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Comparative Analysis of Traditional and Modern Religious Buildings in Terms of Materials and Construction Techniques: The Turkish Mosques Cases

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Abstract

Religious buildings are cultural symbols of societies in urban life. Mosque architecture, one of the religious structures that entered Turkish history and architectural culture with the acceptance of Islam by the Turks, developed over time and reached its peak in terms of architectural formation during the Ottoman period. Although religious buildings are thought to be less affected by social change throughout history, unlike other architectural structures, mosques are seen to be affected by the social and cultural structure that changes over time. Religious buildings, apart from being places of worship in social life, are also meeting points and social sharing areas. This situation shows that it will not be possible for religious buildings to remain indifferent to the changing needs, building materials and living standards over time. The aim of the study is to explain the use of developing and transforming materials and construction techniques in mosques in Türkiye. Within the scope of the study, the reflection of traditional and modern architecture in mosques was discussed and the transformation of buildings in different periods was examined. In this context, examples of traditional and modern mosques built in different periods were discussed with the comparative analysis method. By examining how the classical, iconic elements of mosque architecture were handled in a modern style, their changes in terms of materials and construction techniques were questioned. As a result, it is aimed to be a reference for future studies by looking at the architectural variations of changing religious buildings from past to present.

Keywords

building material, construction technique, modern mosque, religious building, traditional mosque

1 Introduction

There are places of worship that have become symbols of countries all over the world, and these buildings form the social structures of societies (Ayhan and Cubukcu, 2010). Islam is one of the religions that create these social structures. The fundamental book of the religion of Islam is the *Kur'an-ı Kerim*. There is no concept of a place of worship directly defined in the *Kur'an-ı Kerim* (Bayne and Nagasawa, 2006). It is stated that there is no indication of shape or style other than a place where worship of Allah takes place. In the verses of the Quran and the hadiths of the Prophet, there is no description of a place of worship specific to Islam. It is known that prayers performed in groups and under one roof are accepted. The need for a space indicates the existence of an architectural space (Diler et al., 2021; Takva et al., 2023a). At this point, mosque architecture comes to the fore (Çakıcı and Takva, 2023; Ismail and Rasdi, 2010). Mosques differ from other types of buildings because they are visited at certain hours. According to Islamic belief, mosques are periodically partially or fully occupied due to prayer five times a day. Mosques have a spiritual structure, and when you enter them, a wide area welcomes people, giving a feeling of calm and comfort (Abdullah et al., 2016). At this point, these religious structures that make up the built environment are the cultural heritage of the countries, and they need to be protected by transferring them to future generations (Takva and İlerisoy, 2023; Cakir et al., 2023). Mosques have undergone change and transformation due to disasters, interventions, and wars (Büyükkılıç Koşun and Hamamcıoğlu Turan, 2020).

Mosque architecture, from the Masjid al-Nabawi, one of the first examples of mosques, to the present day, has been

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influenced by changing artistic and cultural values as well as meeting the needs of society. Mosques, which are generally the product of a conservative culture, have been transformed due to the changing dynamics and needs of the society, even though they resist the changes (Akan, 2022; Takva et al., 2023b). The location of the mosque is at a level accessible to all segments of the society (Onur and Özeren, 2024). Every state that rose on the Islamic belief sought to both honor its own existence and prove its commitment to Islam by making efforts to build larger and more spectacular mosques than the mosques that were the product of previous cultures. The Ottoman Empire, one of these states, reflected its economic and political power in religious buildings. During the 623-year period during which the empire reigned, the classical mosque form was attained in the 16th century. The greatest chief architect of this period is Mimar Sinan. Selimiye Mosque in Edirne and Süleymaniye Mosque in Istanbul are his best-known works. Mimar Sinan has 375 architectural structures, 81 of which are mosques. Although classical mosque form was affected by stylistic differences in the processes after this period, continuity was achieved in principle in design (Özdemir et al., 2022). Throughout the historical process, the economic and political power of Islamic states has been one of the most important factors determining the change in mosque architecture. Each state reflected the characteristics of its own era in its mosques as well as in other architectural structures. In this context, the development of mosque architecture in our country was also affected by these conditions and the effects of these processes were seen in places of worship (Kucukdogan et al., 2010). From the Ottoman period, the most defining period of Turkish mosque architecture, to the present day, the characteristic features of mosques have remained largely the same, but they have changed both in style and functionality according to the needs of the age (El-Torky, 2018). This situation is also valid for the Republican period.

