

A Study of Ancient Types of Cross Pattern in Iranian Architecture

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Received 20 April 2018; Revised 12 August 2018; Accepted 21 August 2018; Available Online 21 September 2020

ABSTRACT

The cross pattern has long been of special importance in Iranian art and architecture. The history of applying this pattern in Iranian pottery dates back to the Neolithic period. Since this pattern had the semantic importance in the Iranian religions of Mithraism, Zoroastrianism, and Zurvanism, it has influenced Iranian art and architecture. In Iran, in both pre- and post-Islamic periods, various types of cross pattern have been applied as part of ornaments or building plan in various types of buildings. The present study aims to study the different types of this pattern in Iranian architecture and related ornaments. This research is a descriptive- analytical case study in which data are collected using library study and field study. Samples are selected from various types of building ornaments such as tilework, stucco, brickwork as well as different building plans. These samples are selected from a time span between the Medes period and Qajar periods. Then, they are studied, analyzed, and compared. Finally, different types of cross pattern identified in the building plans and architectural ornaments are presented. According to this study, it is found that some geometrical motifs (Girih) and Girih modules as well as some Golandaz (layout of bricks) in brickworks, stucco motifs, plant motifs, and arabesques have been formed based on five types of the cross: "cross, slanted cross, Swastika, nine-patch pattern, and shamseh". Moreover, the study of the plans of buildings such as houses, fire temples, mosques and schools, gardens, etc. shows that twelve types of the cross pattern were applied in the spatial organization of pre-Islamic buildings and six types in the Islamic building. The nine-patch, combined nine-patch, cross, Chaharsofeh, Kooshk (pavilion), Chaharbagh, and four-iwan (Chahar Ayvan) patterns, etc. are of various types of cross pattern identified in the Iranian architecture, and the nine-patch pattern can be considered the origin of all of them.

Keywords: Cross, Slanted Cross, Swastika, Nine-Patch Pattern, Shamseh, Iranian Architecture.

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1. INTRODUCTION

The application of cross pattern dates back to the prehistoric era when it was applied in the pottery art by those who lived in the Iranian plateau. It is a pattern dividing space into four parts and the center of which is a point on the intersection of the axes of a cross. The archaeological pottery findings indicate that the division of the square into nine patches has a much older history than architectural works. During the Pottery Neolithic period (sixth-fifth millennia BC), those potters who lived in Zagheh Tepe, Qazvin and Dalma Tepe, and Hajji Firuz Tepe in northwestern Iran used this motif. In the Copper and Stone ages (about 4500 to 3000 BC), in Choghamish Tepe and Buhalan Tepe, Khuzestan, and Giyan Tepe, Nahavand, this motif was used. Also, in Sagazabad Tepe in Qazvin, Godin Tepe in Kangavar, Shahr-e Sukhteh in Sistan, Haftavan Tepe in northwestern Iran, people were familiar with this motif (Joudaki Azizi, Saremi-Naieni, & Ebrahimi, 2014, pp. 13-14). This pattern is successively seen at the core of the manifestation of the Iranian spirit and it forms an exemplary space that was an element dominating Iranian thought in the pre-Islamic and Islamic periods in Iran (Afshar Mohajer, 2000, p. 55).

The cross pattern and Swastika (or sauwastika) have had different meanings in Iranian rituals. Therefore, this motif has had a special position in the ancient Persian art and architecture. The term "Swastika" was firstly used by Hertzfeld. The Swastika was firstly explored in Khuzestan (Bakhourtash, 2001, p. 138). Some believe that the cross is made of "Swastika", which itself was initially curved (Ibid, p. 150). But as mentioned earlier, the nine-patch pattern was used in Neolithic potteries. The use of this motif had continued after the arrival of Islam in Iran and new manifestations of it had been created. The presence of this motif in Islamic architecture has been differently interpreted. According to some, even the Shamsheh motif in geometric patterns (Girih) is an evolution of the Swastika, which got a new meaning in the Islamic period.

What is important here is the spread of this ancient pattern in pre-Islamic and Islamic Iranian architecture. Thus, in the present study, it was attempted to study the dominant cross types used in plant, animal, geometric, arabesque, Khataei patterns, calligraphy, stucco, tilework, and brickwork, as well as Iranian building plans.

2. RESEARCH PURPOSE AND QUESTIONS

The present study aims to study the types of cross pattern in Iranian architecture and related ornamentations.

The research questions are as follows:

1. What are the types of crosses used in ornaments related to Iranian architecture?

2. What are the types of crosses used in different Iranian building plans?

3. RESEARCH BACKGROUND

Numerous studies have been carried out on the cross. Guenon (1995) has pointed out the meanings and mysteries of the cross. Bakhourtash (2001) has investigated the symbol of the cross in Iran, India and other nations. Esfandiari (2009) and Ghaem (2010) have tried to introduce this motif, its history and concepts. Ghaem (2010) and Zakerin (2011) have also studied the cross pattern used in Iranian potteries. Mohammadi (2009) has investigated the cross pattern in the four-patch spaces of the chaharbagh and Motedayen and Motedayen (2016) in nine-patch kooshk (pavilion) in the Iranian garden. Gholami and Kavian (2017) have searched chaharsofeh pattern in historical references, described the architectural patterns used in hot and dry areas and stated the advantages of the chaharsofeh pattern and the function of spaces with this pattern. In a similar study, the use of chaharsofeh pattern in Iranian house architecture, its origin and the meanings hidden in it have been discussed (Tabatabaee zavvare, Azimi, & Shahbazi, 2016). Joudaki Azizi et al. (2015) have investigated various types of the chaharsofeh pattern in Iranian architecture. Hosseini (2016) has also analyzed the four-patch divisions in the plan of some buildings. In another study, Ranjbar Kermani and Maleki (2017) have introduced the organization pattern of central spaces (in the nine-patch pattern) and examined and analyzed examples of tombs and pavilions, collected common features of case studies and also pointed to the origins of the central space model. In some studies, researchers have investigated the concepts, meanings and history of the cross pattern and some others have studied some types of the cross in special ornaments or a special type of it (such as four-iwan (Chahar Ayvan) pattern) in Iranian architecture. Accordingly, the present study aims to identify and investigate those types of cross patterns used in Iranian architecture and architectural ornaments. By knowing the types of cross patterns used in architectural ornaments and spatial organization of Iranian buildings, its importance and position in Iranian architecture are recognized and the design based on this ancient Iranian pattern will be facilitated.

4. RESEARCH METHOD

The present research is a descriptive, analytical, and historical case study that was carried out with the following process: first, some data were collected in the field of history, archeology, and architecture using library study and field study (taking photos and collecting motifs). Samples were selected from different types of plant and animal motifs, and geometric patterns used in tilework, stucco, brickwork, etc., as well as different building plans. The time span

considered to select the samples was from the Medes period to the Qajar period, i.e. the period in which there were architectural and archaeological documents on this case. Then the samples were examined and analyzed

and the patterns and plans were obtained. Finally, the types of crosses used in the architectural ornaments and building plans were presented separately (Fig. 1).

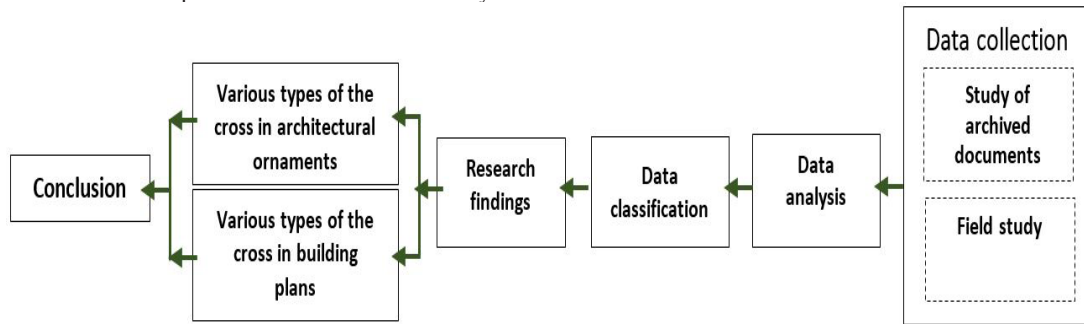


Fig. 1. Research Process

5. FORMAL AND SEMANTIC FEATURES OF THE CROSS

The ancient types of the cross in Iranian architecture, from prehistoric era to the present, have had formal and semantic features, which are discussed below.

