthetics and technologies. These structures not only serve religious purposes but also act as cultural landmarks and symbols of national identity.



Figure 7. Faisal Mosque



Figure 8. Sheikh Zayed Grand Mosque

The transformation of mosque architecture is not merely a reflection of changing architectural styles but also of the evolving needs and aspirations of Muslim communities. The shift from traditional to modern materials and construction techniques has facilitated the creation of complex and visually striking designs that accommodate larger congregations

and provide various community services. Moreover, the adaptation of mosque design to local climatic conditions, cultural contexts, and technological advancements demonstrates the dynamic and responsive nature of Islamic architecture.

This study aims to provide a comprehensive comparative analysis of the changes in mosque architecture from the early Islamic period to the present day. By detailing the evolution of form, function, and ornamentation, this research seeks to highlight significant architectural innovations and cultural influences that have shaped mosque design. Through case studies and comparative analysis, this study will elucidate the interplay between tradition and innovation in the architectural development of mosques. This research will contribute to a deeper understanding of how mosque architecture reflects and influences the cultural, social, and spiritual life of Muslim communities across different historical periods and geographical regions.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 9

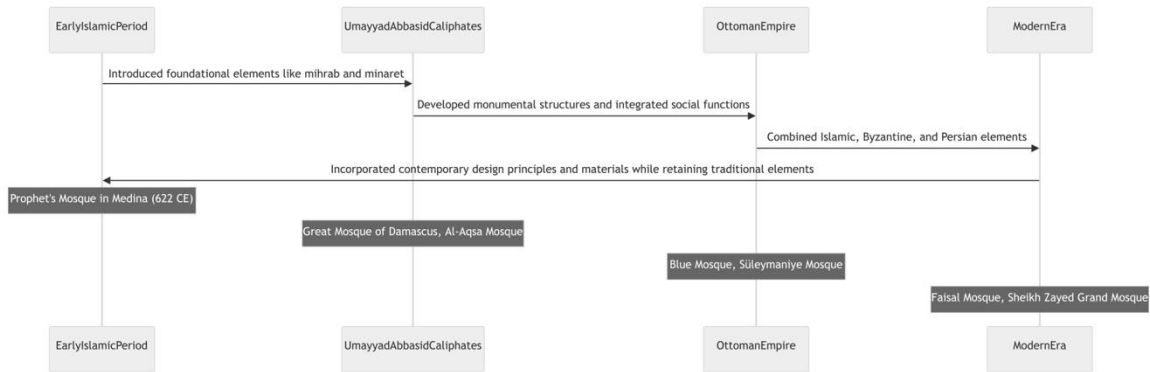


Figure 9. Evolution of Mosque Architecture

2. MATERIAL AND METHODS

This study adopts a comprehensive and multidisciplinary approach to examine the evolution of mosque architecture from the early Islamic period to the present. The methodology encompasses various techniques, including historical analysis, field studies, and comparative analysis.

The foundation of the research is a detailed literature review. This review involves examining academic articles, books, theses, and other scholarly sources to gather information on the historical development of mosque architecture. The literature review covers different periods, such as the early Islamic period, Umayyad, Abbasid, Ottoman, and modern eras, identifying and documenting the key architectural features, materials, and decorative techniques of these periods.

Field studies were conducted to collect empirical data from various mosques across different periods and regions. During these studies, detailed data on the architectural features, structural details, decorations, and materials used in the mosques were gathered. These architectural drawings and plans were utilized in comparative analyses to understand

the changes that occurred in different periods and regions.

The primary analytical method employed is comparative analysis. By comparing mosque examples from different periods, changes in form, function, and decoration were identified. This analysis aims to highlight the innovations in mosque architecture and the continuity of traditional elements.

Qualitative data analysis techniques were used to evaluate the collected data. These analyses covered interpretive data such as architectural styles, decorative techniques, and cultural influences. The results of the study provide a comprehensive examination of the historical and cultural context of changes in mosque architecture and analyze the relationship between innovations in modern mosque architecture and traditional architecture. This section demonstrates that the research adopts a systematic and holistic approach, aiming to deepen the understanding of the evolution of mosque architecture.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 10.

