

Aesthetics of architectural openings in Islamic architecture

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Abstract:

For architectural openings in Islamic architecture have aesthetic values and more advantage than the rest of other architecture forms. As the Muslim designer created its composition and dazzled the whole world, this dazzling attribute is associated with Islamic arts. Where the Islamic heritage in architecture is a manifestation of the creativity of the nation during its long history and an honest record of the culture of the Islamic community. It is a product of the inherited formations of the aesthetic architectural openings that have continued and have proven their authenticity and value in the face of constant change and forced the world to respect them and have continued so far as being appropriate for human.

The openings are represented in the doors, windows, entrances, corridors and contract., It is through the visual perception of the facade or the murals of buildings as a whole. It is one of the most important vocabulary of the architecture that connects the inside with the outside, Mashrabiyya is the Arabic windows as being one of the Islamic architectural elements, that have aesthetic values which gave it a unique and distinctive shape.

The research deals with the study of architectural openings in Islamic architecture and its impact on the architectural shape of the façade, and put some examples that illustrate the plastic treatments of Islamic openings in Egypt.

So I decided to choose architectural openings as it is one of the most important elements that influence the architectural composition of the façade, with its contents of variables, such as the shape of the aperture, its width, flatness, depth, proportions, and the used treatments.

Research problem:

- Moving away from the Egyptian identity and being influenced by Western thought that is not commensurate with the climatic environment in Egypt.
- Moving away from the use of heritage architectural elements that achieve thermal comfort naturally.

Research Aims:

The research aims to:

Study of architectural openings in Islamic architecture as the most important architectural elements that influence the architectural composition of the facade.

Research Importance:

The importance of the research lies in the following:

- The importance of shaping architectural openings and their direct impact on the facades.
- Expressing the Egyptian identity with plastic treatments for architectural openings.
- The need to supply buildings with natural lighting, fresh air and solar energy.

Research Methodology:

- Descriptive analytical method: Through the presentation and analysis of some architectural openings in Islamic architecture in Egypt.

Islamic architectural art was based in its early years on architectural and decorative elements that were consistent with its spirituality, its achievements came out almost similar to each other in the rest of the Islamic countries with a slight variation that each environment could bear and specialized in it, and dictated by the talents of its inherited people, in terms of architecture, decoration, experience and traditions.

Islamic buildings appear contiguous among them, with no spaces between them in order to bring harmony among people, so Islamic architecture focused more on the inside than on the outside, on the privacy of homeowners.

Architectural elements used in the treatment of architectural openings:

1) Mashrabiya:

The "mashrabiya" was a good solution to overcome the problems of ventilation and the view on the outside, reduce the intensity of light and block the sun's rays with full decorative panel. It is noticeable that the area covered by the mashrabiya usually exceeds the area of the regular window, to compensate for the diminution of lighting and ventilation together, and the spaces between the brightness of the mashrabiya allow, like the transparency of the stained glass panels and the opening of the windows to light, to infiltrate through it and the desolation of the interior with the familiarity and glow of the outside.

Mashrabiya functions:

The Egyptian architect, Hassan Fathy, identified five functions of the mashrabiya:

1) Temperature control (summer and winter):

The biggest cause of high temperatures in interior architectural spaces is direct heat gain from sunlight, and therefore it is advised to avoid rays falling on windows with a large and direct angle of incidence, and to be satisfied with reflective glare with less intensity that does not cause thermal gain in the interior. Since the mashrabiya allowed large openings in the walls, it became possible for a constant stream of air to pass through its small openings into the rooms, which helps the users of the place to lose heat from their bodies through sweating. The locals used to place pottery drinking vessels in the Mashrabiya, which allowed the air entering the building to lose its heat by evaporating parts of the drinking water in the vessels, thus entering the "relatively" cold air into the rooms, and the design of the bars and the openings of the mashrabiya allows sunlight. In winter, by entering the internal architectural void, where these openings are designed, angles of the fall of the sun in winter (as they are closer to the ground) were taken into account, and thus this increases the interior temperature and the residents feel warm, the turning point of the mashrabiya that it has become a tool to temper the hot weather

and a tool to keep temperatures warm in winter; Therefore, the designer must fully understand the functionality of the mashrabiya and its response to sunlight in both seasons.