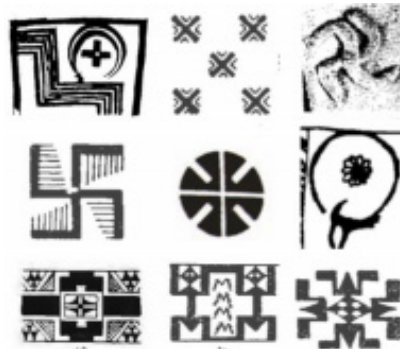


Fig. 2. Various Forms of the Cross Shapes in Potteries and Tablets Discovered in Iran
(Vandenberg, 1969, pp. 40-42; Bakhtourtash, 2001, pp. 141-146)

5.1. Formal Features

Various forms of the cross have been identified in potteries and tablets discovered in ancient sites (Fig. 2). What is known as the cross consists of two equal-sized line segments that are perpendicular to each other at their center points. Since these line segments are the same size, no specific direction is emphasized and there is no stretching in a specific direction and what is important is their intersection (Ghaem, 2010, p. 41). In fact, the cross has a center and four axes (five parts) (Figure 3 (1)). The simple cross, in some forms, has a slanted shape (multiplication sign) (Figure 3(4)). The four corner spaces may also be involved in the formation of the cross (Figure 3(2)). The four corners

of the cross may be hollow or full. Therefore, the cross is combined with the numbers 4, 5, and 9 (Figure 3(2)). The number 4 refers to the four directions or the axes of the cross. Number 5 refers to the four axes of the cross plus its center. The number 9 refers to the center, four main axes, and four corners of the cross (Figure 3 (2)). This form of the cross is called a nine-patch pattern. In some cases, the cross has a broken and rotating form (Figure 3(3)). In this case, one is faced with the numbers 4, 5, and 9 (latently). This form of the cross is called swastika (Figure 3(3)). In the swastika, the corners of the nine-patch pattern seem to be gathered and create a rotating form. The star or sun-like form (Figure 3(5)) is another type of the cross.

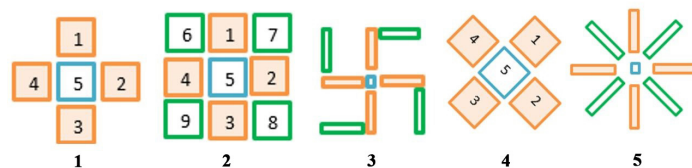


Fig. 3. Form Analysis of the Cross (Types of the Cross)

5.2. Semantic Features

In the past, the cross was the symbol of the forces hidden in nature and the celestial forces (Ghaem, 2010, p. 36). This symbol represents the connection with the sun and the moon, the four sacred elements of "water, air, fire, earth" that sustain the universe and are considered a basis for the creation of the world and human beings (Bakhtourtash, 2001, p. 56) (Fig. 4).

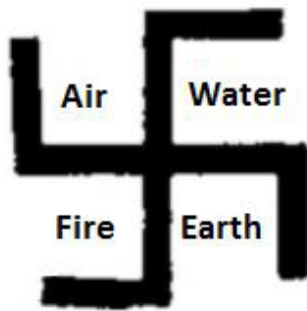


Fig. 4. The Four Sacred Elements Rotate the Wheel of Creation Together and the System of the Universe Remains Stable

(Bakhtourtash, 2001, p. 58)

In ancient Iran, the four elements of the universe were considered sacred and essential for the survival of all living beings, and it was believed that the universe was formed with the combination of these elements in a certain proportion. Hence, they considered each axis of the swastika as a symbol of one of these elements, which coordinates the universe and guards the system of nature by its rotation (Ibid). Ardalan and Bakhtiar (2001) believe that the first circular (automorphic) number, i.e. five, originated from the cross and the center, and from the five elements (the four aforementioned elements plus Aether (also called quintessence)) that are symbolically referred to as the firmament. Geometrically, the cross forms the circle, or sphere, which is the most perfect form and symbolizes the lightness and mobility of the soul. The cross is a sign pointing to the four corners of the world and is a symbol of "peace", brotherhood and unity among all the worlds (Rezaei, 2013, p. 100). According to Mithraism, all of the people in the world should be friends and total peace should prevail in the world, and the cross is the symbol of this unity. In the religion of Zoroastrianism, in Avesta, Mitra rode around the world, clarified everywhere and fought with the violator and liar. Mitra has a tool that is a symbol of agility and courage. This fast tool is a carousel that is pulled by four fast horses that are fed by heaven food. In this region, this fast tool is called Swastika (Ghaem, 2010, p. 37). The cross is also associated with Zurvanism.

Zurvanian knew the infinite time as the god (creator) and believed that everything was created by him, and considered the cross a symbol of the rotation of the wheel of infinite time. According to this religion, the cross was a symbol of birth and death, being and not being, broad and narrow, separation and connection (Ibid, p. 37). In general, the cross has different meanings such as: sun, four elements, four qualities of nature: warmness, wetness, coldness and dryness, and also is the symbol of the origin and cycle of the four seasons, the four states of the moon, the cycle of the universe, infinite time (Zurvan), beginningless and endless, the continuity of life and movement, the movement of water, the four corners of the universe, victory and immortality, fertility and reproduction, love and affection, multiplicity and unity, returning to the Creator, peace and adaptation, long life, prosperity, evolution and transcendence, human's power of thought, goodness and being benefactor, eternal life, and so on.

The cross, with its great hermeneutic ability, as a sacred symbol, has allowed its audience to contemplate and interpret. Some have considered this pattern as the secret of a perfect human being (Esfandiari, 2009, p. 5). For this reason, it has been considered a common pattern between different religions.

After the arrival of Islam in Iran, the cross has been given new meaning and concepts in this period. It was narrated that when the Prophet Muhammad (PBUH) rode the Buraq to Mi'raj, saw the cross sign on its forehead" (Ibid, p. 11). In Iran, mosques and places of worship have been decorated with a wide and extensive grid including the names of Allah, Muhammad (PBUH) and Ali (AS) in the form of the cross (Zakerin, 2011, pp. 25-26). In the calligraphies used in Islamic buildings, the artist has applied the cross form as the base line or background to write holy names, dhikr and hadiths on it. The placement of these letters, which are rich in codes, on a background, which itself rich in mysteries, instills the meaning of unity in the audience, both in terms of form richness and content richness (Nasr, 1996, pp. 108-109). In other words, the cross and the swastika are a factor of unifying letters and words in their central point. Selecting meanings and forms appropriate to them and combining the two, with a logical purpose, are of the most important models in Islamic art. If forms instill the meanings representing the essence (oneness), attributes (glory, beauty, and majesty) and actions (justice and balance) of God which are various aspects of monotheism, they will become sacred. It is not possible to reflect the various aspects of monotheism, except through showing the fraction in the whole and the plurality in unity, and consequently referring to monotheism (Esfandiari, 2009, p. 8).

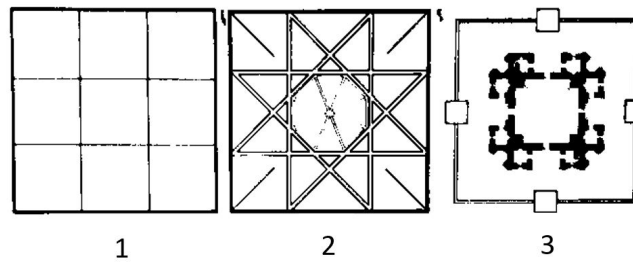


Fig. 5. Ardalan's Interpretation of the Nine-Patch Pattern to Mandal and Different Forms of Mandal in Islamic Architecture (1. Mandal Consists of Four Squares, 2. Isfahan Grand Mosque, Dome No. 185, 3. Tomb of Khajeh Rabie, Mashhad)
(Ardalan, 2001, p. 30)

Ardalan considers the nine-patch cross as Mandal (Fig. 5). Mandal is the interaction between circle and square. While Mandal begins with unity, it moves through manifestation and returns to unity. According to him, Mandal is a cosmic pattern that has been shown in various forms in all human cultures. In Islam, the concept of Mandal refers to divine ideas or names and attributes. In his description of Mi'raj, the Prophet Muhammad (PBUH) mentioned a huge pearl-like dome that was placed on a square with four bases on its corners, and the four-part code of the Qur'an, i.e. "In the name of - God- the Most Gracious, the Most Merciful" was written on these four bases and four streams

flowed under each base. The dome was placed on a square and its boundary was octagonal, a symbol of the 8 angles, i.e. the word "al-a'rsh (Throne of God)". This pattern is dynamic in 8-sided geometry created from a center, and at the center, a square is enclosed by a circle and forms two crosses (Ardalan & Bakhtiar, 2001, p. 31). This Mandal is a symbol of Rozat al-Rezvan (the distance between Prophet Mohammad's (PBUH) pulpit and his altar), and the transcendental relationship with the Quranic verse "He is the First and the Last, and the Outward and the Inward; and He is Knower of all things." (Ibid, p. 31).