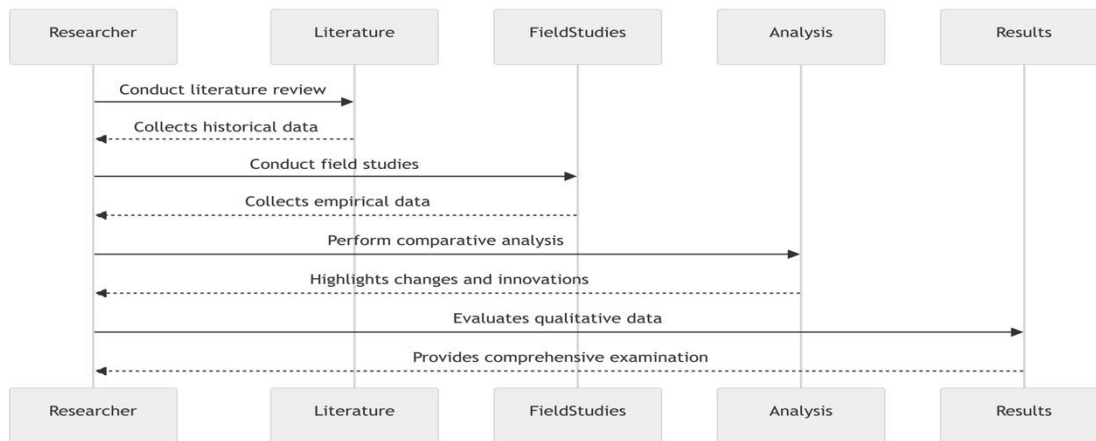


Figure 10. Methodologies for examining the evolution of mosque architecture

3. FINDINGS

The findings section of this study is divided into five main categories to comprehensively cover the changes in mosque architecture from early Islamic times to the present. These categories include formal changes, functional changes, structural changes, material usage, and decorative techniques. Each category examines the evolution and significant differences between traditional and modern mosque architecture, highlighting the impact of cultural and technological advancements on mosque design.

3.1. Formal Changes

From early Islamic architecture to the present, mosque architecture has undergone significant formal changes, both aesthetically and functionally. These changes reflect the evolution and development of mosque architecture across different periods, influenced by cultural and technological advancements. Traditional mosque architecture, since the inception of Islamic architecture, has adhered to certain aesthetic and structural principles. During this period, the use of natural materials in the construction of mosques was prevalent. Stone and wood, for instance, were preferred for both structural and decorative purposes (Grabar, 2006; Petersen, 1996). Key elements such as domes and minarets were prominent features in traditional mosques. Domes served as aesthetic elements and improved the acoustic properties of the interior spaces (Ettinghausen, 2001). Minarets were built as tall and striking

structures to announce the call to prayer (Hill, 1993).

Modern mosque architecture, on the other hand, incorporates innovative materials and technologies alongside traditional elements. Contemporary mosques utilize materials such as reinforced concrete, steel, and glass (Yeomans, 1999; Blair & Bloom, 1994). These materials enable architects to design more complex and larger structures (Frishman & Khan, 2002). For example, the Negeri Sembilan State Mosque in Malaysia, with its flower-shaped roof, exemplifies modern architecture's environmentally harmonious design approach (Mosqpedia, 2023).



Figure 11. Negeri Sembilan State Mosque

The formal changes in mosque architecture are a result of cultural and technological progress. Unlike traditional mosques, modern mosques prioritize functionality along with aesthetic concerns (Rabbat, 2012). The Nile Mosque in Sudan, constructed with modern materials and technologies, is a case in point. Its design,

inspired by riverbank shells, reflects the nature-inspired formal approaches of modern mosque architecture (Necipoğlu, 1998).



Figure 12. Nile Mosque

One of the most notable differences between traditional and modern mosque architecture is the materials and construction techniques used. While traditional mosques utilized natural materials that defined their aesthetic and structural characteristics, modern mosques employ materials like reinforced concrete, steel, and glass, allowing for the construction of larger and more complex buildings (Necipoğlu, 2005). Additionally, new roofing systems and technologies in modern mosques have facilitated innovative designs that were not possible with traditional roofing systems (Alnajjar, 2023).

A significant example of modern mosque architecture is the Şakirin Mosque in Istanbul. This mosque demonstrates how modern decorative techniques are integrated into mosque architecture. The Şakirin Mosque is enriched with decorations that represent modern interpretations of traditional Islamic art (Mosqpedia, 2023). This illustrates the evolution of mosque architecture in both

aesthetic and functional aspects. Similarly, the Faisal Mosque in Pakistan, with its pyramid-shaped roof and modern structural elements, showcases how modern architectural concepts have been incorporated into traditional mosque architecture (Grabar, 2006).



