Fundamental Features of Cairene Houses
Unique Cultural and Environmental Identity

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Abstract. Architecture reveals unique cultural and environmental identity in relation to the place it belongs to. The rise of globalization has contributed to the loss of local and cultural identities and heritage in architecture. This study is focused on traditional houses in Egypt known as Cairene houses, particularly considering fundamental design features. Much of the values and qualities of these houses have been disappearing due to Western influences. This article discusses the Egyptian cultural and environmental factors that results in Egyptian housing designs. The fundamental spatial features of traditional Cairene houses that make the housing designs unique are also studied. Finally, the unique cultural and environmental identity in traditional Cairene houses is also shown.

Keywords: Islamic architecture · Cairene houses · Courtyard · Spatial composition

1 Introduction

The cultural history of Egypt and its unique geographical position provided various opportunities for the emergence of architectural trends and movements. Whereas Egyptian architecture has had various unique traditional, social, and environmental characteristics throughout its history, contemporary Egyptian architecture lacks to draw its rich local and cultural heritage (Salama 1999). In recent decades, efforts are being made to revive local and traditional architectural heritage. Major movements have been increasingly observed to occur in the realms of architecture and urbanization to change the public face of Egyptian architecture (Abdelmonem 2015).

Nevertheless, most efforts to revive the features of traditional architecture are limited to the level of changing the outer facades. Aside from its external aesthetic aspect, lessons learned directly from local, traditional and indigenous forms of architecture must be reinterpreted for the design of new contemporary designs.

Designs in Egyptian traditional architecture reflect the cultural lifestyle of the people, local traditions, availability of construction materials, and the symbols of the legacy of the Egyptian people. In other words, responses to the material and the local and climatic conditions are highlighted to fulfill social needs. In this, it is significant to derive unique cultural and environmental identities inherent in Egyptian traditional architecture.

Representations of Egyptian traditional houses can be found mostly in Cairo and are called Cairene houses. These houses deal perfectly with the climate conditions by

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providing thermal comfort for the residents. Undoubtedly, Cairene houses became the chief traditional residential architecture in Cairo during the Mamluk and Ottoman era. Traditional residences varied from small houses to collective housing units. As such, observing how Egyptian architecture has been strongly imbued with Islamic influence in a way that serves its climate is of interest (Mohamed and Ali 2014).

Two categories can be noticed within Egyptian and Islamic architecture: the first is the spatial organization in the residential buildings coming from a direct influence by the Islamic principles into the Egyptian architecture and the second is that from Egyptian weather influencing Islamic architecture.

2 Evolutions of Egyptian Houses

Egyptian architecture and its adaptation to a particular way of life comprise a wide range of cultural, environmental, social, and religious factors; such factors have become the distinguishing features of the Egyptian architecture. Islamic architecture in Egypt is distinguished by its repetition principle exhibited through several details that have been repeated in buildings. Its influence has given Egyptian architecture unique characteristics different from other architectural styles. The repetition principle was used in the building plan and can also be observed in the repetition of arches, windows, vaults, columns, and so on. These repetitions can also be observed in the ornaments, such as those in the windows, doors, etc. Hence, these elements and details became a main part of the design process, while the others were decorating elements that added aesthetic value to the building.

Several social and cultural issues contributed to the uniqueness of Egyptian architecture. Traditional Egyptian house design depends mainly on the idea of separation between the inside and outside, the residents and the passersby in the street or the surrounding neighbors. This separation has led to the creation of a new functional courtyard space opened to the sky, while the other house elements are distributed around. In addition, because of the Islamic principles, women and men have to be separated from each other. Even women and men in a family have to live separately at the age of adulthood, leading to stay in separated suites in the house.

Designing the house from the inside to the outside is another feature and an important aspect in Egyptian architecture. The façades are designed based on residents' needs and inner room layouts. This contradiction is a feature that can be seen in houses' inner and outer facades. For example, because of men's jealous feelings toward women, the exterior façade is designed in such a way that ensures privacy by making the openings as high as possible so that passersby in the street cannot recognize the residents.

This is the reason why the women's private sitting area, the *Haramlik*, is located on the second floor and is accessible only through a staircase set up only for women. An opening with wooden lattice pane, called *Mashrabiya*, is added as a tool to obfuscate the vision of passersby or neighbors, making it impossible to have a look inside the house. Through the *Mashrabiya*, house residents can live in their own home without being observed.

Along with cultural and social aspects, environmental aspects have had a significant effect on Egyptian traditional houses. Egypt is distinctly characterized by deserts, with

a hot and dry climatic zone, experiencing very little rainfall and strong sunlight due to its geographical location in the tropical desert region of North. These factors have led Egyptian traditional architecture to accommodate the harsh climatic conditions.