Fig. 6. Shamsheh Motif on Reliefs Discovered in Shush



Fig. 7. 12-Pointed Shamsheh in Karbandi Girih



Fig. 8. Shamsheh Girih and Bazuband (Shamsheh and Cross)



According to Titus Burckhardt, the cross, in its original form, implies the concept of a circle- thought of the rotation of the sun (Tahouri, 2002, p. 65). This conceptual affinity has long existed between the cross pattern and the patterns of sun and multi-sided star (called Shamsheh in the Islamic period). Some have also known Shamsheh as the continuation of the multi-sided cross (multi-sided star) that was the symbol of the sun. Shamsheh is the most complete and finished type of the cross pattern in Iranian architecture and related ornaments (Figs. 6-8). This motif begins, is manifested, moves and is multiplied with unity, and returns to the start point. The Shamsheh motif is the utmost symbol of unity in plurality, plurality in unity, light and the perfect man in Islamic architecture, and thus, using this, the artist honors the matter and makes the earth heavenly. In Girih tiling and Karbandi, various types of eight, ten, twelve, fourteen sided Shamsheh, etc. are used. The motifs of the eight-sided Shamsheh and the cross are

seen in the ornaments related to Islamic architecture in many Iranian buildings. The "eight-sided star" or "eight-sided Shamsheh", which alone cannot be expanded, reproduced and developed, are allied in combination with the cross (Fig. 8). This shape, which is formed with two squares and their rotation in each other, indicates the transformation of a square into a circle and is the symbol of the passage from the earth and its related matters to the heaven. A similar process is seen in Islamic architecture in the form of a circular dome which is created by the transformation of a square plan to a circular one (Esfandiari, 2009, p. 11). The central point of the cross also has sublime semantic features. At this point, all contradictions have been resolved. This point represents the divine status and in Islamic mysticism, this divine status is obtained through the assembly of opposing elements (Guenon, 1995, p. 84). This center is the intersection of the major and the minor worlds, it is the place of settlement and

compromise, the origin of departure and return, and the intersection of two horizontal and vertical axes (physical and spiritual, material and spiritual). The movement from the center to the perimeter of the circle manifests the journey in the world of determination and diversity, while the movement towards the center is spiritual and a symbol of absolute unity (Esfandiari, 2009, p. 15).

6. STUDY OF CROSS PATTERN IN IRANIAN ARCHITECTURE

Given the semantic importance of the cross pattern, this pattern has been used in some way throughout the history of Iranian architecture. This pattern has been seen in various forms in the ornaments and building plans in both pre-Islamic and Islamic periods. In the following, it was attempted to investigate various building plans and ornaments to identify the ancient types of this mysterious pattern. For this purpose, it is required to first simplify the patterns used in the selected ornaments and building plans to identify the type of patterns used (based on the form analysis of the cross and the types of crosses given in section 1). To study the cross patterns used in ornaments (subsection 1-6), the samples were selected from the ornaments dating back to the two pre-Islamic ancient and Islamic

periods. In the Islamic period, due to the presence of a wide range of ornaments, each type of ornament was investigated separately. To study the cross patterns used in building plans (section 2-6), it is necessary to identify similar patterns with the identified cross motif types (section 1-5) in the samples. Finding similarities becomes possible by simplifying the plan of each building and finding the spatial organization in each of them (Ranjbar Kermani & Maleki, 2017, p. 33). Comparing these findings may be useful in achieving the types of the cross pattern.

6.1. The Cross Patterns Used in Iranian Architectural Ornaments

The building ornaments are one of the places where the cross pattern has been used, because this pattern has had its own semantic and ritual position in the different historical periods in Iran, and the manifestation of these beliefs is seen on the doors, walls and ceilings of various buildings. This pattern has been seen in building ornaments in both pre-Islamic and Islamic periods. Muslim architects have also used this pattern in various ways. Although Muslim architects did not follow some of the pre-Islamic meanings and concepts of the cross pattern, they beautifully integrated their beliefs into the pattern.

Fig. 9. Naqsh-E Rostam with the Cross Axis

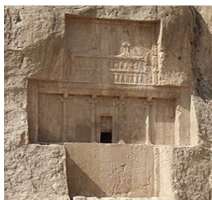


Fig. 10. Persepolis, Symbol of Faravahar with the Cross Axis

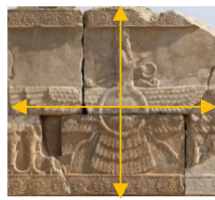


Fig. 11. Stucco in Ctesiphon Palace (Gisso Qaem), with The Cross Pattern and Swastika

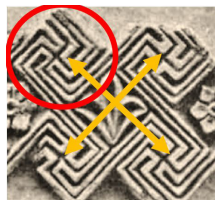


Fig. 12. Stucco in Ctesiphon Palace, Combination of Oak Offshoots and Fruits With the Cross Pattern



Fig. 13. Stucco in the Sassanid Palace in Kish, Stylized Pattern of Pomegranate Leaves Located on the Cross Axis



(Azami, Sheikholhokamaei, & Sheikholhokamaei, 2014, p. 18)

(Ghaem, 2010)

In the Achaemenid period, in Naqsh-e Rostam, the cross pattern was clearly carved on the Kuh-e Rahmat (Fig. 9). In this period, the pattern of Faravahar is a new manifestation of the cross (Fig. 10) and in other words, Faravahar evokes it. Faravahar's head is on the vertical axis of the cross and its wings are on the horizontal axis of the cross. This pattern is seen in the form of the swastika in the Ctesiphon Palace and has a continuous movement (Fig. 11). In the stucco of the Ctesiphon Palace, this pattern can be seen both in the whole and in the component of the design: in the whole design, it is a cross whose center is distinguished by a special motif and the four main axes of the cross are made of continuous swastikas. In the stuccos of Ctesiphon

Palace and Sassanid Palace of Kish, plant motifs have been formed on the cross-shape background and on the other hand, they form a nine-patch pattern (Figs. 12 & 13). After the arrival of Islam (in Iran), the cross pattern was used in various ways in geometric Giris, Moagheli tiles and Bannai script, Golandaz (layout of bricks) as well as arabesque patterns, so that a number of basic girih modules such as Moj (Modakhel or Roomi), Bazuband Salib, Bazubandi, and Bazubandi Ja'am, are all formed based on this pattern (Fig. 14). The Sormehdan, Sormehdan Lowz, Sormehdan Moraba'a and Sormehdan Qenas modules are also cross-shaped (Fig. 14).

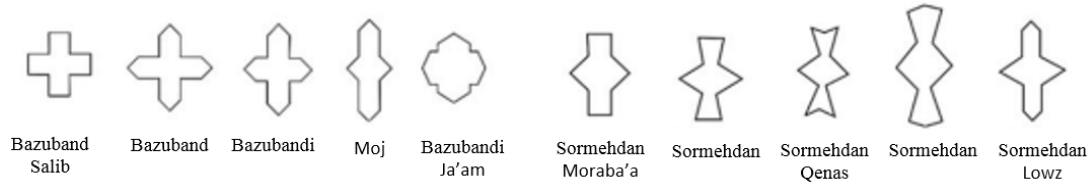


Fig. 14. A Number of Cross-Shaped Girih Modules
(Zomorshidi, 1986, pp. 61-63)

In some girih such as Shamsheh and Bazuband (or Shamsheh and cross) (Figs. 15 & 17), Sormehdan Seli (Sormehdan and cross) (Figs. 16 & 18), Sormehdan Qenas (Fig. 19), 8-Zohreh, 8-Tabldar, Lowz, four-base, as well as acute 4-Shamsheh Sormehdan girih, various types of the cross are seen. Also, as mentioned earlier, the shamshehs created in girih are considered as a type of the cross because the simple cross itself implies the circle and rotation of the sun (Figs. 15, 19 & 21). Also, the Pili motif, which is the same swastika, has

been widely used in tilework, brickwork and stucco. The Pili motif (swastika) in the Bannai script is combined with holy names such as Allah, Muhammad (PBUH) and Ali (AS) and creates a celestial pattern that has been used in many mosques, schools and other religious buildings (Figs. 24 & 22). Pili girih such as 8-pointed Pili girih (Fig. 21), Pili girih in the Khonpa background (Fig. 20) are examples of the swastika in Girih tiles.