Although there was no pressure in terms of belief, modernization efforts were made in mosque architecture during the Republican Era, but they were not effective enough (Danforth, 2014). More than ninety thousand mosques have been built in Anatolia, especially in the last ninety years. Most of these mosques were built without aesthetic concerns. The number of original style buildings that reflect the architecture of the era and where modern materials are tried and included in the decoration is limited (Dewi, 2017; Gürel and Dereli, 2023). Many of them were built by mosque construction associations with limited budgets. The most important reason for the impasse experienced by the mosque architectural identity during the Republic period; The revolutions that took place with the Republic caused the people to be divided into secular and conservative (Ulutas, 2010). Mosques designed in a modern style as a reaction to the secular segment were not generally accepted. An example of this is the Ankara Kocatepe Mosque Project designed by Architect Vedat Dalokay. This mosque, which was not accepted due to its modern lines, was built in Islamabad with another similar architectural project and was appreciated. At this point, it has been observed that the understanding of mosque architecture is divided into traditional and modern. Those who adopted the traditional movement generally tended to build mosques like historical mosques that were masterpieces of their period (Verkaaik, 2012). The sections in mosque architecture are given in Fig. 1.

There are many studies in the literature on mosque architecture. Looking at the research studies conducted in recent years, Asim and Shimizu (2023) investigated the physical characteristics of traditional mosques in the Kuzzat (Bardrani) district of Afghanistan. The mosques discussed are categorized as traditional and modern. Traditional mosques were analyzed under three subheadings: preserved, damaged (destroyed) and transformed. Mustafa and Hassan (2013) focused on measuring the effect of spatial layout on functional efficiency in mosques in the early Ottoman period. Characteristics of spaces are highlighted by using space syntax theory. Batuman (2016) discussed the mosque architecture policies in Türkiye in the context of Cold War geopolitics and discussed the example of Türkiye. Allahham (2019) focuses on the semiotics and metamorphosis of contemporary mosque architecture. It has been determined that the metamorphosis experienced by contemporary mosques, which have

Fig. 1 Different configurations of mihrabs, minarets and domes in mosques (Awad, 2021)

symbolic status, is a result of modernity in contemporary Muslim societies. Takva and Takva (2023) examined the geometric formations in Islamic buildings by investigating the tessellation configurations in mosques with marble and wooden pillars. In traditional mosque architecture, emphasis is placed on geometric integrations in the pulpit and mihrab sections.

In mosque architecture, the traditional models of the past should not be followed continuously, and mosques should not be considered as completely free from the layers of the past. When we look at Islamic architecture, it is seen that no single form has been adopted that aims to convey the divine and universal message to all segments of society in the same form. Incorporating new developments in the name of modernity into mosque architecture without measuring their suitability would be a behavior that contradicts the Islamic faith. Mosque architecture needs to be approached with an innovative approach to meet both today's needs and a contemporary perspective. From this perspective, in the study, mosque structures built in traditional and modern styles were evaluated using the comparative analysis method. The reflection of the change caused by modern life and technological developments on mosque architecture and the consequences of this change are discussed. In this context, the features of traditional and modern mosques were evaluated in the context of building elements and material usage and inferences were made for future designs.

2 Material and method

In the study, traditional mosques built during the Ottoman period and mosques built in modern style during the Republic period were examined by comparative analysis method. First, research articles dealing with traditional and modern mosque practices were examined through a literature review. The research papers examined consist of articles, books, master's and doctoral theses, conference proceedings and similar academic publications and internet resources. Additionally, visual elements in the literature were used to better understand the subject and to be descriptive. The historical process of mosque architecture is discussed and its development, which started with the birth of Islam, is emphasized. In the studies examined, a comparative analysis framework was developed by focusing on the material and construction technique parameters of mosques designed in traditional and modern styles. The concept of traditional and modern in mosque architecture was discussed and the common and distinctive features of both groups were determined.

Within the scope of the study, three traditional mosques built during the Ottoman period and three modern mosques built during the Republic period were discussed. Among the traditional mosques with different plan typologies, Şehzade Mehmet Mosque, Karapınar Sultan Selim Mosque and Gülabibey Mosque were selected to be examined. TBMM Mosque, Sancaklar Mosque and Terzi Baba Mosque were chosen as examples of the modern mosque group due to their distinctive features. After discussing the general characteristics of the investigated buildings, the architectural elements in the mosques were evaluated comparatively in terms of building elements and material use. The flow chart of the study is given in Fig. 2.