Figure 13. King Faisal Mosque

The formal changes in mosque architecture are reflective of the cultural and technological evolution of the Islamic world. While the aesthetic and structural elements of traditional mosques, built with natural materials, have given way to modern materials like reinforced concrete, steel, and glass in modern mosques (Petersen, 1996; Ettinghausen, 2001; Hill, 1993; Yeomans, 1999; Blair & Bloom, 1994; Frishman & Khan, 2002; Rabbat, 2012; Necipoğlu, 1998), this transformation demonstrates the capability of mosque architecture to preserve traditional values while adapting to modern technologies (Necipoğlu, 2005; Alnajjar, 2023).

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 14.

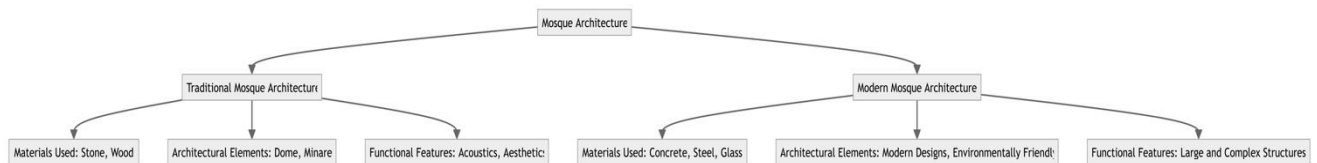


Figure 14. Transformation of Mosque Design

3.2. Functional Changes

From early Islamic architecture to the present, the functional changes observed in mosque architecture significantly reflect social and

technological advancements. The mosque has evolved from being merely a place of worship to a complex structure that incorporates social, cultural, and educational functions. These

changes have resulted in substantial differences in the architectural design and use of mosques.

Traditional mosques were primarily constructed for the purpose of worship and were designed accordingly. Traditional mosque architecture provides large, open spaces for performing prayers. During this period, the additional functions of mosques were generally limited, and very few activities took place outside of worship. For example, in early Islamic architecture, the use of mosques for educational and social activities was quite restricted (Hill, 1993; Petersen, 1996). Structural elements such as minarets and domes were used to enrich the spatial experience of the worshippers (Grabar, 2006). In contrast, modern mosques have assumed a wide range of social and cultural functions alongside their traditional roles. These mosques have transformed into complex structures that serve as community centers, educational institutions, and even health service providers (Blair & Bloom, 1994; Rabbat, 2012). In modern mosques, worship areas are typically designed to be more flexible and suitable for multipurpose use. For instance, large conference halls, libraries, and classrooms are common features of modern mosques (Necipoğlu, 2005).

The functional diversity of modern mosques is closely linked to technological advancements and changing social needs. Modern building materials such as reinforced concrete and steel have enabled architects to design larger and multifunctional spaces (Yeomans, 1999). Additionally, modern climate control and lighting systems have made the use of mosques more comfortable and functional. The functional changes in mosque architecture have also had significant cultural and social implications. Modern mosques are designed as multifaceted structures that serve various segments of society. This has positioned mosques more centrally in social life (Blair & Bloom, 1994). Particularly in large cities, the social and cultural functions of mosques enhance social integration and solidarity. Traditionally, primarily built for worship, modern mosques have become complex structures that incorporate a wide range of social, cultural, and educational functions. These changes have created substantial differences in the architectural design and use of mosques. Modern building materials and technologies have enabled the design of larger and

more comfortable and functional (Frishman & Khan, 2002).

Modern mosques also stand out for their educational and social functions. Many modern mosques offer educational programs for children and adults and are equipped with large classrooms and conference halls for this purpose (Hill, 1993). Furthermore, areas providing social services, health clinics, and sports facilities have become integral parts of modern mosques (Blair & Bloom, 1994).

These changes have positioned mosques at the center of social structures. Particularly in large cities, mosques have evolved from being merely places of worship to becoming centers of social and cultural activities (Rabbat, 2012). This has led to significant changes in the design and functionality of mosques.

Structural and technical developments play a crucial role in modern mosque architecture. New construction techniques and materials have allowed the construction of larger and more complex buildings (Necipoğlu, 1998). Especially reinforced concrete and steel constructions have enabled the creation of wide and open interior spaces (Grabar, 2006). Moreover, modern technologies are used to enhance the energy efficiency of mosques and reduce their environmental impact. Solar panels, underfloor heating systems, and smart building technologies are common features of modern mosques (Petersen, 1996). These technologies have made mosques more sustainable and environmentally friendly.

