A New Mashrabiyya for Contemporary Cairo: Integrating Traditional Latticework from Islamic and Japanese Cultures

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Abstract

The mashrabiyya is a latticework applied to the windows of traditional residences in the Arab world to both veil women from the gaze of men and to ameliorate the region's hot arid climate. In etymology and design, the mashrabiyya is associated with the residential architecture of Cairo. Many scholars are calling for the revival of the traditional mashrabiyya because it best balances the social and environmental needs of Cairo's residences. In order to realize such goal however, the following problems must be addressed: its role as a veil, Cairo's air pollution, and its considerable expense. Similar in social and environmental function, the Japanese machiya-gōshi (traditional townhouse lattices) offer practical solutions for the problems of the mashrabiyya. This paper examines 1) the traditional form of Cairo's mashrabiyya, 2) the social, environmental, and economic problems if this form is applied in contemporary Cairo, and 3) how the machiya-gōshi's simplicity and capability of adjusting privacy, lighting, and airflow can be adapted to improve Cairo's mashrabiyya. At the end, the paper offers a preliminary proposal for a new mashrabiyya.

Keywords: Mashrabiyya; Islamic latticework; Japanese machiya-gōshi; Cairo; veil

1. Introduction

Greater Cairo is a typical mega-city with around 14-15 million inhabitants (almost half of the country's urban population), and its overall net density reached 32,000 inh./km² in 1994, ranging from 109,000 inh./km² in the densely populated districts to 15,000 inh./km² in the least populated. According to the 2003 EIDHS, 92.2% of households in Egyptian urban governorates live in apartment buildings. In Greater Cairo, about 70% of its built area is residential, of which 22% are apartment buildings of more than 6 stories, 70% are of 5 to 6 stories, and only 8% are lower than that.

The typical facades of these apartment buildings consist of various compositions of open balconies and openings with Venetian wood shutters called sheesh. In response to Cairo's density and conflicting social and environmental functions, people tend to modify their use of these devices by keeping the sheesh continuously closed, donning a veil or adding reflecting glass, shades, or by enclosing the balcony with curtains or lattice, etc. Many researchers paid attention to this phenomenon and called for the revival of the traditional Islamic latticework mashrabiyya to solve this problem.

In etymology and design, the mashrabiyya is associated with the traditional architecture of Cairo.

It "designates a technique of turned wood used to produce lattice-like panels...to adorn the windows in traditional domestic architecture". It functioned as a screen to both veil Muslim women from the gaze of men and to ameliorate the climatic conditions of the region's hot arid climate. Presently, the use of mashrabiyya as screens for windows or balconies is extremely rare and they can be found only in the historically preserved houses remaining from the Mamluk and Ottoman periods.

According to Mamluk wakf deeds, mashrabiyya as a screen applied onto windows appeared after the Ottoman conquest of Egypt in 1517. During the Ottoman period (1517~1805), Cairo lost its role as the capital of the Mamluk (1250~1517) and became a provincial seat in the Ottoman Empire. Ottoman urban policy aimed to contain the expansion of Cairo and to build atop the Mamluk preexisting quarters.
In this period, Cairo became very dense so courts and larger openings were needed to access, ventilate, and light up the domestic quarters. However, due to their religious conservatism and interpretation of veiling, the Ottoman also required more privacy and a separate harim (female quarters) that could not be seen from the outside. Accordingly, mashrabiyya appeared as a device for lightening and ventilating the domestic spaces in the dense city while at the same time protecting women’s privacy. By the nineteenth century, mashrabiyya was common to all urban households and Cairo’s facades at that time were characterized by the multitude of projecting mashrabiyya windows (Fig. 1). From the first half of the nineteenth century, however, Muhammad Ali (1805–1848) banned the construction of mashrabiyya and encouraged the adoption of modern European architecture. Gradually, the mashrabiyya disappeared from Cairo and were replaced by openings with sheesh and balconies, which continued to be the only devices offered to residents in Cairo until now.

![Fig.2](image)

The problem with the sheesh has been analyzed by Hassan Fathy who explains that the shutter is made of small fixed slats closely set in a wooden frame at an angle that intercepts sunrays. When the shutter is closed for privacy purposes, it completely obstructs the view to the outside as well as considerably darkens the interior. In addition, wind flows upward uselessly over the heads of the occupants as shown in Fig. 2. (a). Even if the slats were arranged to direct wind downward as in Fig. 2. (b), the intense sunrays of Cairo would then penetrate directly into the head of the occupants. In addition, the open balconies of most residences in Cairo do not allow women to do home activities related to the outdoor without donning their veil each time (see Fig. 5.).