3 Conceptual framework and architectural features of traditional and modern style mosques

The mosque is one of the political and symbolic structures with high spiritual value that is at the center of Islamic architecture. In addition, mosque buildings, which are meeting points and social centers for urbanites who share a common belief, are an important public space (Astor, 2012). This public space has created a classic mosque architecture in the Islamic world for centuries (Al-Krenawi, 2016). Building elements such as dome, mihrab, minaret, pulpit and lectern, which are the most distinctive elements of this architecture, constitute the invariable archetypes of mosque plans in every culture. Although these elements vary formally in terms of construction techniques and material use on the basis of countries and cultures, almost all of these elements are seen in mosque architecture.

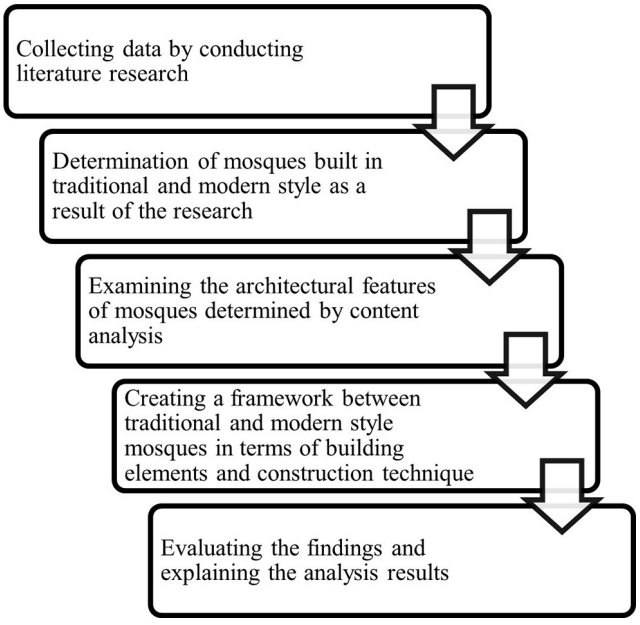

Fig. 2 Flowchart of the study

Mosques, the most important symbol of the Islamic faith in urban life, continued their development rapidly with the spread of Islam. This development process slowed down in the 17th century, when today's mosque understanding reached its final form. This stagnation continued despite the industrial revolution in the 19th century and the developments in technological and material knowledge. Thus, the classical mosque architecture approach that was effective in the 17th century has largely been carried to the present day. However, today, with the emergence of the Industry 4.0 era and the development of technology, architectural application techniques have also improved (Baharudin and Ismail, 2014). As construction techniques keep up with technology, modern style mosques are planned by interpreting the classical mosque form and going beyond the traditional form. It is possible to come across mosques all over the world, especially since the 1950s, which abandoned the classical mosque image and tried to achieve a modern appearance.

Religious buildings are urban figures and symbolize the belief structures of cities. For this reason, these buildings are located in the most central and strategic points of the city (Erzen, 2011). The most important examples of religious buildings in cities include the Selimiye Mosque in Edirne, Hagia Sophia, Sultanahmet and Süleymaniye Mosques in Istanbul and the Ulu Mosque in Bursa (Redondo Buitrago and Huylebrouck, 2015). The starting point of information and technology in the world is cities, and the modernization movement always emerges in cities. For this reason, it is not possible for mosques not to be affected by the dynamic lifestyle of cities and the emerging developments. The way for modern mosques has been paved with the expansion of the material scale, the change in design understanding and the development of innovative construction techniques. In Section 3, the content analysis and architectural features of traditional and modern style mosques are discussed and a comparative analysis framework is created.

3.1 Şehzade Mehmet Mosque

Şehzade Mehmet Mosque, located within the Şehzade Mehmet Complex, was designed by Mimar Sinan upon the request of Suleiman the Magnificent and built between 1543–1548. In the structure planned around a central dome, the upper cover system supported the main dome in the center with semi-domes in four directions. A half dome is placed on both sides of the half domes. The upper cover system was completed by adding small domes to the corners (Fig. 3). The mosque has a square plan of approximately 40 × 40 meters and consists of four weight towers at the corners and four elephant feet (*pilpaye*) supporting the main dome. The main dome has a diameter of 18.70 meters and the distance from the ground to the keystone is 35.98 meters (İlerisoy and Soyluk, 2012). The dome form is supported by pendants and muqarnas. The mosque has a place of worship, a courtyard with a fountain and a minaret with two balconies. When Şehzade Mehmet Mosque is examined in terms of materials and construction techniques, cut limestone was used on its walls. There are twenty-four windows in the main dome. Circular windows were used only on the mihrab façade (Şen, 2019).

