



**Review article**

## **Light and color aesthetic in sash windows (case study: Behnam building)**

**P.A. Sadabad\*, M. Amirdastmalchi, N.H.O. Nourani**

Masterof Architectural Engineering, Department of Architecture, Islamic Azad University, Eris, Iran

\*Corresponding author; Masterof Architectural Engineering, Department of Architecture, Islamic Azad University, Eris, Iran

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### ABSTRACT

Sash windows can be described as the talent of Safavid and Ghajarid architects. They are mix of wooden Girih tiles with colorful pieces of glass. When lights are intermixed they make the colors of internal space seem excellent and larger than their actual size. This article introduces sash windows, their applications and their status as well as their forming elements based on colors psychological impressions, light aesthetic and the talent of Iranian architects in making good use of mixings in sash windows. At the end, we find that color is a very important element in Islamic architecture to convey spiritual messages. This article introduces sash windows, their history and functions. It uses sources, references and pictorial records. It is intended to depict the light aesthetic in sash windows.

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### **1. Introduction**

Every culture and community has its own peculiar architecture which defines architectural identity of that culture and community. The elements that form the architectural features indeed form a large part of the construction's elements ranging from spatial organization and erection of the overall construction to manner of using architectural elements and details and designs and manner of using materials. Due to the important role that window plays regarding architectural principles, it can convey the highest mystical themes (Parsa 2010:77).

Light is an aspect of God and an excellent beauty. Architecture is an artistic branch in which light plays a central role. Light is either natural or artificial. It is an important element beside spatial structure, materials, color

and spatial hierarchy. Natural light has always been noted in Iran along the history (Zeinalzadeh and Jodaee, 2011:2).

An element that can best show the artistic aspects of the light is sash window. Sash window is made of one or more movable panels or "sashes" that form a frame to hold panes of glass, which are often separated from other panes (or "lights") by narrow muntins (Omarae 2004:40).

Behnam Building is a typical of these buildings which is located in Tabriz. It was constructed after devastating earthquake in 1193 and is considered as one of the oldest buildings of Ghajar era. It was recovered during Nasereddin Shah reign and probably some decorations were added to it. Girih tiles are a main feature of this historical monument which has intermixed light dance with wood carving and geometrical decorations. All elements of this monument have been covered by bricks excluding the main part (southern) which has also stucco in the edge of the roof and on the alcove which have been covered by plaster and also the pillars have been covered by plaster (Zeinalzadeh and Jodaee 2011:4,5).

this article deals with the aesthetic aspects of sash windows.

## **2. Sash window**

In the old times when there were no irons and cement people built their homes using wood bars, straw, and cob their windows had three or five or seven doors. They were tremendously beautiful which had been built using juglan tree woods. Windows arches and their decorations were wood carving with a handful of detailed decorations. They included tiny pieces of glass in such decorations which were seemed as if they were bushes or they found strange shapes geometrically. Traditional sash windows had one, two, three, four, five and seven even in some cases, nine doors. Each one of these cases differed from each other depending on the type of monument (Omarae 2004:36,40,41).

## **3. Style of sash windows**

The style of sash windows can be summarized as follows:

1. Occupying minimum amount of place when opening and closing
2. Establishing visual communication in different forms and having harmony with the green space of the yard (or other similar spaces)
3. Letting sufficient amount of light into the building
4. Having a good wall between two or more rooms (Omarae, 2004, 91,92)

## **4. Forming elements**

### **4.1. Frame**

It forms the skeleton of the windows including rows of woods in longitudinal and transverse and even arch direction. its form depends of the skylight of the building.

### **4.2. perpendicular pillars**

Perpendicular pillars of the frame and those which have longitudinal direction split the whole space in equal parts for the windows doors.

### **4.3. Ramca**

It is the lower part of the sash window with horizontal direction and varying heights ranging from 10 to 50 cm depending on the location of the window. In some occasion, this height can play the role of a shelter.

### **4.4. Patagh**

It is the most important and the most complicated part for decorations. It is located in the upper part of the window in which the doors are located. As was mentioned, perpendicular pillars extend up to the patagh to allow easy movement of the doors (Omarae, 2004, 111,112,114,116).



Fig. 1. Forming Elements Sash Behnam House.

## 5. Function of meshed surface of sash window

It works to provide light into the internal part and to provide good vision of the outside part, to decrease

sunlight intensity and heat, to improve aesthetic aspects of the building, to keep the privacy as well as keeping insects outside of the building (the colorful glass pieces that are used in sash windows reflect different lights and serve as means to keep the insects outside).