Mosques host various cultural activities, contributing to the strengthening of social bonds (Frishman & Khan, 2002).

In conclusion, the functional changes observed in mosque architecture from early Islamic times to the present reflect social and technological advancements. While traditional mosques were

multifunctional spaces. Additionally, modern mosques have positioned themselves at the center of social life, becoming centers of social and cultural activities.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 15.

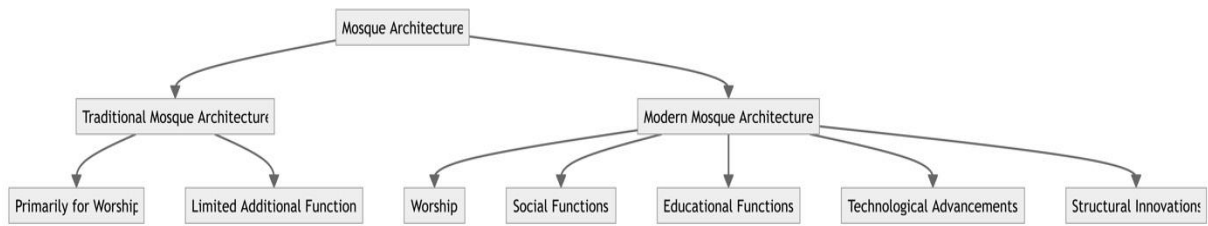


Figure 15. Architectural and Functional Changes in Mosques

3.3. Structural Changes

From early Islamic architecture to the present, structural changes in mosque architecture have undergone significant transformations influenced by technological advancements, cultural shifts, and functional requirements. These changes reflect the evolution of mosque design, from the use of traditional building materials and techniques to the incorporation of modern technologies and innovative structural solutions.

In early Islamic architecture, mosques were constructed using locally available materials such as stone, brick, and wood. These materials dictated the structural form and aesthetic qualities of the buildings. Early mosques commonly featured large hypostyle halls with numerous columns to support flat roofs. For instance, the Great Mosque of Kairouan in Tunisia, built in the 9th century, exemplifies the hypostyle mosque model with its forest of columns supporting the roof (Grabar, 2006). As Islamic architecture evolved, the introduction of new building materials and construction techniques led to significant structural innovations. The use of brick and stone allowed

In the modern era, structural changes in mosque architecture have been driven by the availability of new materials and construction technologies. Reinforced concrete, steel, and glass have become prevalent in contemporary mosque design. These materials allow for the creation of large, open interior spaces without the need for numerous columns. The King Faisal Mosque in Islamabad, completed in 1986, utilizes a concrete shell structure to create a vast, unobstructed prayer hall, reflecting modern structural capabilities (Frishman & Khan, 2002). The integration of advanced structural systems has also facilitated the design of

for the development of more complex structural elements such as domes and vaults. The Umayyad Mosque in Damascus, built in the early 8th century, exemplifies this transition with its large central dome and extensive use of stone masonry (Hill, 1993).

The Ottoman era marked a period of significant structural advancements in mosque architecture. Mosques of this period were characterized by the extensive use of large central domes, semi-domes, and buttresses. The Süleymaniye Mosque in Istanbul, designed by Mimar Sinan in the 16th century, showcases the pinnacle of Ottoman structural engineering. The use of pendentives to transition from a square base to a circular dome and the incorporation of massive buttresses to support the structure are notable features of this period (Necipoğlu, 1998). Ottoman mosques offered significant structural innovations in creating large interior spaces with central domes and semi-domes. The use of wide arches and support structures during this period allowed for the support of large domes, increasing the spaciousness of mosque interiors (Blair & Bloom, 1994).

innovative mosque forms. The Shah Faisal Mosque in Pakistan, with its tent-like structure and minimal use of traditional load-bearing walls, exemplifies how modern engineering techniques can redefine mosque architecture (Rabbat, 2012). Similarly, the use of space frame systems and geodesic domes has allowed architects to experiment with new forms and spatial arrangements (Necipoğlu, 2005).