2) Adjust the passage of light:

The designer should choose the spacing and the size of the rods suitable for the mashrabiya that covers an opening in the front so that it intercepts direct solar radiation. On the southern façades, a clamp with small separation distances is used. The gradient in the intensity of the light (the gradient resulting from falling on the bars of a circular section) reduces the intensity of the contrast between the darkness of the bars (impermeable to light) and the intensity of glare between them; Therefore, the eye of the beholder is not dazzled by this contrast between blackness and whiteness, unlike what happens when using sun refractors, and it is preferable that the mashrabiya rods located at the human level are close to each other, to increase the refractions in the light passing through them, thus reducing the dazzling resulting from the rays of the sun and the components of the mashrabiya, and to compensate for the lack of lighting at the lower level, it is preferable to increase the distance between the bars as we head up .

3) Adjust the air flow :

The mashrabiya with large clear openings provides larger spaces in the clamp, which helps the flow of air into the room, but when lighting considerations require narrow openings to reduce dazzling, the air flow is significantly reduced, compensating for this negative airflow deficiency through larger openings between the mashrabiya rods in the upper part of it, and from here appeared the main parts of the mashrabiya, which are: - A lower part consisting of a narrow clamp with fine rods - an upper part consisting of a wide clamp with wide cylindrical wooden bars (the tank style). If the airflow calculations remain insufficient, the negative deficiency can be compensated by opening the entire façade and then covering it with a very wide mashrabiya.

4) Increase the humidity of the air stream :

It is done through two methods: placing pottery jars with high porosity in the mashrabiya, the passage of air current over these jars leads to the evaporation of quantities of water on its surface due to its high porosity, thus the air current cools down, this process is called evaporative cooling, and this process does not affect the thermal content of the air, because evaporative cooling reduces the latent heat of the air and thus increases the humidity of the air. All organic fibers, such as the wood are used in mashrabiya, absorb and filter reasonable amounts of water quite easily. As long as it is not covered or painted, the air passing through the executed wooden mashrabiya will lose some of its moisture by the absorption of the wooden bars for it, if it is moderately cold, as it is of high quantity at night, and when the mashrabiya is heated by direct sunlight it loses this moisture to the air and it will flow through it. This technique can be used to increase the humidity of dry air during the heat of the day, and to cool and humidify the air at the times when it is most needed. The mashrabiya rods have optimum and relative sizes between them, depending on the area of surfaces exposed to the air, and the rate at which air passes through them. Therefore, increasing the surface area by increasing the size of the rods leads to increased cooling and hydration effects. In addition, a large rod simultaneously has a larger surface area that increases its ability to absorb water vapor in addition to the cooling caused by the evaporation of water on its surface. Its water absorption capacity is also greater, which enables it to continue the process of releasing water vapor by evaporation for a longer period of time.

At night, the mashrabiya absorbs moisture carried by the wind and passes through the separators when heated by the sun's rays, it releases moisture into the air that passes through, thus increasing the humidity inside the house and reducing its temperature.

5) Providing privacy for residents :

In addition to its physical effects, the mashrabiya provides privacy to residents while at the same time allowing them to look outside through it. This supports the use of the two-part mashrabiya, as the lower part guarantees privacy, while the air flows through the upper part of it, and this gives the mashrabiya a wonderful psychological dimension where the inhabitant feels that he is not separated from the external spaces, without losing the factor of solitude, which gives the inhabitant a sense of reassurance.

2) Entrances :

The entrance in general has a symbolic meaning, as it is the boundary between the inside and the outside, and in the religious building it is the outlet that transfers us from what is unholy to what is sacred. The entrance in general is a summation of the architecture of the facade of the mosque, as it is its focal point, with its lofty height that is worthy of the House of God. There is usually only one entrance to the mosque, a symbol of the oneness of God. This same concept, as well as this same symbol, is prevalent in non-Islamic religious buildings in general, whether they are a cathedral, a Pharaonic temple, or a Hindu temple, except in some individual cases. Even in the mosques where different doctrines were taught, no one would think that they have only one door, as all these doctrines are derived from one origin and they all involve the worship of one god. In order for the entrance to symbolize welcoming the arrivals, the door was constructed in the form of a retreating "entry" rather than in the form of a prominent exterior linked to the desecration of the highway. Likewise, the entrance to the mosque, with its height and verticality, symbolizes the aspiration towards the sanctity of heaven, and therefore the entrance architecture was extended as far as the height of the facade.