Fig. 15. Plain Tile.
7th Century A.H,
Imamzadeh Jafar,
Damghan, Shamsheh
and Bazuband
Girih (Shamsheh
and Cross)

Fig. 16. Ali Gholi
Agha Mosque
(Isfahan),
Sormehdan Seli
Girih

Fig. 17.
Goharshad
Mosque,
Mashhad,
Shamsheh and
Bazuband Girih

Fig. 18. Tile
Ornaments,
Bastam,
(Sormehdan and
Cross)

Fig. 19. Holy
Shrine of Imam
Reza (AS)
(Mashhad),
Sormehdan Qenas
Girih

Fig. 20. Mosaic
tile, Jāme'h
Mosque, Yazd,
8-4-Bazu Pili
Girih

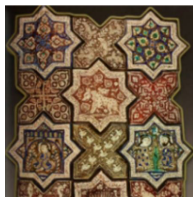


Fig. 21. 8-Pili
Girih in a Square
Table



Fig. 22. Moagheli
Tile, Bibi-
Khanyim Mosque
(Samarkand),
Execution of Holy
Names With the Pili
Motif on the Nine-
Patch Background

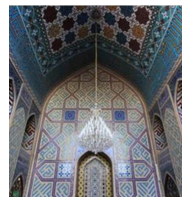


Fig. 23. Tile with
Pili Motif, Bastam



Fig. 24. Moagheli,
Bastam,
Combination of
The Name of Ali
(AS) with the Pili
Motif (Swastika)

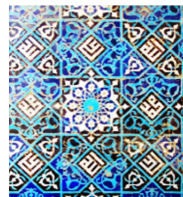


Fig. 25. Brick
Ornaments,
the Minaret
of Tarikhaneh
Mosque, Damghan,
Cross Pattern,
Created with
Changing the Nine-
Patch Pattern

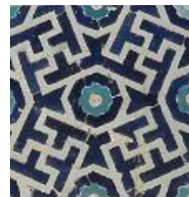
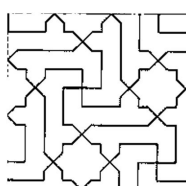
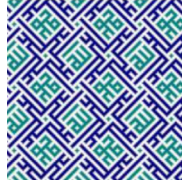


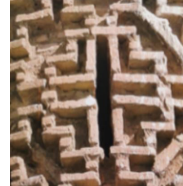
Fig. 26. Brick
Ornaments,
the Minaret
of Tarikhaneh
Mosque,
Damghan, Cross
Pattern and Nine-
Patch Pattern



(Helli, 1986, p.
163)



(www.slideshare.
net)



Another ornaments in which the cross pattern has been used, is brickwork. This motif has been used in many Golandaz and patterns in brickworks. For example, Figures 25 to 29 show some examples of crosses used in the minaret of Tarikhaneh Mosque in Damghan, the minaret of Semnan Grand Mosque and Beyazit Mosque.

Also, various types of the cross are widely seen in Moagheli tiles (Figs. 31 & 30) as well as the Bannai

script (Fig. 32) in the Islamic architecture. In the decorative Kufic script, various types of the cross motif have been used, especially the nine-patch pattern (Figs. 33 & 34).

In plant and geometric motifs used in stuccos and stucco plugs, various types of the cross pattern can also be seen. In stucco with plant motifs, most of the plant motifs are displayed on the axes of a cross (Figs. 37-35). Figures 35 and 36 also represent the nine-patch

pattern and the eight-pointed shamseh flower. In stucco plugs, the simple cross, slanted cross, nine-patch and swastika patterns in different forms are seen (Fig. 37). Using these stucco plugs, religious buildings have been decorated in holy names such as Allah, Muhammad (PBUH) and Ali (AS) h, with the nine-patch and swastika patterns.

In most arabesque tileworks, the cross is at the center of

the pattern. It seems that the arabesque starts from the central point of the cross and moves in four directions, then expands from these four points to the whole scene and returns to the center (Fig. 39) or the arabesques were created in the form of a cross and a slanted cross (Fig. 40). Some arabesques were also created based on the Shamseh motif (Figs. 41 & 42).

Fig. 27. Brick Ornaments, the Minaret of Tarikhaneh Mosque, Damghan, Cross Pattern

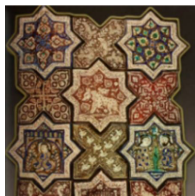


Fig. 28. Brick Ornaments, the Minaret of Damghan Grand Mosque, Cross Pattern and Nine-Patch Pattern



Fig. 29. Part of the Brickwork Ornaments Used in the Minaret of the Semnan Grand Mosque, Cross Pattern and Nine-Patch Pattern

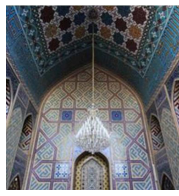


Fig. 30. Moagheli Tile, Sheikh Lotfollah Mosque, Cross Pattern



Fig. 31. Moagheli Tile, Golestan Palace, Tehran, Cross Pattern

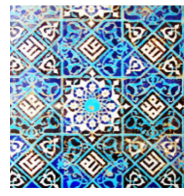


Fig. 32. Moagheli Bannai Script on the Cross-Shaped Background, Bibi-Khanyim Mosque, Samarkand



(www.slideshare.net)

Fig. 33. Decorative Kufic Script, Minaret of Damghan Grand Mosque. Nine-Patch Pattern

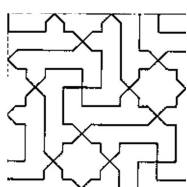


Fig. 34. Decorative Kufic Script, Altar of Bastam Mosque. Cross Pattern

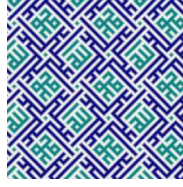


Fig. 35. Bastam. Simple Slanted Cross and Continuous Swastika



Fig. 36. Stucco, Bastam. Simple Cross and Nine-Patch Pattern Using Plant Motifs



Fig. 37. Stucco, Bayazid Bastam Monastery, Plant Motif on the Cross-Shaped Background



Fig. 38. Stucco Plugs, Damghan Grand Mosque, Nine-Patch Pattern



(Kakhki & Taghavi Nejad, 2016, p. 86)

(Behdad & Jalali Jafari, 2013, pp. 72-73)

Fig. 39. Sheikh Lotfollah Mosque, Arabesque and Khataei Motifs with the Cross Pattern in the Center



Fig. 40. Sheikh Lotfollah Mosque, Creating Cross and Nine-Patch Patterns Using Arabesques

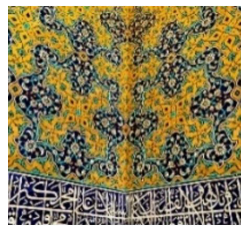
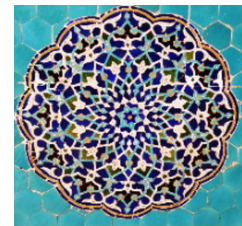


Fig. 41. Jāmeḥ Mosque of Yazd, Arabesque Pattern with Shamseh Motif



Fig. 42. Jāmeḥ Mosque of Yazd, Arabesque Pattern with Shamseh Motif



6.2. The Cross Patterns Used In Iranian Building Plans

Different ancient types of the cross motif are seen in

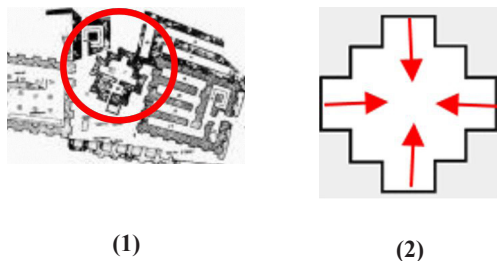
the spatial organization of the plans of many Iranian buildings. This motif was not dedicated to a specific type of building and has been used in different types of buildings such as houses, fire temples, palaces and

kooshks (pavilions), schools, mosques, guesthouses, bazaars and gardens.