Technological advancements have not only influenced the structural design of mosques but have also enhanced their functionality and sustainability. Modern mosques often integrate climate control systems, advanced lighting, and

acoustics to improve the worship experience. The use of sustainable building practices and materials has also become common, reflecting a growing awareness of environmental concerns (Hill, 1993). Solar panels, underfloor heating systems, and smart building technologies are common features of modern mosques. These technologies have made mosques more sustainable and environmentally friendly (Yeomans, 1999).

Structural changes have also had significant impacts on the cultural and social functions of mosques. Modern mosques are designed as multifaceted structures that serve various segments of society. This positioning has made mosques central to social life. Particularly in large cities, the social and cultural functions of mosques enhance social integration and solidarity. Mosques host various cultural activities, contributing to the strengthening of

social bonds (Blair & Bloom, 1994). By hosting different cultural events, mosques contribute to the strengthening of social ties (Frishman & Khan, 2002).

From early Islamic times to the present, the structural changes observed in mosque architecture reflect a continuous process of adaptation and innovation. The transition from traditional materials and techniques to modern construction methods has enabled architects to create more complex and functional mosque designs. These advancements have allowed mosques to serve not only as places of worship but also as community centers that meet the diverse needs of contemporary society.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 16.

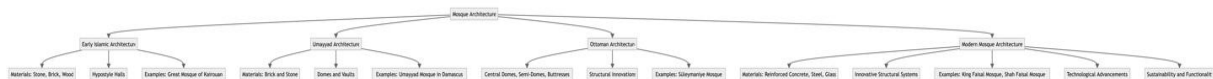


Figure 16. Modern and Traditional Mosque Architecture: Structural Changes

3.4. Material Usage

From early Islamic architecture to the present, the materials used in mosque construction have evolved significantly, reflecting advances in technology, availability of resources, and changing aesthetic preferences. These changes in material usage have not only influenced the structural integrity and durability of mosques but also their aesthetic and functional aspects.

In the early Islamic period, mosques were primarily constructed using locally available natural materials such as stone, brick, and wood. These materials were chosen for their availability, workability, and structural constructions, including the development of domes and vaults. The Umayyad Mosque in Damascus, constructed in the early 8th century, showcases the extensive use of cut stone, which enabled the creation of its grand arches and intricate detailing (Petersen, 1996). The transition to more refined materials facilitated greater architectural innovation and complexity, setting the stage for future developments.

The Ottoman period marked a significant advancement in the use of building materials in

properties. For instance, the Great Mosque of Kairouan in Tunisia, built in the 9th century, prominently features stone and brick in its construction, reflecting the materials readily available in the region (Grabar, 2006). The use of these materials dictated the architectural style, resulting in the characteristic hypostyle halls supported by numerous columns, as seen in many early Islamic mosques (Hill, 1993).

As Islamic architecture evolved, the use of more durable and versatile materials such as fired brick and cut stone became prevalent. This shift allowed for more intricate and larger-scale

mosque architecture. The widespread use of marble and Iznik tiles became a defining feature of Ottoman mosques. The Süleymaniye Mosque in Istanbul, designed by Mimar Sinan in the 16th century, is a prime example of this trend. The extensive use of marble not only provided structural strength but also added to the aesthetic grandeur of the mosque (Necipoğlu, 1998). Additionally, the use of Iznik tiles, with their vibrant colors and intricate patterns, became a hallmark of Ottoman decorative arts, significantly influencing the

interior aesthetics of mosques (Blair & Bloom, 1994).

In the modern era, the introduction of new materials such as reinforced concrete, steel, and glass has revolutionized mosque architecture. These materials have enabled architects to create innovative designs with larger spans and more open interior spaces. The King Faisal Mosque in Islamabad, completed in 1986, exemplifies the use of concrete and steel to achieve its iconic tent-like structure, which allows for a vast, unobstructed prayer hall (Frishman & Khan, 2002). The use of glass in modern mosques has also become more prevalent, providing natural lighting and enhancing the visual connection between interior and exterior spaces (Rabbat, 2012).

Technological advancements in material science have also led to the development of new construction techniques that enhance the durability and sustainability of mosques. For example, the use of advanced composites and environmentally friendly materials is becoming more common in contemporary mosque designs. These innovations not only improve the structural performance of buildings but also address modern concerns about environmental impact and sustainability (Hill, 1993).

The integration of traditional materials with modern innovations is another significant trend in contemporary mosque architecture. Many modern mosques combine the use of traditional elements such as stone and tile with modern materials like steel and glass. This blend creates a harmonious balance between historical continuity and contemporary innovation. The Sheikh Zayed Grand Mosque in Abu Dhabi, completed in 2007, utilizes traditional marble extensively while incorporating modern construction techniques to create its expansive domes and intricate interior spaces (Yeomans, 1999).