In Egypt, traditional architecture from the Islamic era offered a great solution to Egypt's climate, and served as a source of construction materials that give form to architectural elements. Specific techniques and details for controlling natural climate have been applied to ensure a better thermal comfort in homes, providing proper lighting and ventilation (Ficarelli 2009). Egyptian houses are relatively different from European houses in that the latter is more open to an outside garden than the former. Egyptian houses are closed into an inner garden or courtyard that keeps cool air inside.

3 Spatial Features of Egyptian Traditional Houses

Residential design around the world represents the background and framework for culture and human existence. Because of the socio-cultural differences in each region, one can realize many distinctive examples of traditional architecture, mainly seen in houses. Each culture has its own unique spatial organization, demonstrated in the way that houses are composed. The design concept of houses can be traced in many existing cases of traditional architecture, in which forms and rooms are dictated by habits and traditions. The heritage of traditional Egyptian houses includes various forms, which are developed in response to religious, cultural, and social factors, along with the specificity of the locally-built environment.

3.1 Common Spatial Compositions

Egyptian houses are composed of three to four floors because local materials used in the construction cannot bear the weight of additional floors. The main materials which were used in the Egyptian houses were stones, brick walls, or mud.

Traditional Egyptian houses include courtyards with open-air and sky-lit spaces and are surrounded by other rooms. The courtyard lies at the center of the house, which is why the design of the house always starts from the courtyard. Other rooms are arranged around the courtyard in different ways to accommodate the needs of social, cultural, and environmental factors.

The courtyard is designed from the inside out according to the location, the size, the shape of the lot, and the internal spaces. In many cases, its orientation depends on the street outside and/or the shape of the lot.

Nevertheless, the orientation of the courtyard is determined more importantly determined, prior to other factors. At times, a rectangular courtyard is oriented to the cardinal points and enclosed by various buildings in an irregular site so that the interior is hardly recognizable from its exterior (Reynolds 2002). The courtyard is typical not paved and has naturally soil-covered surfaces. At times, it has a well, a fountain, or trees. The shape of a courtyard is usually a rectangle; in a few cases however, it has an irregular shape to be suitable in almost all building typologies (Fig. 1).

The courtyard of the Cairene house does not serve as a gathering place for housework or other purposes, but a semi-private place for the residents and visitors to

Fig. 1. Courtyard formation in several buildings [1. Shabshiri House; 2. Zainab Khaton House; 3. Harawi House; 4. Al-Kretlia House; 5. Amna Bent Salim House; 6. Al-Suhaymi House]

dismount. Unlike courtyards in other surrounding countries, it serves as a means of ventilation, lighting, and communication between the various quarters of the home (Behrens-Abouseif 1989).

The courtyard is approached from the entrance through *Magaz* (refracted entrance), concealing it from outside view. Entrances are generally opened to secondary streets to avoid noise and direct contact with the main street with its activities. Some houses could have another hidden door that leads to corridors and an exit for emergency cases.

Traditional Egyptian houses (Fig. 2) are divided into three main sections. First is the *Salamlik* located on the first floor and is used by men as reception halls. Second is the *Haramlik*, which is allocated for women and used for daily life and is located on the second floor. The last is an area allocated for utility and service rooms found on the first floor away from the *Salamlik* and *Haramlik*.

The ground level is composed of reception halls to host an event and receive visitors. These halls are located within a view of the inner yard through openings covered mostly by *Mashrabiya*, a projecting oriel window (Rabbat 2010). According to Egyptian social traditions, men's rooms were located on the first floor to check or supervise visitors passing by them, entering the yard, and allowing visitors to enter the house or to stay in the reception hall. It is also intended to block the view with women on the second floor. In other cases, a secondary reception hall is provided in order to host and welcome visitors. It is usually adjacent to the main entrance so that visitors can wait or rest before going to the main reception hall.

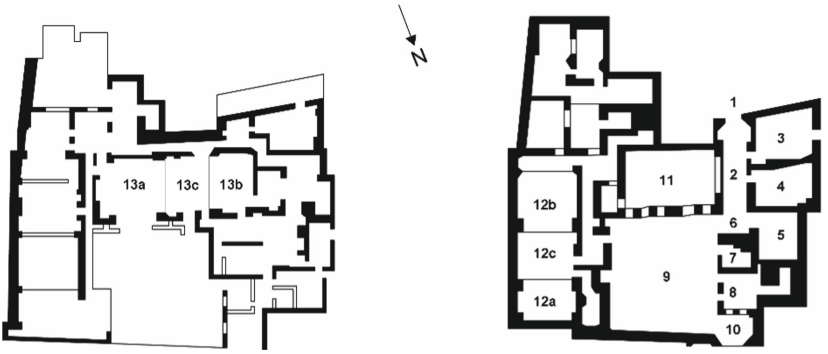

Fig. 2. Harawi House, a typical Egyptian traditional house: first floor and second-floor plan [1. Magaz; 2. Entrance corridor; 3. Mill (store room); 4. Stables; 5. Guest room; 6. Covered porch; 7. Haramlik staircase; 8. Service room].