In the Medes period, the cross motif is seen in a part of the monument in Noushijan Teppe in Malayer (Fig. 43). Also, this motif has been used in a nine-patch form in the plan of many Achaemenid buildings. From this era, in the archeological site of Dahan-e Gholaman in Sistan, there is a place of worship that has a courtyard and on its axes, there are four verandas (Fig. 45). This building has an introvert nine-patch pattern. In the same archeological site, there are several Achaemenid houses. These houses are people's private houses located next to state, social and religious buildings. This city and its buildings have been prepared with previous planning and plan, and the formal Achaemenid architecture and local architecture can be seen in the city (Seyed Sajjadi, 1996, p. 37). In this site, House No. 6 (Fig. 44) has fortunately experienced the least damage. The house has four large rooms around a central hall, and four rooms in the corners (Ibid). This building is based on a nine-patch pattern that is influenced by a center and there are some spaces along the axes of the cross (Fig. 44(2)). By carefully looking at the plan of this building, it is found that it has a nested nine-patch pattern (Mohammadkhani, 2012, p. 9). In this era, in Persepolis, Pasargadae and Gohar

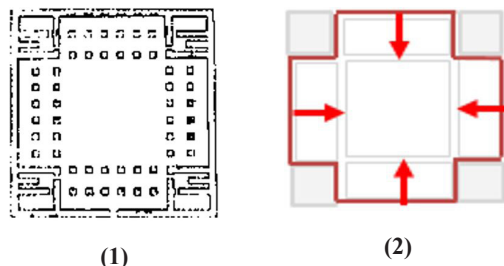
plain, there are different types of nine-patch pattern with emphasis on the center and axes of the cross. For example, in the Apadana Palace in Persepolis (Fig. 49, section B), there is a columnar hall in the center of this nine-patch pattern, and there are extrovert verandas (except for one side, which is replaced by rooms) along the axes of the cross. There are two central courtyards in Persepolis treasury (Fig. 49, Section A). In these two central courtyards, like Dahan-e Gholaman Temple, the central space is uncovered and there are four columnar porches on the four axes of the cross and there are four rooms in the four corners of the central courtyard. In fact, in Persepolis treasury, there is a combination of two types of introvert nine-patch pattern: the combination of the introvert nine-patch pattern (central space of the columnar hall) with the introvert nine-patch-and-four-verandas pattern (open central space: courtyard) (Fig. 49, part A). Also, in Pasargadae, there are extrovert kooshks with an extrovert nine-patch pattern (Fig. 46). Also in Pasargadae, there were gardens with the famous Chaharbagh pattern (Fig. 47). The Chaharbagh pattern has one center, four axes and four gardens. Its four axes and center evoke the cross pattern. This cross and its four adjacent gardens form a nine-patch pattern. In later periods, the Chaharbagh pattern became the model of Iranian gardens.

Fig. 43. Noushijan Teppe, Medes, 2. A Type of Cross Design



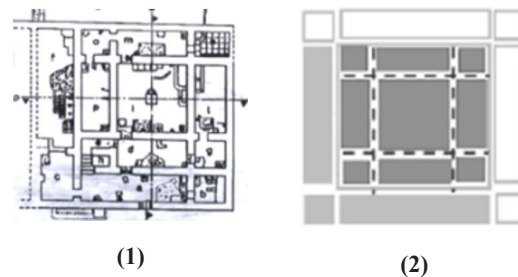
(Zareiee, 2006, p. 71)

Fig. 45. Achaemenid Place of Worship, Dahan-E Gholaman, 2. Introvert Nine-Patch Pattern With Columnar Four-Iwan Space, Central Space of the Courtyard



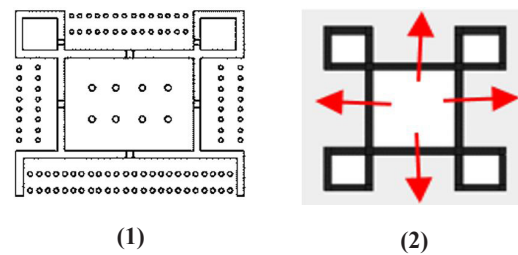
(Scerrato, 1989, p.146)

Fig. 44. 1. Achaemenid House, Dahan-E Gholaman, 2. A Type of Nine-Patch Pattern (Nested Nine-Patch Pattern), Central Space with Flat Roof (Introvert Nine-Patch Pattern)



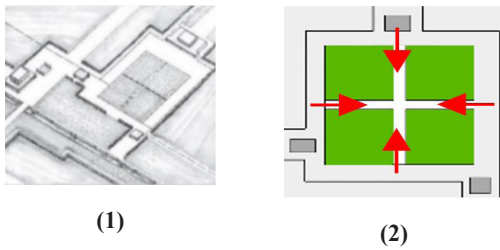
(Scerrato, 1989, p. 147)

Fig. 46. Pasargad, 2. Extrovert Nine-Patch Pattern (Part of the Nine-Patch Pattern) with a Central Columnar Hall



(Mohammadkhani, 2012, p. 13)

Fig. 47. (1). Pasargad, (2). Combination of Chaharbagh Cross Pattern (Centripetal) and Kooshk (with a Type of Extrovert Nine-Patch Pattern)



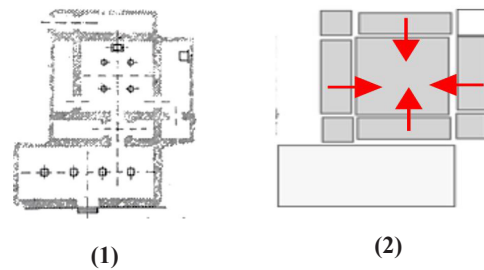
(Pirnia, 2003, p. 68)

In the fire temples built in this era, the nine-patch pattern is seen. One of these fire temples is the fire temple discovered by Hertzfeld in the Persepolis platform (Fig. 48). Its plan includes a central hall with four columns in front of which there is a long portico in front of it and there are introvert rooms with a small central courtyard on the other three sides (Godard, 2009, p. 188). This fire temple also had a nine-patch pattern (Fig. 48(2)). The remains of another Achaemenid fire temple have been discovered in Shush (Fig. 50). The fire temple consists of a central hall with four columns in front of which there is a corridor. There is also a corridor (ambulatory) around the central hall and a porch with two columns at the entrance of this hall and the whole complex ends to a courtyard surrounded by a portico. As can be seen, this building is a combination of two nine-patch patterns (Fig. 50(2)): one of them has a central pattern without a courtyard and the other has a courtyard in the center and is introvert.

The cross pattern had been used in other forms in the plans of the building of later periods. As Iranian architects developed in roofing ((constructing an arch (over)) techniques, in the Parthian and Sassanid periods, other types of this pattern had been created. During the Parthian period, with the invention of Barrel vaults, the Achaemenid verandas were turned into iwans (porch). During this period, the four-Iwan building of the Ashour Palace was built (Fig. 51). This pattern was seen earlier in Achaemenid architecture. Although the four iwans of this palace, two by two, deviate slightly from each other, they evoke the cross pattern. The cross pattern of the four-iwan central courtyard has been applied in later periods in various buildings. For example, the Sassanid al-Ma'arez house (Fig. 52) has a 4-iwan central courtyard. By carefully looking at the space syntax, it is found that there is a kind of nine-patch pattern in other parts of this building (Fig. 52(2)).

In Sassanid fire temples such as Niasar fire temple, new types of the cross pattern are seen. With the prevalence of the use of dome in the Sassanid period, chahartaqs (4-vault buildings) with the cross plans were built (Figs. 53 & 54). The chahartaqs were the same Achaemenid nine-patch pattern, which had undergone changes with the development of roofing techniques. In chahartaq

Fig. 48. (1). Achaemenid Fire Temple, Persepolis, (2). Introvert Nine-Patch Pattern With Central Columnar Hall



(Godard, 2009, p. 188)

buildings, the central space became a Gonbadkhaneh, and in the four corners of the nine-patch pattern, there were four columns on which the dome was placed (in the Achaemenid period, in these four corners, there was usually a room-like space). In these buildings, there were usually four entrances in the directions of the axes perpendicular to the center, which formed a cross pattern (Fig. 53). During the same period, some fire temples with the same cross-shaped plan were built, which were covered by a corridor (ambulatory) and had an introvert space, such as Azargoshasp Fire Temple (Fig. 54). During the Sassanid period, nine-patch fire temples were also built with five domes. In this type of fire temples, a large dome was built in the center of the nine-patch pattern and four small domes were built in its four corners (Fig. 5).