3.2 Karapınar Sultan Selim Mosque

The mosque, located in the Selimiye District in the Karapınar district center of Konya, is located within a social complex. In the social complex, the mosque, fountain, bath, arasta-caravanserai and *tabhane* have been preserved until today. However, the school and the *muvakkithane* have not survived to the present day. The construction of the social complex was started in II. It started after May 14, 1560, during the reign of Selim I, while he was the governor of Konya. The complex, completed in 1563, was put into service. It was built in the typology of a range complex on the Konya-Adana caravan route, in the direction of the Pilgrimage route of Anatolia. Although the complex is shown as the work of Mimar Sinan in some sources, when looking at the archive records, it is stated that the chief architect was Cemâleddin from Halep and Mehmed, who was the main architect, played an assistant role in the construction of the mosque. The mosque structure is located in a courtyard on the south side of the complex, which is oriented in the northwest-southeast direction. There is an octagonal fountain in the courtyard. The mosque measures 17.8 × 17.8 meters and has a square plan. The structure, which was built with a single dome, has a circular dome with a diameter of 14.7 meters, sitting on a drum (Fig. 4). The dome, supported by eight buttresses from the outside, is also reinforced with a buttress located at the corners and

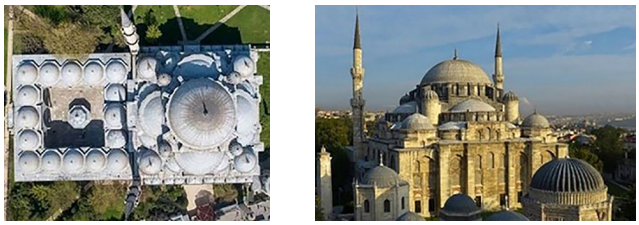

Fig. 3 Top view and façade of Şehzade Mehmet Mosque (Şen, 2019)


Fig. 4 Façade of Karapınar Sultan Selim Mosque (Mısırlı and Erten, 2023) and interior view (Özyalvaç, 2020)

in the middle of the façade. Sultan Selim Mosque has a strategic value as it is the center of one of the complexes on the main roads built in the 16th and 17th centuries on the eastern and southeastern route of Anatolia. The main walls and minarets of the mosque are made of cut stone and the mihrab and pulpit are marble (Mısırlı and Erten, 2023).

3.3 Gülabibey Mosque

Gülabibey Mosque is located in the north of Kemah district center in Erzincan province. There are five inscriptions on the mosque. According to the information obtained from these inscriptions, it is known that the mosque was built in 1347 and was repaired by Hacı Bilal Ağa in 1837. The mosque was registered as an immovable cultural asset by the Erzurum Cultural Heritage Preservation Regional Board. Gülabibey Mosque, one of the largest mosques in Kemah, has a rectangular plan. The ceiling of the mosque, which belongs to the wooden pillar mosque typology, is built with flat wooden planks and is placed on eight wooden poles (Fig. 5). The main walls of the mosque were built of sculpted stone material. The narthex on the north (entrance) façade was later covered with glass using wooden paneling. There are five windows on the east side of the mosque and six windows on the west side. The minaret is located in the southwest of the last congregation area. The stone minaret with a square base, polygonal body and single balcony can be reached from the east via a five-step staircase (Naldan, 2016).