The evolution of material usage in mosque architecture reflects broader changes in technology, economy, and cultural interactions. As new materials become available and construction technologies advance, the design and construction of mosques continue to evolve, resulting in structures that are not only functional and durable but also aesthetically diverse and culturally significant.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 17.

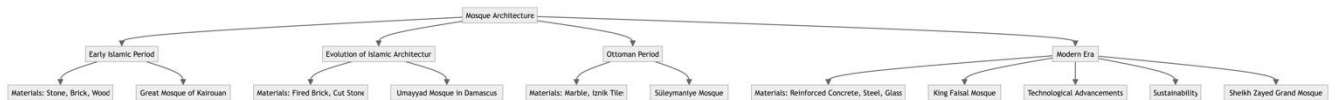


Figure 17. Evolution of Materials in Mosque Architecture

3.5. Decorative Technique

From early Islamic architecture to the present, the decorative techniques used in mosque architecture have evolved significantly, reflecting the artistic, cultural, and technological developments of each period. These techniques, ranging from intricate geometric patterns to elaborate calligraphy, have played a crucial role in defining the aesthetic identity and spiritual ambiance of mosques.

In the early Islamic period, decorative elements were primarily influenced by pre-Islamic artistic traditions, which were adapted to meet the religious and cultural needs of the new faith. The use of geometric patterns and vegetal

motifs, often referred to as arabesques, became prominent. These designs were not only aesthetically pleasing but also carried symbolic meanings, representing the infinite nature of creation and the unity of God (Grabar, 2006). The Great Mosque of Kairouan in Tunisia is a prime example, featuring elaborate stucco carvings and intricate wooden panels adorned with geometric and floral designs (Hill, 1993).

As Islamic architecture evolved, the use of calligraphy as a decorative technique became more prevalent. Verses from the Quran were inscribed on walls, domes, and minarets, serving both a decorative and didactic function. The Dome of the Rock in Jerusalem, completed in 691, is one of the earliest examples of

extensive use of Quranic inscriptions in mosque decoration. The building features a frieze with Quranic verses in Kufic script, highlighting the importance of the written word in Islamic art (Petersen, 1996).

The Seljuk and Mamluk periods saw further refinement and expansion of decorative techniques. The use of glazed tiles and faience mosaics became widespread, allowing for more vibrant and durable decorations. The Blue Mosque in Tabriz, Iran, built in the 15th century, showcases the intricate use of blue tiles to create complex geometric and floral patterns, exemplifying the technical and artistic advancements of the period (Necipoglu, 1998).

During the Ottoman era, the incorporation of Iznik tiles became a defining feature of mosque interiors. These tiles, known for their bright colors and detailed floral patterns, were used extensively to adorn walls, mihrabs, and minbars. The Süleymaniye Mosque in Istanbul, designed by Mimar Sinan, is renowned for its extensive use of Iznik tiles, which add to the visual and spiritual richness of the interior space (Blair & Bloom, 1994). Additionally, the use of painted decorations on domes and arches, often depicting intricate arabesques and calligraphy, became a hallmark of Ottoman mosque architecture (Necipoglu, 2005).

In the modern era, decorative techniques have continued to evolve, incorporating both traditional elements and contemporary innovations. The use of new materials such as glass and steel has allowed for innovative

approaches to decoration. The King Abdullah I Mosque in Amman, Jordan, completed in 1989, combines traditional Islamic motifs with modern materials and construction techniques, creating a unique blend of old and new (Frishman & Khan, 2002). Moreover, the use of advanced lighting technologies has enhanced the decorative potential of mosques, allowing for dynamic light displays that highlight architectural details and create an immersive spiritual experience (Rabbat, 2012).

The integration of traditional and modern decorative techniques is evident in many contemporary mosques. The Sheikh Zayed Grand Mosque in Abu Dhabi, completed in 2007, features extensive use of marble inlay, mosaic, and calligraphy, combined with modern lighting and structural technologies. This mosque exemplifies how contemporary architecture can honor traditional artistic practices while embracing modern advancements (Yeomans, 1999).

Overall, the evolution of decorative techniques in mosque architecture reflects a continuous dialogue between tradition and innovation. As materials and technologies have advanced, so too have the methods of decorating mosques, resulting in spaces that are not only visually stunning but also rich in cultural and spiritual significance.