During the Islamic period, the cross pattern was applied in the form of a four-iwan central courtyard in schools (Fig. 56), mosques, and caravanserais (Fig. 57). During the Islamic period, the construction of four-iwan buildings became popular since the Seljuk period. During this period, military schools were built by the order of Nizam-al-Molk. One of the main characteristics of these schools was their four-iwan plan, and from this period onwards, the four-iwan plan became the model of many Iranian schools. Godard believes that four-iwan mosques were also constructed under the influence of four-iwan schools (Ibid, p. 412). In some four-iwan mosques and schools, the iwan facing the qibla leads to a gonbadkhaneh. Such a gonbadkhaneh is the same chahartaqi model that its southern side is covered. This type of gonbadkhaneh usually has a cross or nine-patch pattern. The combination of the cross or nine-patch space syntax with the four-iwan central courtyard seen in the Shush fire temple from the Achaemenid period (Fig. 50) and in the al-Ma'arez House from the Sassanid period (Fig. 52) has evolved in the Islamic period. In garden design, the cross pattern has also appeared in the form of chaharbagh and nine-patch pavilions in the Islamic period. According to the descriptions of Paradise in the Quran and Chaharbagh and its four flowing streams, as well as Iranian people's memory of Chaharbagh, which had a special position among Iranians in pre-Islamic eras, Chaharbagh became a common model for

garden design in the Islamic period. Kooshk is the most important architectural element in Iranian gardens and shows the art of combining gardens and buildings. The kooshks were built in the center of the garden and at the intersection of two longitudinal and transverse axes in such a way that they can be seen from four sides and this doubled the influence of the geometric composition of the Iranian chaharbagh although, in terms of both shape and structural classification, different types of such spaces are seen in the composition of Iranian

gardens. However, buildings with nine-patch divisions are widely used in kooshks built in Iranian gardens (Motedayen, 2016, p. 15). The cross-shaped form of Chaharbagh is centripetal (Fig. 59) and in this center, there is usually a kooshk with a nine-patch pattern that is extrovert (Fig. 58) and as a result, a beautiful interaction is created between the garden and the kooshk and the extroversion of the kooshk becomes a ground for enjoying the garden landscape.

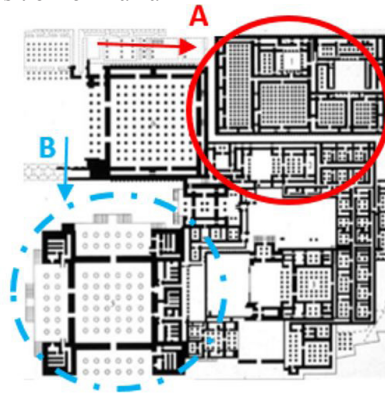
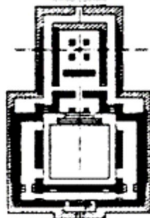


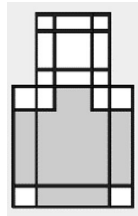
Fig. 49. Persepolis, A: Combination of the Introvert Nine-Patch Pattern (Central Space of the Columnar Hall) and the Nine-Patch Pattern with Four-Iwan Veranda (Introvert Nine-Patch Pattern with Open Central Space), in the Treasury Section of Persepolis and the Palace; Section A: Guesthouse, Section B: Extrovert Nine-Patch Pattern in Apadana Palace
(Pirnia, 2003, p. 74)

Fig. 50. (1). Achaemenid Fire Temple, Shush, (2). Combination of a Type of Introvert Nine-Patch Pattern with a Central Columnar Hall and an Introvert Nine-Patch Pattern with a Central Courtyard



(1)

(Godard, 2009, p. 188)



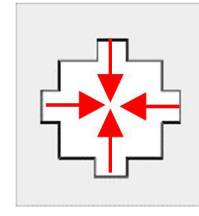
(2)

Fig. 51. (1). Ashour Palace, (2). Four-Iwan Central Courtyard Pattern



(1)

(Pirnia, 2003, p. 103)



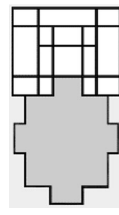
(2)

Fig. 52. (1). The Sassanid House, Ctesiphon, (2). Combination of a Nested Nine-Patch Pattern with a Four-Iwan Central Courtyard



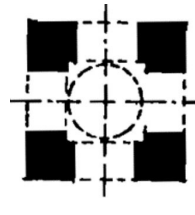
(1)

(Pirnia, 2003, p. 171)



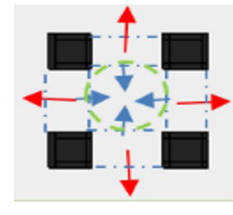
(2)

Fig. 53. (1). Niasar Fire Temple, (2). Extrovert Cross Pattern (Extrovert Chahartaq)



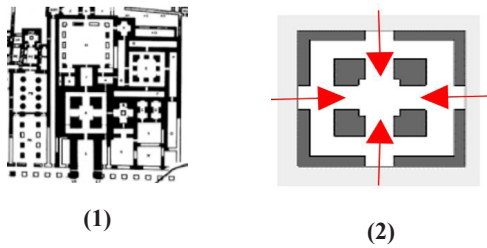
(1)

(Godard, Godard, & Siroux, 1992, p. 13)



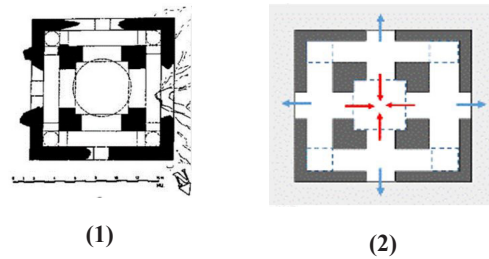
(2)

Fig. 54. (1). Azargoshnasp Fire Temple (Connected Fire Temple), (2). Introvert Cross Pattern (Introvert Chahartaq)



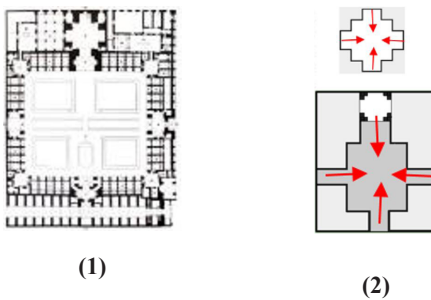
(arthut.com)

Fig. 55. (1). Zahir Shir Temple, Fasa, (2). Nine-Patch Pattern with Five Domes (Extrovert and Introvert)



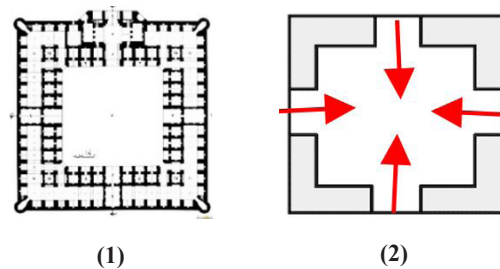
(Joudaki Azizi, Mousavi Haji, & Mehr Afarin, 2015, p. 81)

Fig. 56. (1). Chaharbagh School, (2). Combination of Four-Iwan Central Courtyard Pattern with a Dome (Dome Plan: Cross Pattern)



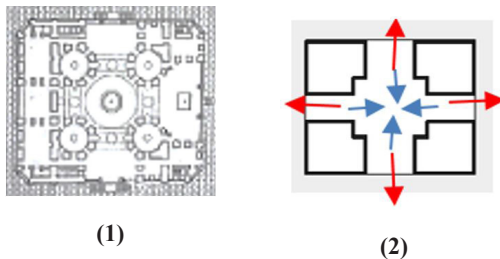
(Pirnia, 2003, p. 332)

Fig. 57. (1). Dehnamak Caravanserai, Garmsar, (2). Four-Iwan Central Courtyard Pattern



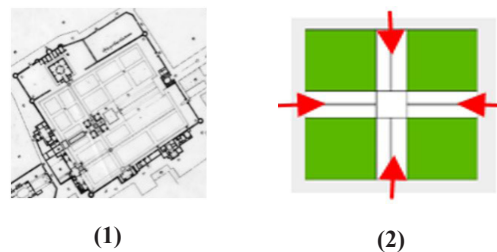
(ArtHut.com)

Fig. 58. (1). Hasht Behesht Kooshk, Isfahan, (2). Extrovert Nine-Patch Pattern, Roof of the Dome-Shaped Central Part



(Pirnia, 2003, p. 310)

Fig. 59. (1). Fin Garden, Kashan, (2). Combination of Chaharbagh –and-Kooshk Pattern with the Nine-Patch Pattern



7. ANCIENT TYPES OF THE CROSS PATTERN

According to what mentioned in section 6, various cross pattern types were used in both Iranian architectural ornaments and the plans of the studied buildings, as presented in the following classification.

