TRADITIONAL COMPONENTS OF IRANIAN VERNACULAR ARCHITECTURE IN CONTEMPORARY PROJECTS

SEYED ALIREZA BEHNEJAD, ARMIN MOTTAGHI RAD AND HOSSEIN JAMILI

Name: Seyed Alireza Behnejad, Architect, Civil Engineer (b. Tehran, Tehran, Iran, 1972).
Address: Civil Engineering, University of Surrey, Guildford, Surrey, GU2 7XH, United Kingdom.
E-mail: sb00344@surrey.ac.uk or a.behnejad@gmail.com; Home-page: www.archi-vision.com
Fields of interest: Architectural technology, Structural systems, Spatial structures, Geometry, Regularity.
Publications:

Address: 9, 4th Hejrat Street, Mashhad, Khorasan, Iran.
E-mail: mottaghi@archi-vision.com
Fields of interest: Geometry, Texture in architecture, Architectural technology, Structural systems, Spatial structures, Teaching of architecture and structural systems.
Awards: 3rd place at design competition of the First Engineering Festival, Tehran, 1996; First place in design competition of the Gate of Mazandaran Oil Refinery, 2010; 5th place at design competition of residential complex at Mashhad town, 1996.

Name: Hossein Jamili, Architect (b. Mashhad, Khorasan, Iran, 1972).
Address: 13 Niloo Street, Vanak Square, Tehran, Iran.
E-mail: jamili@archi-vision.com
Fields of interest: Architectural technology, Spatial structures, Geometry, Regularity, Computational Design.
Awards: 1st place at design competition of the First Engineering Festival, Tehran, 1996.
Publications:

Abstract: Iran has a rich history in architecture from at least 5000 BCE. The paper tries to investigate the dominant components of Iranian vernacular architecture in different
aspects. This gives a flavour of such architecture by presenting the examples from various periods (Achaemenid, Sasanian and Islamic period) and cities (mostly in central Iran). Specifically, the dominant components related to building materials, structural forms, mechanical elements and architectural ornaments will be introduced. Then, a few contemporary buildings, which applied some of these components, will be informed. Due to the research limitations, the components of nomadic architecture will not be covered in the paper.

1 TRADITIONAL COMPONENTS

Archaeological studies show a rich history of Iran in architecture from at least 5000 BCE to the present. Pope (1971) argues that Iranian architecture has peaked during both the Achaemenid dynasty (549-325 BC) and the Sasanian dynasty (224-624 AD) based on the ruins of their structures. The Persepolis for instance, was a massive ceremonial palace complex near the city Shiraz, mainly built by stone and wood in the Achaemenid era. Arg-e Bam (Bam citadel), the largest mud brick building in the world located in Bam, central Iran, is another example built at the same period, listed by UNESCO as a part of the World Heritage Site, Fig. 1. This citadel including private and public buildings was built before 500 BC and has been occupied for more than 23 centuries till about 1850 AD. Using mud brick as the main building material in conjunction with quick dry gypsum mortar was popular during Sasanian era. Figure 2 shows the Ayván-e Kšrā (the Palace of Kšrow), the most famous Sasanian monuments built by such a material in the ancient city of Ctesiphon, Iraq, in the mid-3rd century (Keall, 1987). According to Graber (1987), ‘the ayvān is a single large vaulted hall walled on three sides and opening directly to the outside on the fourth’. Ayvân-e Kšrā by 37 m high, 26 m span and 50 m long was the largest barrel vault ever constructed in the country. Structural form of brick masonry buildings is significantly important due to the high compressive strength of the materials (i.e. brick and mortar) and their weakness in tension.

Brick arches, barrel vaults and domes were widely constructed in the country for different purposes in the Islamic period as well as before. Jameh Mosque in Isfahan for
example, is one of the oldest mosques still standing, probably based on a fire-temple, Fig. 3. The mosque has four ayvāns and a main dome, all constructed in bricks and mortar. The mosque is the result of continual construction, reconstruction, additions and renovations on the site from around 771 to the end of the 20th century. Although the average lifetime of a residential building is usually much less than a public building, there are still a number of noteworthy old houses around the country. House of Ameri Family, a masonry building constructed in the mid-19th century in Kashan is one of them, Fig. 4. The house has seven yards, two ayvāns and two separate bathrooms for men and women, constructed in an area of more than 9000 square meter, having the tallest wind-catcher in the city, which will be mentioned later. All examples from different cities represent the role of mud and backed brick as the main building material and various curve shapes as the dominant structural form in Iranian vernacular architecture.