## 6. Reasons of using sash windows

### 6.1. Light

Sash window lets sufficient amount of sunlight into the building, not too much not too less.

### 6.2. colors psychology

Different colors and glasses used in these windows exert psychological impacts on humans. Each color lowers the intensity of the next one and creates a balance of intensity. These colors are mainly blue, red, green and yellow. Each of them has its own peculiar impressions.

### 6.3. Aesthetic

Sash windows surfaces were decorated with different motives and colors to create harmony between the mesh and colors in order to give a pleasant image.

### 6.4. geometrical decorations in sash windows

Avoidance of using human/animal shapes in visual arts caused a negligence to nature in Islamic arts, driving them to abstract geometrical shapes.

### 6.5. privacy

Sash window provides a privacy to the internal part of the building.

### 6.6. acoustic properties

When the angles are different from each other, these varying angles can create sound effects which are the subject of acoustic science. Six-dimensional forms have special acoustic properties which can also be observed in nature such as beehive which roughly conducts resonance function.

## **7. Sash windows performance**

### **7.1. simple sash windows**

Due to low – weight doors, they can be easily opened and closed and dislocated by one person.

### **7.2. heavy sash windows**

In these types of windows, in addition to the sliding part which also exists in the simple ones, the inside part of frame is empty with weights hang over the ropes made of stomach of cows and sheep which help moving the doors upward or downward (Omarae, 2004, 44).

### **7.3. Sash window applications and status**

Sash window is a valuable art in different societies with full of details and decorations. It was mostly used by landlords and the feudal and rulers. Sometimes a ruler ordered this window to be built in a mosque. Those who used this window for their houses could use different types of it, depending on their social status. Sash windows were opened to the sitting room or they were used in long halls of the palaces or big buildings. In architectural masterpieces, sash windows were used in sitting rooms. This art belongs mainly to Safavid and Ghajar eras (Omarae, 2004, 41,42,44).

## **8. Utilization of glass colors in sash windows**

After sampling it was observed that the color composition in large-scale ones (with a roof height than 5m) is different. Yellow glasses were mostly used and blue ones hardly used in these windows. In small sash windows all colors were used equally with no special difference, because they needed to attract light. It is surprising to mention that it had been anticipated red colors were seldom used in traditional sash windows because they were so expensive, but the results indicate that they were highly used both in large and small sash windows.

## **9. Light aesthetic**

In meaning-based architecture, light can symbolize God's presence. Light has the following uses in architecture:

### **9.1. Reflection**

Elements that can reflect the light to other surfaces and ensure the light is extended in space

### **9.2. light refraction:**

It is another function of the light in architecture. muqarnas has the main function of refraction in Muslims architecture. It also creates a visible change in the surface.

### **9.3. light and shade contrast:**

Fierce contrast in different surfaces as well as in dark and lighted spaces is very effective in architecture. In Islamic mysticism, the light has been described as a colorless thing as an unprecedented thing in the planet. It can be decomposed to different sub-lights all with their own meanings (Abbasi and Noshadi, 2012:3).

## **10. Color aesthetics**

Color is the result of light reproduction and reflects a part of God's holy existence. Islamic arts experts think that white symbolizes absolute existence and black is the color of the covering of God's house (Kaba) which symbolizes Excellency of the existence. Blue, golden and green are widely used in Iranian and Islamic arts to convey different themes. Koran has also made mentions of the colors: there is a verse in Koran that tells us that yellow and golden colors can bring delight. Other citations also contain such descriptions. White was greatly loved by Prophet Muhammad and green symbolizes his dynasty (sons of Imam Ali and Fatemeh). So in Islamic architecture, colors are taken as important means to convey meanings. One of noble be discuss in Islamic art is

turquoise also is azure blue nucleus allegory and attention and observation, in dictates immensity calm blue and is thinking controversial clear sunrise and heartfelt (Javanshir, 2013, 2).

Color is also a result of refraction. When it is not refracted it can symbolize God's existence. It has been important in Iranian architecture. Color and its harmony which is in direct link with its role can be observed in Iranian entire art (Abbasi and Noshadi, 2012: 4).

## **11. Conclusion**

Due to having different colors and geometrical forms, sash windows have always great status in view aesthetics and Islamic arts. They also mirrored the social status of persons who used them in their houses. Feudal and landlords could use sash windows in their buildings. These windows made the buildings seem glorious and excellent. They not only could make the space so beauty, but they could mirror reflect light in small places. In Islamic arts, sash windows have been used in different forms and sizes to convey different messages. They rendered a heavenly atmosphere when light reached them.

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