7.1. Ancient Types of the Cross Pattern Used in Architectural Ornaments

According to the investigations conducted in this study, the ancient types of the cross pattern used in ornaments related to Iranian architecture in the pre-Islamic and Islamic periods are as follows:

A) Pre-Islamic period

1. Type I: The cross pattern or the swastika was used.

2. Type II: Plant, animal and human motifs, etc. were used on the cross- or swastika-shaped background.

3. Type III: The motifs were based on the swastika pattern (like a continuous swastika).

4. Type IV: There were sun, star, multi-sided flower motifs.

B) Islamic period

1. Various types of the cross pattern used in geometric motif of Girih:

- Some geometric motifs (girih) and girih module are taken from the cross pattern, swastika and nine-patch pattern.

- Some geometric motifs (girih) (masonry and wood carving) generally evoke the cross and nine-patch patterns.

- A number of geometric motifs (girih) are taken from swastika (Pili Girih).

- A number of geometric motifs (girihi) create a sun-shaped cross (called Shamsheh in Islamic architecture).
- 2. Various types of the cross pattern used in Karbandi:
 - In karbandi girihi, there is Shamsheh.
- 3. Various types of the cross pattern used in Moagheli (tiles, bricks):
 - They were formed based on the cross, slanted cross, swastika and nine-patch pattern.
- 4. Various types of the cross used in calligraphy (Bannai, decorative kufic, etc.) of inscriptions:
 - They were formed based on the cross, slanted cross, swastika, nine-patch pattern and Shamsheh.
- 5. Various types of the cross used in stucco and stucco

relief:




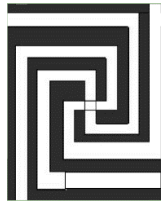

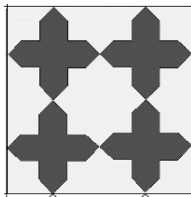
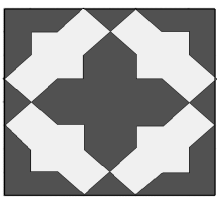
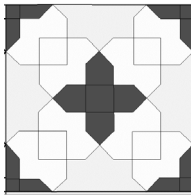
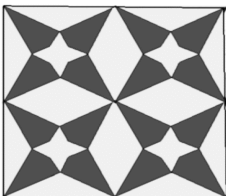
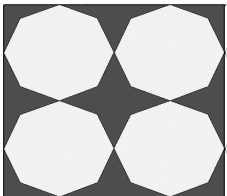



- They were formed based on the cross, slanted cross, swastika, and nine-patch pattern.

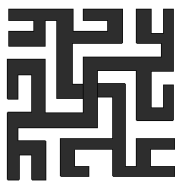




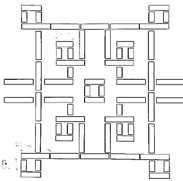
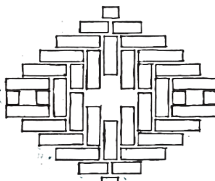
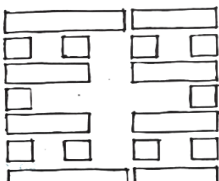
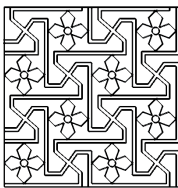
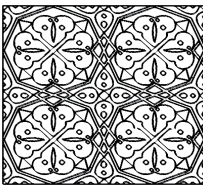
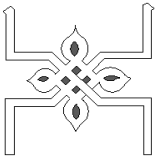



6. Various types of the cross used in arabesque and Khataei patterns:

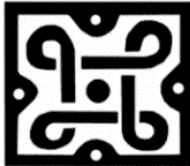


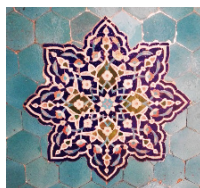

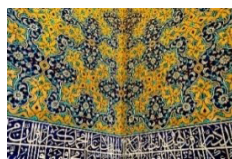
- The cross pattern is predominant in these patterns.
- In some cases, the arabesque was designed in a way that evokes the nine-patch pattern.
- Some of these patterns create Shamsheh.

In general, the five types of cross, slanted cross, swastika, nine-patch pattern and Shamsheh can be seen in the ornaments. All the mentioned types, along with samples, are presented in Table 1.

Table 1. Ancient Types of the Cross Used in Architectural Ornaments

Type	Sample		
Pre-Islamic Period	Various motifs derived from the cross and slanted cross patterns		
	Geometric motifs on the cross-shaped background	Plant motif on the cross-shaped background	Faravahar motif on the cross-shaped background
	Various motifs derived from swastika		
Islamic Period	Swastika on the cross-shaped background		Slanted cross
	Various geometric Girihs derived from the cross and slanted cross patterns, or the patterns evoking the nine-patch pattern and Shamsheh		
	Shamsheh and Cross Girihs	Sormedan Seli Girihi	Sormedan Qenas Girihi
			
	8-Zohreh Girihi	Lowz and 4-lengeh Girihi	8-and 4-lengeh Girihi
Various geometric Girihs derived from swastika (Pili Girihi)			
	Zohreh and 8-Pili Girihi	8-Pili Girihi in square table	8-4-Bazu-Pili Girihi
	(Helli, 1986, p. 181)	(Helli, 1986, p. 163)	(Zomorshidi, 1986, p. 129)

Type	Sample		
Cross pattern in Moagheli tiles and calligraphy with the use of cross, slanted cross, swastika and nine-patch patterns)			
	Bastam, Moagheli with the use of swastika	Part of the decorative Kufic inscription used in the minaret of Damghan Grand Mosque, Cross and nine-patch patterns	Bibi-Khanyim Mosque, Samarkand, Cross pattern
			
	Bibi-Khanyim Mosque, Samarkand, Cross pattern	Bibi-Khanyim Mosque, Samarkand, Cross pattern	
			
	Part of the brickwork ornaments used in the minaret of Damghan Grand Mosque, Nine-patch pattern	Part of the brickwork ornaments used in the minaret of Tarikhaneh Mosque, Cross and slanted cross patterns	Part of the brickwork ornaments used in the minaret of Tarikhaneh Mosque, Cross pattern
Cross pattern in stucco (plant and geometric motifs and holy names on the background with nine-patch, cross, swastika or slanted cross pattern)			
	Bastam, Cross and slanted cross patterns	Bastam, Cross, Nine-patch and Shamsheh patterns	Bastam (part of kufic script used in altar, Cross and nine-patch patterns
			
Cross pattern in stucco plugs (plant and geometric motifs and holy names on the background with nine-patch, cross or slanted cross pattern)	Jameh Mosque of Yazd, Combination of cross and nine-patch patterns (Behdad & Jalali Jafari, 2013, p. 72)	Jameh Mosque of Yazd, Combination of cross, Nine-patch and slanted cross patterns (Behdad & Jalali Jafari, 2013, p. 73)	Jameh Mosque of Yazd, Slanted cross pattern (Behdad & Jalali Jafari, 2013, p. 73)

Type	Sample			
<p>Cross pattern in stucco plugs (plant and geometric motifs and holy names on the background with nine-patch, Cross or slanted cross pattern)</p>				<p>Cross pattern</p>
	<p>Jameh Mosque of Yazd, Nine-patch pattern (Behdad & Jalali Jafari, 2013, p. 73)</p>	<p>Jameh Mosque of Yazd, Nine-patch pattern (Behdad & Jalali Jafari, 2013, p. 7)</p>		
<p>Cross pattern in arabesque motifs (arabesque and Khataei motifs creating a cross pattern or a nine-part pattern and shamseh)</p>				<p>Sheikh Lotfollah Mosque, Isfahan</p>
	<p>Jameh Mosque of Yazd</p>	<p>Sheikh Lotfollah Mosque, Isfahan</p>		

7.2. Ancient Types of the Cross Pattern Used in the Plans of Various Iranian Buildings (in Pre-Islam and Islamic Periods)

According to the analyses of Section 2.6, the ancient types of the cross used in the plans of the studied samples are based on the nine-patch pattern. According

to the spatial organization analysis of these buildings, the form of the central part, four axial spaces and four corner spaces of the nine-patch pattern determine and create the types used in the samples (Fig. 60). Also, the combination of types together creates new types of this pattern. The types obtained from the analyses are presented below.