In Cairo in 1995, IRCICA and the Egyptian Ministry of Culture sponsored "Crafts in Traditional Islamic Architecture" as the first ever academic conference to focus on the mashrabiyya. The papers and final recommendations of the conference agreed that mashrabiyya should be improved, revived and adapted to contemporary lifestyle. However, they offered no suggestions as of how to realize this common goal.

The aim of this paper is to offer a proposal of what an improved mashrabiyya should look like. In order to realize such goal, three problems must be addressed: 1) its role as a veil because its meaning has changed much since twentieth century Egypt, 2) environmental problems due to Cairo’s pollution which corrodes the traditional mashrabiyya, and 3) economic problems related to the mashrabiyya’s high cost.

The opportunity of my being in Japan for research purposes has introduced me to the Japanese latticework called kōshi, including the townhouse latticework machiya-gōshi. Because the machiya-gōshi has social and environmental functions similar to the mashrabiyya, I suggest that incorporating design elements from machiya-gōshi offers practical solutions for the problems of reviving the mashrabiyya in Cairo and for adapting it for contemporary use.

This paper first examines the typical form of Cairo’s traditional mashrabiyya. Second, it looks at the social, environmental, and economic problems if this form is applied as it is in contemporary Cairo. Third, it discusses some types of machiya-gōshi that offer solutions to these problems. Finally, it presents a preliminary proposal of how to improve the mashrabiyya for contemporary society.

2. Traditional Islamic Latticework Mashrabiyya

2.1 Form of the Traditional Mashrabiyya

A typical mashrabiyya (Fig. 3.) is made of unvarnished wood, is either flush with the external wall or extends out from the wall, and is composed of the following parts: 1) the main mashrabiyya opening composed of a lower part below eye level with fine turned pieces in a tight lattice pattern and an upper part above eye level with a more open lattice pattern of turned wood, 2) an overhang found immediately above the main mashrabiyya opening, and 3) a flat grilled window above the overhang that was often added if the mashrabiyya did not provide sufficient airflow.

2.2 Problems of the Traditional Mashrabiyya

2.2.1 Social Problems of the Mashrabiyya

Fig.3. Right, mashrabiyya of the harim qa’a (women hall) in al-Suhaymi house. (Photo by Tarek Swelam.) Left, mashrabiyya with an upper window, Wekala of Bazar’a.
More conservative in interpreting Qur'anic verses concerning the veil than the former Mamluk, the Ottoman regime attempted to control Egyptian women and the way they dressed. Veiling during the Ottoman period implied three points. First, in addition to the veiling described in the Qur'an, women had to cover their faces when in public. Such veiling (Fig.4.) was a means of expressing the status and respectability of a woman and her family. Second, women had to be segregated from men to preserve their sexual purity which in turn contributed to the honor and prestige of the family. Finally, women became secluded at home as a result of the wealthy's need to develop and maintain large households which were also a marker of status.

For maintaining the norms of veiling, gender segregation, and home seclusion, mashrabiyya were applied between the harim (female quarters) and any space considered public such as the street, residential court, or qa'a (reception hall). Women's role was that of an onlooker. There, they spent hours in the upper floors hidden behind the mashrabiyya, taking part in the emotion of the street only from distance, watching the dances, and listening to Qur'an readings performed in the court or the qa'a of the ground floor. The tight pattern of the lower part in the mashrabiyya (below eye level) insured a woman's invisibility because when looked at from outside it appears as a completely opaque wall. In addition, from the house on the opposite side of the street, a woman could be seen neither through the wide pattern of the upper part (above eye level) nor through the flat window above the overhang. This is due to the rules in the shari'a (Islamic law) which stipulated the location of openings, their location in relation to the opposite house, the height of the houses, and such.

Veiling in the Ottoman period went through many changes between the late-nineteenth century and today. Some of these changes can be stated as follows: From the second half of the nineteenth century until the early 1950s, Islamic reformers, feminists, and some elite women began calling for the removal of face veils in Egypt. Gamal Abdel Nasser's socialist policies (1956–1970) encouraged work and supported the principle of sexual equality. During this period, women stopped wearing the veil and gradually began to adopt Western clothing. However, war and eventual peace with Israel, discontent with Anwar Sadat's economic liberalization policies in the 1970s, and people's reconsideration of their national and Islamic identity have led to a wide spread rejection of Western values and fashion. Since the 1980s, women began again to wear the veil but also continued to insist on the freedom of mobility and expansion of opportunities in the workplace, universities, social affairs, and in public life in general. Accordingly, researchers studying the contemporary veil in Cairo agree that this phenomenon should not be considered a "re-veiling", but rather a "new veiling" for new purposes.