3.4 Türkiye Grand National Assembly (*Türkiye Büyük Millet Meclisi*) Mosque

The Grand National Assembly of Türkiye (TBMM) Mosque is located at the southern end of *Devlet Mahallesi* in Ankara. Devlet Mahallesi was designed by Austrian Architect Clemens Holzmeister during the structuring process of Ankara after the declaration of the Republic. It was decided to build the parliamentary mosque in 1984 and it was completed and put into service in 1989. The mosque project was achieved as a result of the competition. In the competition specifications, it was stated that it should be a design with a capacity of 500 people, a single minaret, and a settlement and growth opportunity that would extend into the green area. An integrated plan was made with the steeply sloping hill by Behruz Çinici and his son Can Çinici, the author of the project selected as a result of the competition. The mosque consists of a building complex within the framework of a square, a place of worship and a library. TBMM Mosque has been deemed worthy of awards in many areas (Özmen, 2018). The Aga Khan Award for Architecture, which was given in 1995 to works of architecture that successfully reflect Islamic culture, is one of them. Landscaping was done by taking advantage of the elevations of the land and natural stairs were obtained (Fig. 6). The upper cover of the rectangular place of worship is designed with a pyramid-style roof in three directions according to the steep slope of the land. The middle tier was designed higher than the others and replaced the dome in traditional mosques. The upper cover of the mosque consists of gradually narrowing terraces. There are glasses in the spaces between the terraces, thus providing natural lighting in the building (Ertuğ, 2023).

3.5 Sancaklar Mosque

Sancaklar mosque, located in Büyükçekmece, Istanbul, is one of the representatives of modern Islamic architecture. The mosque, whose construction started in 2011, was completed in 2013. The mosque, which has a geometry close to rectangular in plan, has a seating area of 1300 square meters. At this point, there is a plan consisting only of the main place of worship. In the mosque, which does not have a women's mahfil, the main area is reached after a gradual entrance. The section reached has the feature of the last congregation area. There is one minaret in the mosque, which allows 650 people to pray at the same time. Concrete and stone materials were used in the mosque


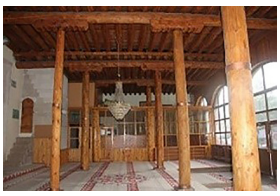

Fig. 5 Façade and interior view of Gülabibey Mosque (Naldan, 2016)


Fig. 6 Perspective and interior view of the Grand National Assembly of Türkiye Mosque (Ertuğ, 2023)

structure. Since part of the building is built below ground level, the entire structure is not noticeable at first glance, and the main entrance of the mosque is accessed by stairs. Due to the elevations, there are two sections: lower and upper courtyard. The mihrab section of the mosque is illuminated with natural light and evokes the tendency to call for worship (Fig. 7). While the qibla wall in the place of worship has an exposed concrete surface, the eastern wall is covered with black glass panels. Although the upper cover, which is graded with concrete slabs, is seen as a different interpretation of the dome, strips are included in this section to provide natural lighting (Gür, 2017).

3.6 Terzi Baba Mosque

Tailor Baba, who gave her name to the mosque, is a valuable person who is known for her Sufi personality and has led many people to turn to Sufism. Terzi Baba Mosque, which has a capacity of 7000 people and an area of approximately 3000 square meters, is located in the Fevzi Paşa District of Erzincan. The construction of the mosque and social complex designed by Danyal Tevfik Çiper started in 1990 and was completed in 2002. The construction process took 12 years due to financial difficulties. The building complex, designed with a modern social complex approach, includes a parking lot, shopping center and social facilities in addition to the mosque. There are differences between the mosque's initial design and its current state. Especially the difference in dome form attracts attention. In the dome structure designed with hexagonal spaces, the hexagonal form was removed after implementation. In the mosque, which was built with donations made by philanthropists, steel was used instead of reinforced concrete in the dome section for earthquake resistance (Fig. 8). Unlike traditional examples, the diameter of the dome covering the entire harim is approximately 44 meters and it is 14 meters high. The double-walled steel lattice carrier dome is covered with polycarbonate material on the inside and aluminum sheets on the outside. The minarets of the mosque, built of reinforced concrete,

Fig. 7 Perspective view and prayer area of Sancaklar Mosque (Şahin and Sennou, 2023)

Fig. 8 Perspective view and worship area of Erzincan Terzi Baba Mosque (Altınyaldız, 2002)

were inspired by the sword form. Both minarets of the mosque are 38 meters high (Kızılelma and Özler, 2023). Pulpit and lectern elements created with different formal approaches and iron profiles are among the other striking elements in the interior.

4 Discussion

As the religion of Islam spreads over a wide geography over time, the construction techniques and materials used in mosque construction vary both nationally and internationally. However, despite all the differences of the mosques, there are distinct elements that hold the mosque form and geometry together. While these elements provided a function in the mosque, over time, with the development of technology, they became symbolic and began to be used as a means of creating the visual integrity of the mosque. Diversity has been achieved by transforming these elements, which are indispensable elements of the mosque perception, into different designs in different periods in terms of construction technology and material selection. This development and change in mosque architecture has also led to the enrichment of the building blocks of the mosque. Developing technology has accelerated the transition from traditional to modern by shaping itself according to the needs of users.