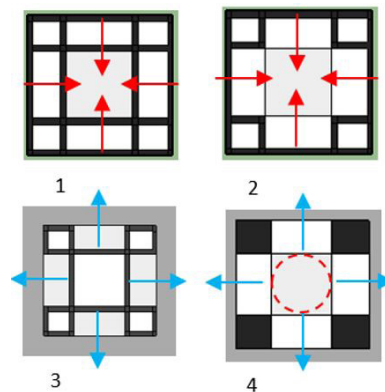


Fig. 60. The Analysis of the Nine-Patch Space in Terms of the Form of Central Space, Four Axial Spaces and Four Corner Spaces: 1. Introvert Nine-Patch Space with Covered Central Space, 2. Introvert Nine-Patch Space with Open or Covered Central Space, 3. Extrovert Nine-Patch Space (Covered Central Space, Iwans (Porches) or Columnar Porches Facing Outwards), 4. Extrovert Chahartaq Building (Central Space Covered with a Dome)

A) Pre-Islamic period

1. Cross pattern
2. Introvert nine-patch pattern, in which the central part is the courtyard and four columnar porches are on the axes of this courtyard and have a cross shape.
3. Introvert nine-patch pattern, in which the central part is covered with a flat roof and there are some elongated rooms on the axes of the cross and four rooms in the corners.
4. Extrovert nine-patch pattern, in which the central

part is a columnar hall with a flat roof and on the axes of this center, there are four columnar porches facing outwards. There are four rooms in four corners.

5. Nested nine-patch pattern
6. Combination of various nine-patch patterns
7. Combination of the nested nine-patch pattern with the four-iwan central courtyard
8. Five-patch pattern, known as four-patch and chahartaq pattern, which is actually part of the nine-patch pattern, in which there are four chahartaq columns

in the four corners of this pattern and a dome is placed on these four columns. This pattern is extroverted.

9. Introvert four-patch pattern, which is the same Chahartaq building (No. 8) which is connected to other spaces through the corridor (ambulatory).

10. Nine-patch pattern with five domes

11. Four-iwan central courtyard (introvert) that has a cross shape.

12. Chaharbagh pattern

B) Islamic period

1. Four-iwan central courtyard (introvert) that was used in schools, mosques and caravanserais and is cross-shaped.

2. Chaharsofeh model (introvert), which has a nine-

patch pattern in which the central space is covered with a dome and in some cases is open, and there are four rooms in the four corners and there are four sofahs (platform) on the axes of the cross.

3. Kooshk model, which is a nine-patch pattern and extrovert.

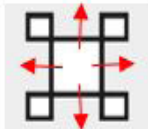
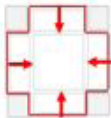

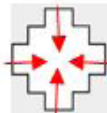

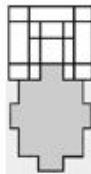
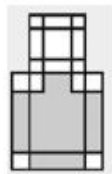

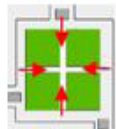

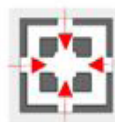
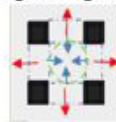
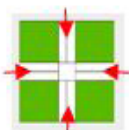
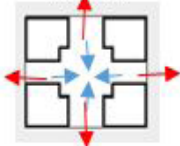
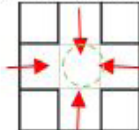
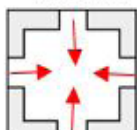
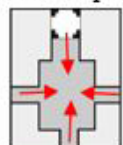
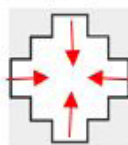
4. Chaharbagh pattern

5. The cross pattern of some domes

6. Combined dome and four-iwan pattern

In general, two types of cross pattern and nine-patch pattern were seen in the studied plans. The types of the cross used in the plans of Iranian buildings, along with samples, are given in Table 2.

Table 2. Ancient Types of the Cross Used in the Plans of Iranian Buildings

Pre-Islamic Period			
Extrovert nine-patch pattern, central part with flat roof (columnar hall)	Introvert nine-patch pattern, central part: courtyard	Introvert nine-patch pattern, central part: columnar hall	Cross pattern with introvert flat roof
			
Nine-patch pattern with 5 domes	Combination of the nested nine-patch pattern with 4-iwan pattern	Nine-patch pattern combinations	nested nine-patch pattern
			
Chaharbagh pattern	4-iwan cross pattern	Introvert 4-patch pattern	Extrovert 5-patch pattern (known as 4-patch pattern)
			
Islamic Period			
Chaharbagh pattern	Kooshk nine-patch pattern	Chaharsofeh nine-patch pattern	4-iwan cross pattern
			
		Combined dome and 4-iwan pattern	The cross patterns of some domes
			

Ancient Types of the Cross Pattern Used in the Plans of Various Iranian Buildings

8. CONCLUSION

The cross pattern has had deep meanings throughout the history of Iranian architecture. This motif is the symbol of the sun, the four sacred elements, the four qualities of nature, the season cycle, the life cycle of the universe, infinite time, the cycle of the universe, infinite time, beginningless and endless, the continuity of life and movement, the movement of water, the four corners of the universe, victory and immortality, fertility and reproduction, love and affection, multiplicity and unity, returning to the Creator, peace and adaptation, long life, prosperity, evolution and transcendence, goodness and being benefactor, eternal life and so on. Due to its semantic importance, it has been integrated into the Iranian architecture as an extraterrestrial principle and pattern and there are different types of this motif in the building plans and architectural ornaments. In the plans of the studied pre-Islamic and Islamic buildings, including houses, fire temples, pavilions, gardens, palaces, mosques, schools, etc., among various types of the cross pattern, two types of the simple cross pattern (which is part of the nine-part pattern) and nine-patch pattern, are dominant. In the present study, it was found that the form of the central space, four axial spaces and four corner spaces of the nine-patch pattern determine the types of patterns used in the studied buildings. This study indicates that there are twelve types of the cross pattern were applied in the plans of pre-Islamic buildings and six types in the plans of Islamic building. "Cross, introvert nine-patch (the central part of the courtyard), introvert nine-patch (a central part with a flat roof), extrovert nine-patch (the central columnar

hall with flat roof), nested nine-patch patterns, nine-patch pattern combinations, four-iwan central courtyard pattern, combined nine-patch-and-four-iwan-central courtyard pattern, extrovert five-patch pattern (known as four-patch-and-chahartaq pattern), introvert four-patch pattern, nine-patch pattern with five domes and chaharbagh" are of the types identified in the spatial organizations of pre-Islamic buildings and "four-iwan central courtyard, Chaharsofeh (introvert nine-patch pattern with central space covered with a dome and in some cases with no dome), kooshk pattern (extrovert nine-patch pattern), Chaharbagh pattern, cross-shaped dome and combination of the central courtyard and cross-shaped dome" are of the types identified in the plans of Islamic buildings. In pre-Islamic architectural ornaments, the simple cross, slanted cross, swastika, continuous swastika, nine-patch pattern and shamseh (multi-pointed star, sun or multi-pointed flower) and combinations of them have been used, and sometimes plant, animal and human motifs have been drawn on the backgrounds in the forms of the cross and slanted cross and nine-part pattern. In the Islamic architectural ornaments, simple cross, slanted cross, swastika, nine-patch pattern and Shamseh were used in Girih Tiling and Girih modules, calligraphy, moagheli in tilework, brickwork, and stucco. Moreover, Shamseh was used in the design of Karbandi. Considering the originality and semantic richness of the cross pattern in Iranian Islamic architecture and its form, functional and structural diversity, different types of this pattern can be used in new designs to take effective steps to revive, regenerate and continue the use of original Iranian Islamic patterns.

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HOW TO CITE THIS ARTICLE

Mohseni, M., & Bastanfard, M. (2020). A Study of Ancient Types of Cross Pattern in Iranian Architecture. *Armanshahr Architecture & Urban Development Journal*. 13(31), 115-133.

DOI: 10.22034/AAUD.2020.113263

URL: http://www.armanshahrjournal.com/article_113263.html