Additionally, the related diagram prepared using the "Genius by Diagram" program based on these data is shown in figure 18.

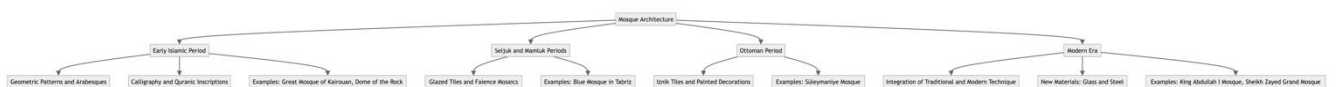


Figure 18. Mosque Architecture: Changes in Decorative Arts

4. DISCUSSION AND CONCLUSION

This study aims to comprehensively examine the changes in mosque architecture from the early Islamic period to the present. The findings demonstrate significant evolutionary developments in mosque architecture over time, encompassing not only architectural form and construction technologies but also the social and cultural functions of mosques.

In the early Islamic period, mosque architecture was characterized by simplicity and functionality. Mosques built during this period were generally constructed from natural materials and designed to meet basic worship needs. For example, the Prophet's Mosque in Medina and the Quba Mosque, both built during the time of Prophet Muhammad, are notable for their simple yet functional structures. These mosques featured large courtyards and straightforward prayer areas.

During the Umayyad and Abbasid periods, mosque architecture became more elaborate and ornate. The Umayyads, influenced by Byzantine and Roman architecture, constructed large and impressive mosques. The Great Mosque of Damascus, for instance, reflects the architectural richness of this period. The Abbasid period saw the expansion of mosque complexes to include educational institutions and libraries, thereby broadening the social functions of mosques. Notable architectural elements such as the mihrab and minbar also emerged during this time.

The Ottoman Empire introduced a unique blend of Islamic, Byzantine, and Persian architectural elements in mosque design. Iconic structures such as the Süleymaniye Mosque and the Sultan Ahmed Mosque featured large domes, slender minarets, and rich decorative elements. Ottoman mosques were often part of a külliye, a complex that included schools, hospitals, baths, and other facilities, underscoring their importance as social and cultural centers.

In the modern era, mosque architecture has evolved to incorporate traditional elements with modern materials and technologies. Modern mosques exhibit innovative approaches in aesthetics and functionality. The Faisal Mosque in Pakistan and the Sheikh Zayed Mosque in the United Arab Emirates are prime examples, featuring large prayer halls, modern heating and cooling systems, and innovative roof structures. Environmental and sustainability considerations have also become crucial in modern mosque design. The Negeri Sembilan State Mosque in Malaysia and the Nil Mosque in Sudan are constructed using eco-friendly materials and energy-efficient designs, optimizing natural light and ventilation to reduce energy consumption.

The evolution of mosque architecture has also brought significant changes to their social and cultural functions. Early mosques served as

centers for worship, community gatherings, and educational activities. During the Ottoman period, these functions expanded, with mosques providing social welfare and healthcare services. In the modern era, mosques have become important centers for social integration and cultural preservation. They host educational, cultural, and artistic events, playing a central role in the social and cultural life of communities. Furthermore, modern mosque architecture reflects the universality and diversity of Islam in different cultural contexts, reinforcing the unity of the global Muslim community.

The findings of this study illustrate how mosque architecture has evolved over time and how this evolution has been shaped by social, cultural, and technological contexts. From the early Islamic period to the modern era, mosque architecture has been a continuous process of development and innovation, balancing the preservation of traditional elements with the adoption of new ones. Changes in mosque architecture are significant not only in terms of aesthetics and structure but also in their social functions. Modern mosques serve as social hubs, providing a wide range of services from education to healthcare, art to culture, thereby playing a central role in the social and cultural life of communities.

This study's results contribute to a better understanding of the evolution of mosque architecture and provide a valuable reference for future architectural design and restoration projects. Additionally, by highlighting the importance of the social and cultural functions of mosque architecture, this study aids in the development of policies aimed at promoting social integration and preserving cultural heritage through these structures. The evolution of mosque architecture is a process shaped by cultural, social, and technological dynamics, both historically and in the modern context, and this study elucidates these dynamics in detail.

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Tuğba ERDİL DİNÇEL on 19.06.2023, numbered 809044.