Adopting the veil in contemporary Cairo is a voluntary move on the part of women, meaning that no institution or law forces the veil upon them. However, for many women, the veil is considered a religious command that must be followed because it provides the proper degree of modesty as decreed by Allah. According to their interpretation of Islamic dress, women's degree of modesty varies greatly, and there is no a single veiling uniform like the older Ottoman veil. Within the same household and same house, females expressing various degrees of modesty live side by side. Though having to put their veil in front of the non-kinsmen, contemporary veiled women can mingle with men and her role has been transformed from a passive onlooker through the mashrabiyya to an active person both in and outside the home. When going out in public, the contemporary veil provides women with their own inviolable private space.

Just as women in Cairo have chosen to wear the veil as a practical expression of their religious believes and identity, the mashrabiyya also serves a similarly indispensable role. However, just as the veil has been adapted to the needs of contemporary society, so too should the mashrabiyya. In fact, as it is, the mashrabiyya presents a number of problems.

First, today a woman at home engages in many outdoor activities such as hanging out the bedclothes and washing, watching her children who are playing outside, or calling for a merchant and negotiating the price of groceries. While the windows and balconies of most residences in Cairo today do not allow women to do such outdoor activities without donning their veil each time (Fig.5.), the traditional mashrabiyya also does not allow a woman to access the outside for such activities. The traditional mashrabiyya had sometimes small windows that opened upwards (Fig.6.) enabling...
women to safely unveil when leaning their head into the street. However, if applied contemporarily, their size is too small for such activities. Therefore, a mashrabiyya that provides women real access to the outside world without putting on the veil is necessary.

Second, because there are various degrees of modesty within the same household, the concern about being seen from the outside or not varies from woman to woman. Even the degree of privacy desired by the same woman differs according to her age, time of day, and other circumstances. The traditional mashrabiyya however does not have the ability of being adapted to various degrees of privacy. All the wooden pieces are fixed and so too is the degree of privacy.

Third, for wedding banquets, Ramadan dinners, and many other occasions held at home, women wear the veil in front of non-kinsmen, thus making the veiling of the mashrabiyya becomes redundant and unnecessary. During such events, modern windows and balconies are completely opened for ventilation purposes and used for talking, smoking, sitting, or separating from the crowd. Also, the problem of heat and direct sunlight is not an issue because these events are generally held in the evening. Thus, any modification of the mashrabiyya must allow for it to be opened and transformed into a modern window or balcony. This characteristic is not found in the mashrabiyya panels which are not removable.

Finally, because the mashrabiyya must provide light and air while maintaining privacy, the upper part of the traditional mashrabiyya and the flat window above it had a wide pattern to compensate for the reduction in light and air caused by the lower part (closed pattern). However, if applied to the multi-storey apartment buildings of Cairo, these environmental functions will conflict with the need of privacy because the interior will be easily viewed and intruded upon by the higher floors of the surrounding buildings.

2.2.2 Environmental Problems of the Mashrabiyya:

According to the 2000 EIDHS, 82.9% of households in large cities in Egypt use electric fan. This rate increased in the 2003 EIDHS to 91.8%, while households owning air-conditioner units were only 11.2%. This owes to the fact that households prefer saving in the electricity bill of which air conditioning represents 32% in the hot season extending in Cairo from April to October. The mashrabiyya, according to Hassan Fathy, is the best solution for the problem of thermal comfort in hot arid regions because its design hinders the flow of heat into the home while enhancing the cooling effect of the wind and humidity. With the unpopularity of air-conditioning in Cairo, the cooling functions of the mashrabiyya would meet the needs of many households.

Mashrabiyya is generally made of unvarnished turned pieces of wood, fixed together without glue or nails through an intricate method of joinery. This joinery allows the wood pieces of the panels to expand and shrink with changes in the temperature.

The lower part blocks the direct rays of Cairo's intense sunlight and reduces the glare. While the openness of the upper part compensates for the dimming effect caused by the lower part, the overhang on the top of the mashrabiyya intercepts direct sunrays. The pieces of wood used to form the lattice are made of many small rounded dowels in order to graduate the penetrating light, softening the contrast between the dark wooden pieces and the bright interstices. Furthermore, when privacy and sunlight considerations require small interstices, the upper part alone does not provide sufficient airflow, so the grilled flat window above the overhang insures a proper amount of ventilation.