The entrances to public buildings and palaces in Islamic architecture were distinguished by their enormity, and their frames, arches, and recessed mihrab-shaped curves which were often lengthened until they reached the height of the walls of the facade and may have exceeded them as well. The first explicit and clear entrance in religious architecture in Egypt was the western entrance located in the axis of the Al-Hakim Mosque (380 - 403 E) It is similar to the entrance to the Mahdia Mosque in Tunis (308 AH), where the door was placed in a large compartment, knotted with a pointed arch, and the entrance block protruded from the azimuth of the facade. It dried up, or "stream" that ends at a man's knot, and breaks and turns inside the compartment.

3) Wind-Catcher :

It is an air well installed in the corner in the direction of the wind from the hall, and when the humid winds blow in Egypt from the northwest, the two sides of this well are closed and its sides from the north and west are open and its roof is tilted higher in the direction of the wind to catch the moist air and push it inside.

Hassan Fathy also explains the importance of using the chanqaf to ventilate the building, as it attracts air from the top of the building and directs it inward, so that the muqaf works as a method of cooling by using traditional energy, which is parallel in its goal of using solar energy for heating.

The tunnels played an indirect role in lighting from the highest level so as not to harm the eye, and also helped reduce the inconvenience and noise from the outside, which may accompany

the natural ventilation by the window, all of this confirms the ability of this element to treat the climatic intensity of heat in a way that exceeds functionally, what modern conditioning methods have not achieved.

Hassan Fathy in his writing "Natural Energy in Traditional Architecture" discussed the issue of air dynamics. If the air velocity moves from large holes to a small opening, it increases in small ones, and the movement of air helps to deform the air pressure around it, which helps move the air into a stream. Rapid movement, which is expressed by the difference in pressure.

4) The sistrum :

The emergence of the sistrum was associated with the parking lot to achieve a better climate treatment as it works to renew the air permanently and regularly inside the building through the exit of hot air through the openings in it in order to provide the necessary thermal comfort and ventilation, and thus the sistrum was considered one of the important functional and aesthetic elements that are evident in the buildings in different Islamic eras.

5) Contracts :

The knot is an arched architectural element that depends on one or more fulcrums, and forms the openings of the building or surrounds it, and the node consists of several stones, each one called a paragraph or cymbal. Contracts in Islamic architecture in different forms.

Types of contracts:

- Pointed knot :

It is the most widespread due to its ability to bear heavy upper weights and to transfer it directly through the legs and shoulders to the ground, and the tapered knot has developed into new forms, including:

- The refracted triangular pointed arch (monocentric): it is the oldest and easiest to form. Many examples of it have been found in the gates of the Sumerian city of Aru and Ugarit.
- The pointed arch with two centers: it is a type developed from the refracted pointed arch. It is formed by the overlapping of two quadrants or two arcs drawn from two different centers.
- The pointed arch with four centers (Farsi): This type of arches is dated back to the era of the Umayyad Caliphate and was used in the short structures of Umrah at the beginning and then in the Great Mosque of Samarra and the Al-Jusq Al-Khaqani, and it consists of drawing four arches with four different centers, two large lower connected with two others, the upper ones meet at the crown of the arch, which is characterized by its lower than the level of the apex and convexity of the normal pointed arch.
- The Fatimid pointed arch (crotch): also known as the bow or the Abbasid arch, and it is a type developed from the pointed, refracted, single-center or two-centered arch, and it consists of two semi-straight upper archs that meet at the top in the form of an obtuse angle with two straight vertical ends connected at the shoulders of an arched curve from each side, so that the knot or bow takes the shape of the ship's bottom. It was used in the entrance to the Abbasid Al-Ukhaidir Palace, as well as in the arches of the corridors of the Abbasid palace in Baghdad, as well as the facades of the huge Fatimid mosques as well as in the facades of the Al-Azhar Mosque in Egypt.
- The apostate pointed arch: is similar in shape to the circular knot and differs from it in terms of the extension of the arch of the nodes to stand at a certain angle on the top in preparation for