REFERENCES

Ahmad, M., Rashid, K., & Naz, N. (2018). Study of the ornamentation of Bhong Mosque for the survival of decorative patterns in Islamic architecture. *Frontiers of Architectural Research*, 7(2), 122-134. <https://doi.org/10.1016/j.foar.2018.03.004>

Alnajjar, A. (2023). Changes in mosque architecture from early Islamic architecture to the present (Master's thesis, Haliç University Graduate Education Institute).

Ayyad, E. S. (2017). Evaluating the dominant theories on the genesis of the mosque type. *Journal of Islamic Architecture*, 2(4), 727-748. <https://doi.org/10.18860/jia.v2i4.4280>

Ayyad, E. (2017). Revisiting K.A.C. Creswell's theory on the first mosque in Islam. *Journal of Islamic Architecture*, 4(4), 188-195. <https://doi.org/10.18860/jia.v4i4.4321>

Blair, S., & Bloom, J. (1994). *The art and architecture of Islam*. Yale University Press.

Bloom, J. (2022). Exterior vs. interior in early Maghribi mosques. *Libyan Studies*, 53, 161-172. <https://doi.org/10.1017/lis.2022.12>

Bonner, J. (2016). The historical significance of the geometric designs in the northeast dome chamber of the Friday Mosque at Isfahan. *Nexus Network Journal*, 18(1), 55-103. <https://doi.org/10.1007/s00004-016-0302-3>

Boostani, A., Fratini, F., Misseri, G., Rovero, L., & Tonietti, U. (2018). A masterpiece of early Islamic architecture: The Noh-Gonbad Mosque in Balkh, Afghanistan. *Journal of Cultural Heritage*, 32, 33-41. <https://doi.org/10.1016/j.culher.2018.03.00>

Ettinghausen, R. (2001). *Early Islamic art and architecture*. Oxford University Press.

Farazmand, P., & Sarbangholi, H. S. (2015). Investigating the patterns of Islamic architecture in architecture design of third millennium mosques. *European Online Journal of Natural and Social Sciences*, 3(3), 501-514.

Frishman, M., & Khan, H. U. (2002). *The mosque: History, architectural development & regional diversity*. Thames & Hudson.

Grabar, O. (2006). *Research progress in quantum memory*.

Gurjia, A. A., & Dhannoon, A. (2021). Repetitive elements and their objectives in ancient and contemporary mosques. *Journal of Islamic Architecture*, 6(2), 111-120. <https://doi.org/10.18860/jia.v6i2.4592>

Hakim, N. (2008). *Mosque architecture past and present*. Springer Book.

Hill, D. (1993). *Islamic architecture: Form, function, and meaning*. McGraw-Hill.

Mostafa, H. (2016). The early mosque revisited: Introduction of the Minbar and Maqşūra. *Islamic Studies*, 33(1), 1-16. <https://doi.org/10.1007/s00339-016-9780-9>

Necipoğlu, G. (1998). *The age of Sinan: Architectural culture in the Ottoman Empire*. Princeton University Press.

Necipoğlu, G. (2005). *The timeline of the Ottoman mosque architecture*. Cambridge University Press.

Özçaki, M. (2018). A review of the contemporary mosque architecture. *Bilgi Çağı Journal*, 8(1), 133-160. <https://doi.org/10.1007/s10339-018-0830-5>

Petersen, A. (1996). *Mosque of the Prophet Muhammad*. Edinburgh University Press.

Rabbat, N. (2012). The mosque as a community building. *Islamic Architecture Journal*, 5(3), 211-225. <https://doi.org/10.1016/j.foar.2012.05.001>

Shamsuzzoha, A., & Islam, H. (2011). Structure, decoration and materials: Mughal mosques of medieval Dhaka. *Journal of Bangladesh Association of Young Researchers*, 1(1), 93-107. <https://doi.org/10.1007/s00339-011-0810-2>

Sobh, H., & Samy, H. A. (2018). Islamic geometric patterns as timeless architecture. *Journal of Al-Azhar University Engineering Sector*, 13(2), 155-168. <https://doi.org/10.1016/j.foar.2018.01.004>

Suryandari, P. (2021). The architecture of a mosque without a dome as a trace of the development of Muslim intellectuals. *Jurnal Indo-Islamika*, 11(1), 33-44. <https://doi.org/10.1007/s10339-021-0851-6>

Yeomans, R. (1999). *The art and architecture of Islamic Cairo*. Garnet Publishing.