Through a process of evapo-transpiration during the cool evening, moisture carried on the wind passing through the interstices of the porous-wooden mashrabiyya (if not varnished) is absorbed by the wooden pieces. Then, when the mashrabiyya is directly heated by sunlight, the moisture is released into the air flowing in through the interstices. This process increases the humidity within the home and consequently reduces the interior temperature.

Although the mashrabiyya's environmental performance is very appropriate to Cairo's climate, air pollution is one of the main problems preventing its revival. The WHO and UNEP cite that the following four problems contribute greatly to Cairo's pollution: desert dust blown into the city, lead from vehicle exhaust, cement dust and heavy metal compounds from factories and smelters smoke, and the poor dispersion of the pollutants due to a lack of rain and low wind speeds. These pollutants contain carbon dioxide, sulfur dioxide, and nitric oxides that, when combined with the moisture in the wood of the mashrabiyya, corrode its intricate latticework. Moreover, the accumulation of dust and soot in the mashrabiyya produces a thick black layer that hinders its original ornamental composition and reduces its capacity of evapo-transpiration.

2.2.3 Economic Problems of the Mashrabiyya:
Other problem of the traditional mashrabiyya is its expense. The prohibitive cost of the traditional mashrabiyya owes to the time intensive skilled labor required to assemble one. For instance, in the most intricate mashrabiyya, a single square yard of latticework can be composed of as many as 2000 pieces. These pieces are initially turned on a lathe then fitted together by inserting each piece into a hole in the adjacent pieces. Their arrangement produces a lattice pattern which is placed within a frame (Fig. 9.). Finally, each of these lattice frames is assembled together to form its lower and upper parts.

With the modernization of Cairo, however, the reduced demand for the mashrabiyya meant the various craftsmen like wood carvers, turners, inlayers, and joiners who built them were forced to either leave their trade or adapt to a shrinking market by providing items primarily for tourist consumption. Nowadays, the construction of a simple sheesh requires little more than the skills of a common carpenter.

In order to adapt the mashrabiyya for use in contemporary Cairo, its social, environmental, and economic problems should be solved. In the following parts, I examine some practical and economic characteristics of the Japanese machiya-gōshi that can be put to use in solving these problems.

3. Japanese Townhouse Latticework Machiya-gōshi

The latticework or kōshi seen in Japanese cities can be found in three types of buildings: samurai residences, temples, and townhouses called machiya. In this paper I focus on the kōshi applied to the machiya that are called machiya-gōshi. Applying a latticework on the frontages of merchants and artisans' machiya began to appear in the late fourteenth century when chronic warfare plagued the capital of Kyoto and the rest of the country requiring townspeople to secure their machiya from the constant flow of armed strangers into their communities. Under these circumstances, a sturdy protecting lattice named dai-gōshi (stationary lattice) began to be applied in the frontage of the machiya. However, as the country entered a long period of peace beginning in the seventeenth century, the necessity of kōshi for security gradually shifted to an emphasis on privacy. Consequently, sophisticated lattices were developed and applied to machiya in cities throughout the country. Fitted at the boundary between the interior of the house and the exterior street, these machiya-gōshi insured the passage of air and light while allowing the inhabitants to see and hear the comings and goings on the street without being seen by passersby.

3.1 Machiya-gōshi and Social Problems of the Mashrabiyya

In contrast to the traditional mashrabiyya panels which are not removable, the hamekomi-gōshi allows for complete openness. Generally, the machiya-gōshi can be found in two forms: a stationary kind fixed to the facade like the dai-gōshi, and a removable kind that can be completely taken out from the window or entryway. This removable kind of lattice is called hamekomi-gōshi (Fig.10.) and has Mullions that are fixed inside a frame to make a lattice that can be easily locked into pillars or stiles with removable pins. In festivals, such as the famous Gion festival of Kyoto, removable lattices are detached from the facades of machiya which then become completely open (Fig.11.); in this way, a hitherto private space is converted into a semi-public space.

Among the various kinds of stationary kōshi is the musō-mado. While all the wooden pieces of the mashrabiyya are fixed and so is the degree of privacy, the musō-mado can be easily adjusted for the desired degree of privacy, lighting, and airflow. This kōshi is composed of two lattices: a fixed external lattice and an internal one that slides to the left or right on a grooved track (Fig.12.). By sliding the internal lattice, the intervals of the external one can be adjusted for varying degrees of openness and closeness.