The climate differs along the country from arid or semiarid to subtropical, while in most of the areas, summers are warm to hot with almost continuous sunshine. Therefore increasing the thermal capacity of the skin of the building and creating airflow during the day was a basic necessity, in order to attain a ‘comfort zone’. Using massive brick masonry skins (i.e. walls and roof) and innovation of the Bādgīr (wind-catcher) was intelligent response to these necessities. According to Roaf (1988), ‘bādgīr, literally “wind-catcher”, is a traditional structure used for passive air-conditioning of buildings’, Fig. 5. The figure shows the bādgīr of Bāḡ-e Dawlatābād (Dawlatābād garden) and a
sketch of its functionality, the tallest bādgīr in the world by 33.35 m high above the roof in Yazd. Broujerdis House in Kashan, having a set of bādgīrs in different directions on top of the dome, is another example, Fig. 6. Additionally, the tallest bādgīr in Kashan is in the House of Ameri Family, Fig. 4. However, now construction of bādgīrs has it seems to have completely halted, due to more effective electrical systems. But its structural form is still well-known and is an iconic element in Iranian contemporary projects.

The role of the geometric patterns in Iranian architecture improved drastically in Islamic period due to the prohibition of representing the living beings for decoration. Tile mosaic for instance, as a geometrical ornament was widely used for decoration of mosques and theology schools, Fig. 7. The figure shows the ceiling of the dome of Sheikh Lotf Allah Mosque in Isfahan. Moreover, brickwork, mirror work and stucco are some other media using geometric patterns. In particular, most ayvāns and domes were decorated with moqarnas in this period, Fig. 8. According to Dold-Samplonius (2004) ‘A moqarnas is a three-dimensional architectural decoration composed of niche-like elements arranged in tiers’ The moqarnas in the Gowhar-šād Mosque in Mashhad, built in early 15th century (Golombek, 2002), is shown in Fig. 8.

The geometric patterns have still high importance in Iranian vernacular architecture and is using in different aspects from landscaping to structural forms and architectural ornaments. Examples of such architectural contemporary projects will be presented in part 2 of this paper.

2 CONTEMPORARY ARCHITECTURE

Many Iranian architects and engineers have tried to design and build the structures using traditional components, but due to the limitation of this research, a few ideas and projects will be introduced in sequence. In terms of using earth as the main building material, Nader Khalili started to research on vernacular architecture in 1960’s in Iran, and thereafter he founded the California Institute of Earth Art and Architecture, ‘Cal-Earth’, in 1986 in the USA. His basic idea was to fill long plastic tubes with earth and then build dome shape buildings from these earthbags judiciously braced with metal
wires, Fig 9. The figure shows a set of buildings built in the manner of using earthbags. Kamran Diba is another architect, interested in using vernacular traditional components in his projects. Shushtar New Town was designed by Diba and constructed in 1977, near the city Shushtar, one of the oldest fortress cities back to Sasanian era. The design concept of the project was based on taking the forms relatively to the climatic constraints, using available local technology and respecting to the country’s customs and culture. Diba won The Aga Khan Award for Architecture in 1986 (akdn.org) for this project. Additionally, he designed the Tehran Museum of Contemporary Art in 1969, with interconnected galleries, which gradually progress downwards. The skylights of the galleries, the only part of the structure above the ground level, designed based on the structural form of bādgīrs, Fig. 10.

The National Museum of Iran was designed by André Godard, the French architect in 1930’s, drawing inspiration from the Ayvān-e Kesrā (Ctesiphon), Fig. 11. Moreover, Red bricks were chosen for the three story building, to recall Sasanian architecture (Sadr, Tavoos). Figure 12 shows Tehran City Theatre, having Y shape columns and Iranian geometric patterns on its wall, designed in 1967. The capitals and tile mosaics created a modern moqarnas in this building.

Geometrical pattern was used in the landscape design as well as design of the buildings. Azadi Tower for instance, designed by Hossein Amanat in 1966 as a modern monumental gate of Tehran, has a marvelous geometric landscape, Fig. 13. Amanat won a competition to design the monument, which combines elements of Sassanian and Islamic architecture. The landscape of the tower in an area of some 50,000 m², has a honeycomb pattern. Additionally, the fully symmetric tower lies on the museum and
other buried galleries. Milad Tower, the sixth tallest telecommunication tower in the world (435 m), is the new Iranian monument in the capital city Tehran, Fig. 14. The lamella pattern on top of the tower emphasizes on the role of geometric patterns in contemporary Iranian architecture and the transparent dome is a reminiscent structural form.

![Figure 13: Azadi Tower, monumental gate of Tehran, designed by Hossein Amanat in 1966.](image1)

![Figure 14: Milad Tower, the sixth tallest telecommunication tower in the world.](image2)

### 3 CONCLUSION

The brick as a main building material and curve shape structures (e.g. barrel vaults and domes) as the structural form are the characteristics of Iranian vernacular architecture. Moreover, geometrical ornaments were widely used for decoration of the buildings especially after Islam. It is remarkable that Iranian architects still take these components into consideration and utilize them in contemporary projects.

### References