giving the required design, and this angle differs in contrast to the proportions in the same contract, and this type of contract is distinguished by being the most suitable for many others. The buildings due to its relative capacity due to the construction of two sides on different centers taking into account the distance between each center, as well as the possibility of modifying the proportions in the opening of the arch and the chord as needed due to the absence of fixed standard ratios linking the length and width of the arch or the nodes. The pointed arch left a clear imprint in the Gothic architecture that was moved across Andalusia, as it appeared in Notre Dame Cathedral in Paris in 1163 AD and in many western buildings due to its importance and ability to concentrate the forces of upper and lateral pressure at specific points that could not meet the clinical vaults in ancient Romanesque architecture.

– The three-lobed complex ganglia: This node was formed as a result of the merging of two types of contracts, the outer pointed and the inner three-lobed, which share one of them with the other in one central point.

6) Windows :

They may be narrow from the inside and wide from the outside to expand the angle of view on the one hand, to achieve the amount of light, and to prevent direct rays from entering on the other side.

In Islamic homes, wide windows overlook the inner courtyard, while narrow windows appear in the outer walls, for climatic, religious and social purposes, so it is not permissible for the homeowner to be exposed to the gaze of curious people or passers-by from outside the house.

The windows are divided into two types, the first type is the sunshades, which are windows made of stone, marble or plaster hollowed out with geometric, plant or written motifs, and the spaces are often filled with stained glass. Among the first marble solar panels are those in the Umayyad Mosque. As for the second type, it is known as the moonlight, which is a narrow skylight that opens above doors, windows, or walls and gives a faint light like moonlight, which explains the origin of its name. The sunshades and moonwalks are among the prominent elements in Arab and Islamic buildings that have been employed to create a relationship between aesthetic and utilitarian value. One of their functions is also to prevent insects that infiltrate from outside the building into the interior.

References:

- Okasha, Tharwat : el kiem el gamalia fe el amara el aslamia. El tabaa el ola, dar el shoruk, 1994.
- Rajab Abdul-Maqsoud Muhammad, Rania : athar el tahoya el tabeaia ala el tashkeel el maamari. Resalat doctora, kolyet el handasa, gamaet el kahera, 2009
- Monhae Hamed Salem, Rabab : el aatbarat el beaia we taetherha fe gamaliat el wagehat el maamaria. Resalat doctora, kolyet el fnon el tatbeia, gamaet helwan, 2010 .
- Adel, Rowan : malkef el hawaa kaonsor mn anaser el edaea el mamaria fe madars we massaged el kahera el bakia zamn el mamalek el baharia .
- Ali Yusef, Abdul-Raouf : el mashrabya – mn aamal el nadoa el dawlya haol el herf el yadawya fe el amara el aslamia , kahera, 1995
- Muhammad Samir Ismail Mustafa, Ola: el ryada fe fkr el mamare el masre el alame Hassan fathai, magalet el amara we el fnon .
- Shaalan Al-Tayyar, Muhammad:el akoas we el okod fe el amara el aslamia, ethad el kotab el arab, 2016 .

Farghali Bayoumi, Nevin: el tatbekat el moasra lImashrabya kamoroth thakafe, magalet el amara we el fnon, el adad el awel, 2016.

Hamdi Mahmoud, Heba Allah : mnHag tasmem el amara el da5elya ben el asala we el moasra – drasa ala el monshaat el thakafya, rsalat doktora, kolyat el fnon el gamela, gamat helwan, 2016.

Mahdi Salameh, Hiam: el mashrabya fe el amara el aslamia, magalet el amara we el fnon, el adad el thalath ash, 2019.

Wazere, yahya : mosoet anaser el amara el aslamia, el tabaa el ola, maktabet madbole, 1999.

4<http://antiquities.bibalex.org/Collection/Detail.aspx?collection=42&a=1005&lang=ar>