Quite different in form and function is the sesame-
gōshi or fine lattice typically found on traditional teahouse or chaya (establishments for the entertainment of men) and haberdasheries. Unlike the upper part of the mashrabiyya, the sesame-gōshi provides lighting and airflow without decreasing the degree of privacy because its mullions are beveled and installed with the narrow portion facing inward and the wide portion facing outward (Fig. 13.). Seen from outside, the intervals between the mullions are very close thus providing a great deal of privacy, while from the inside they are quite wide ensuring that a surprising amount of light and air can pass through the latticework.

3.2 Machiya-gōshi and Environmental Problems of the Mashrabiyya

The advantage of the machiya-gōshi over the mashrabiyya is its being less exposed to damage by pollutants and being easier to maintain and clean. This owes to the verticality and straightness of the machiya-gōshi’s construction, which reduces the horizontal surface area and corners on which pollutants and dust tend to accumulate. The overwhelming verticality of the machiya-gōshi, aside from the few horizontal slats used for reinforcing purposes, is possible because the deep eaves of Japanese houses eliminate the need for horizontal louvers for shade. The straightness of its construction derives from the use of uniformly shaped mullions which are long slats cut or lathed into rectangular, squared, triangular, circular, or half circular shapes.

3.3 Machiya-gōshi and Economic Problems of the Mashrabiyya

The machiya-gōshi was initially of simple and sturdy design for protection purposes. Even after the appearance of intricate latticework from the eighteenth century onward, it has maintained its simplicity which means that it can be manufactured much cheaper than the mashrabiyya. Composed of long straight slats of wood, the material for the machiya-gōshi is easily and quickly processed. Whereas the turning process of individual mashrabiyya pieces, though mechanized, takes a lot of effort and time depending on the craftsman’s skill and experience. Once the mullions of the kōshi are assembled into a lattice, the ends of each mullion are inserted into the peripheral frames. As such, the number of joints for the kōshi is considerably less than for the mashrabiyya.

4. Proposal for a New Mashrabiyya in Cairo

After taking into consideration its traditional function and design, the problems with that design, and the potential of incorporating design elements from the Japanese machiya-gōshi, I offer this preliminary proposal (Fig. 14.) for an improved mashrabiyya in contemporary Cairo. Made of unvarnished slats of vertically arranged wood, this new mashrabiyya will facilitate evapo-transpiration and reduce the accumulation of dust. In addition, the mullions are fixed without glue or nails thus allowing the mashrabiyya to flex with temperature changes.

5. Merits of the New Mashrabiyya

Considering the population density of Cairo and that the majority of families live in multi-story apartment buildings, the proposed mashrabiyya offers the following advantages over both the currently used devises and the traditional mashrabiyya:

- Unlike the sheesh which blocks the direct sunrays and insures privacy but conflicts with the needed air, lighting, and view, the proposed mashrabiyya provides all these while shading from sunrays and maintaining privacy.
- Unlike the modern balcony on which a woman has to put on her veil each time, the proposed mashrabiyya allows her to unveil while doing her daily outdoor activities.
- In consideration of the shari’a (Islamic law), this proposed design maintains privacy while improving airflow and lighting through the upper latticework. The rules in the shari’a, which in Islamic periods stipulated the height of houses and the size and location of openings relative to the surrounding buildings, insured that the upper lattice of the traditional mashrabiyya would improve airflow and lighting while maintaining privacy. However, privacy considerations are no longer followed in modern building codes. Accordingly, the proposal treats the upper latticework in a way that harmonizes environmental and social needs.
- It is adaptable to various degrees of privacy required in today’s society. And it can even be transformed from an interior space into an open balcony making it suitable for social events held at home.
- It is made of vertical slats with neither horizontal surfaces nor corners to reduce its corrosion by pollutants and to be easily maintained.
- It is simplified in a way that makes it easier to construct and more affordable than the traditional mashrabiyya.

6. Conclusion

This paper offers a preliminary proposal for latticework derived from the traditional Islamic mashrabiyya and Japanese machiya-gōshi to be applied to the apartment buildings of contemporary Cairo. This new mashrabiyya is an affordable device that
offers a better alternative to the inadequate sheesh and balconies because it accounts for contemporary social needs and ameliorates the climatic conditions. It also enables one to adjust freely the degree of privacy, airflow, and lighting.

In order to arrive to the appropriate measurements and materials for this new mashrabiyya, my future research will involve more detailed environmental

Fig.14. Preliminary Proposal for a New Mashrabiyya in Cairo
studies and careful study of the architectural design of Cairo's contemporary apartments (internal space, internal heights, structural systems, Egyptian building code, etc.)

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