Within the scope of the study, three traditional mosques built during the Ottoman period and three modern mosques built during the Republic period were discussed. Within the scope of the sample study, the architectural elements in the selected mosques were evaluated comparatively in terms of building elements and material use (Table 1). It is seen that the use of square and rectangular plan forms in traditional mosques is also adopted in modern examples. It has been determined that the square and rectangular architectural plans, which were used in the Principalities and Ottoman periods, starting from the Seljuk period, were also applied in modern mosques, but the modern examples were not included in any plan or facade typology

Table 1 Comparison of the examined traditional and modern mosques in terms of building materials

Mosque	Plan typology	Main walls	Mihrab, pulpit, and lectern	Minaret	Dome/cover system
Şehzade Mehmet Mosque	Mosque with central dome and 4 half-domes	Cut stone	The mihrab and pulpit are made of marble, the lectern is made of wood.	The minarets are built of küfeki natural stone, and their cones are covered with lead.	The brick domes are covered with lead.
Karapınar Sultan Selim Mosque	Central single-domed mosque	Cut stone	Stone was used in the mihrab, marble in the pulpit, and wood in the lectern.	The minarets were built from cut stone material.	The brick domes are covered with lead.
Gülabibey Mosque	Mosque with wooden pillars	Cut stone	The mihrab is made of stone, the pulpit and the lectern are made of wood.	The minaret was built from cut stone material.	The wooden-constructed hipped roof over the flat wooden ceiling with wooden beams is now covered with tile-like sheet metal.
TBMM Mosque	–	Reinforced concrete	The mihrab is made of curvilinear glass and has a stained glass design, the pulpit is made of wooden material.	A cypress tree was planted instead of the minaret.	The upper cover is a whole with the facade material and rises gradually. Exposed concrete was used in the upper cover.
Sancaklar Mosque	–	Reinforced concrete	The square mihrab and the six-step circular pulpit are made of reinforced concrete. The mihrab is in the shape of a hollow.	Rising on a square base (pedestal), the minaret was designed as a stone tower in the upper courtyard.	The top cover system consists of flat concrete slabs.
Terzi Baba Mosque	–	Reinforced concrete	The mihrab, pulpit and lectern are made of cold iron.	The minaret was built from reinforced concrete.	The dome that covers the entire structure is built with steel construction material. The inner coating of the dome is polycarbonate and the outer coating is aluminum alloy.

class. One of the striking design elements of traditional and modern mosques is the courtyards. While traditional mosques generally have courtyards with clear boundaries, modern mosques such as Sancaklar Mosque and TBMM Mosque have courtyards without sharp boundaries.

Traditional mosques built with masonry construction technique mostly have thick walls built with stone material, and the domed upper cover on the prayer hall is carried by huge elephant feet. In parallel with the developments in materials and construction technologies, reinforced concrete and steel carrier systems are preferred in modern mosque examples, and much thinner cross-section load-bearing elements and walls have begun to be used. In addition, while the diameters of the domes built with the masonry technique with stone and brick materials on the top cover and covering a part of the prayer hall cannot exceed certain limits required by the material and construction technique, a single top cover can be used more freely in today's buildings. In parallel with this, it can be said that larger glass surfaces are used in modern examples.

It is known that the dome is a means of representation in traditional mosques. In terms of dome/covering material, it can be seen that while stone and brick are commonly used in traditional domes, lead is commonly used as the outer covering material. The domes, which are plastered on the inside, mostly have hand-carved decorations. In Gülabibey mosque, which is one of the traditional mosques with wooden poles, a wooden construction hipped roof was used on the upper cover, depending on the carrying capacity of the wooden poles. In modern mosque examples, much freer designs are tried that explore different interpretations of the dome with innovative materials and construction technology. In this context, Terzi Baba Mosque has a modern interpretation of the traditional dome with modern materials. In the TBMM and Sancaklar mosques, it is seen that in addition to the new and technological interpretation of the dome created with stepped concrete slabs, lighting strips located between the concrete levels are used instead of windows in the dome drum.

When mihrabs, pulpits and preaching platforms, which are iconic building elements, are evaluated in terms of material use, it is seen that traditional mosques mostly use stone or marble mihrabs, while wooden materials are widely used in lectern and pulpits. Different variations have been made in modern mosques. The geometry of the pulpit and mihrabs has been generally changed. There are also differences in the materials of the replaced building elements compared to traditional mosques. Building elements such as glass, reinforced concrete and cold iron were preferred in modern mosques. It has been determined that the preaching platform is not included in some modern examples. Focusing on simplicity and minimizing the use of decoration and decoration in modern mosques can be considered as another feature that distinguishes and attracts attention from traditional mosques.

In terms of minaret material, stone building material was mostly used in the minarets of traditional mosques. In modern mosques, experiments with different materials, such as in the pulpit and mihrab, attract attention. It has been determined that the minaret forms and geometry differ in modern examples. The use of cypress trees as minaret positions in the TBMM mosque is considered an indicator of harmony with nature and sustainability.

5 Conclusion

Like other public buildings, mosques have been greatly affected by the technological developments that emerged in the 20th century, especially the Industrial Revolution. The modernization process of today's mosque architecture with technological developments in construction techniques and building materials is clearly seen in the mosque practices built in the last fifty years. In this context, mosque architecture has moved away from the influence of traditional architecture and moved into a postmodern phase where different combinations are applied and changed direction. Mosques especially have domes, minarets, mihrabs, pulpits, lecterns, etc. While its iconic elements become symbolic elements, significant changes are observed in these building sections in modern designs. It is possible to say that the most obvious effect of the modernization of mosques is the use of materials and modern lines in design. At this point, it can be said that the traditional architectural style has lost its influence over time with the development of construction and material technology due to technological developments. In this context, the number of modern mosque design approaches is increasing day by day.

When considered in terms of construction technique and material use, it can be said that today's modern mosques differ greatly from traditional mosques. It is observed that modern mosques do not adhere to a certain plan or façade typology, paving the way for more original designs. In addition, thanks to technological developments in construction techniques and materials, massive mass structures formed by thick body walls and large carriers such as elephant feet have been replaced by modern structures consisting of much more naive structural elements. Pendant, tromp, etc. required by masonry construction technique. The use of transition elements to the traditional dome has not been required in today's construction technology. However, the use of traditional architectural elements has not been completely abandoned, and it is seen that different interpretations and designs are included within the possibilities offered by technology. The fact that the minaret is one of the indispensable building elements in mosques because it carries an invitation mission and calls the society to worship has brought about different variations in terms of form and material in the minarets in modern mosques. Sound technology, which has developed with the advent of technological possibilities, provides ease of design in a sense by disabling the active use of minarets, planning minarets separately from the main structure in modern mosques, while clearly showing that minarets have become a symbolic icon by moving away from functionality.

It has been determined that there are differences in the use and understanding of domes in the transition from traditional to modern. In the mosques of the Republic period, we encounter mosque architecture that imitates the Classical Ottoman mosques, as well as mosques that seek a contemporary interpretation of the dome and mosque designs that use completely different coverings instead of the dome. While the dome highlights the sense of sublimity in the perceptual dimension of the mosque interior, it is also a building element that has an important function in dispersing sound in the interior in a functional sense. With the development of sound technology, the availability of equipment that can perform the function of the dome has enabled the emergence of different design alternatives instead of the dome. In this context, it has been determined that the modern mosques built recently do not use the dome element as it is, re-consider it with different approaches and interpretations, and cover designs with different geometries have begun to be applied instead of the dome. While it is seen that the mihrab element in

modern mosques differs mostly in terms of material use, it is seen that different designs emerge in terms of both formal approach and material use in elements such as pulpit and preaching platform. In some modern mosques, the courtyard walls that separate traditional mosques from urban areas have been shortened or eliminated, with a more inclusive approach.

As a result, it is seen that the developments in the field of construction technique and material technology have brought significant changes to mosque architecture and revealed the modern mosque understanding. On the other hand, it has been determined that the iconic architectural elements were not completely abandoned but were redesigned with new interpretations by making use of contemporary construction techniques and material technology. In this context, it is predicted that alternatives to modern mosque designs will be developed and increased in the coming years.

With the development of technology, artificial intelligence and digital design techniques are increasing. One of these methods applied in buildings is the metaverse universe. In this universe where different mosque designs are created, the buildings of the future are being shaped. In this direction, bridges can be built between mosques and the metaverse, and different digital simulations and virtual reality activities can create the buildings of the future.

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