The women have their main sitting area, the *Haramlik,* located on the second floor with a separate entrance. It has a *Mashrabiya* overlooking the inner courtyard and the street. The *Haramlik* is located on the second floor to avoid direct and indirect contact with visitors on the first floor. Another reason was to make the windows and openings as high as possible to avoid being observed from the outside by passersby in the street or neighbors.

In many cases, the *Haramlik* has a separate entrance for the exclusive use of women to keep their privacy. The *Haramlik* is also attached with one or more wings; each has its own living room, bedroom, and bathrooms. The number of bedrooms varies considerably depending on the wealth of the owner and the size of the structure. Bedrooms are located on the upper floors far separated from the reception halls to prevent any kind of contact with the visitors' area. The rooms are enclosed to block strong heat from the outside. In the cases of large residences, the bathroom serves as a combined room of the toilet, massage room, and cloth room.

Salamlik and *Haramlik* as separate reception halls for men and women constitute relatively wide spaces in larger houses. They are divided into two sitting areas with a huge ceiling height. These two sitting areas are called *Iwan,* where the master of the house receives his guests. In the middle is the *Dorqaa,* which is at a lower level than the *Iwan.* The *Dorqaa* typically has a dome-shape skylight, so called *Shokhshekha.* It is installed to provide light and thermal comfort. In some cases, it contains a pond in the middle. In very large residences, the *Dorqaa* is regarded as another type of yard for the purpose of a secondary social space.

Another service area located on the first floor is the storage room, which usually has a kitchen behind it. The main kitchen, located on the ground floor, is the men's kitchen, where everyday meals for the master's entire household and his guests are prepared, while the other is located in the *Harim* (female), in the upper part of the house. Stables exist to keep horses safe in the house and are accessible through a third entrance.

3.2 Orientation and Arrangement of Main Rooms

In Egyptian houses, the rooms are arranged along the main courtyard. This concept was inspired by an Islamic principle by which design styles are shaped. A house was considered a typology within Islamic architecture because it facilitated religious life (Fig. 3). As such, rooms always start from a given point. For example, in the plan, it can start from the courtyard as a key element, and the other rooms are surrounded around the courtyard according to their functions. The resulting hierarchy can be seen from the diagram shown in Fig. 4. One can start from the entrance zone, reaching to a small reception room, called the *Takhtabush,* which was allocated for visitors who will stay for a while, or visitors on a trifling matter. The *Maqad* is accessible from the courtyard through a few steps going to the second floor, and is allocated for friends, or through the main reception hall for large gatherings. On the other side of the first-floor plan, a gatekeeper room can be found in some Cairene houses, where service rooms are also found.

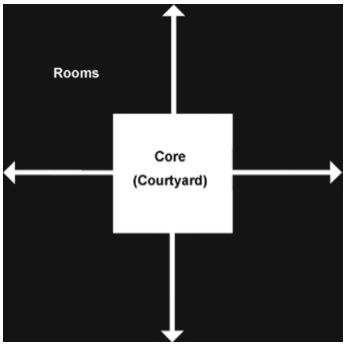

Fig. 3. Designing from the inner core to the outside perimeter.

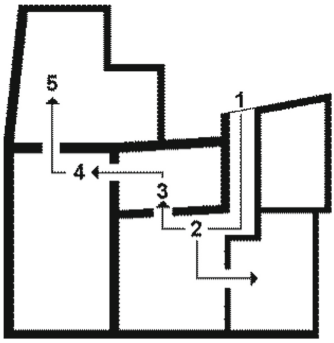

Fig. 4. The circulation which visitors may experience after entering the house, showing the spatial hierarchy of Harawi House [1. Entrance; 2. Magaz & Courtyard; 3. Takhtabush (sitting area); 4. Reception hall; 5. Service rooms].

Egyptian climatic conditions have affected the spatial organization of Cairene houses. Although the sun is considered an important factor in room orientation, the wind direction is another significant factor in determining probable sources of spatial compositions of the houses. Previous researchers, Gut and Ackerknecht (1993), have obtained the conclusion from the study that the best sun direction is east-west, while the best direction regarding prevailing winds is north-south. These factors have led to locating the main reception hall on the first floor to encounter east-west, with the *Malqaf,* installed in the ceiling, oriented to the north to catch the preferred wind coming from that direction.

Instead, the semi-opened sitting places, such as *Takhtabush* and *Maqad* are placed to face north. The *Takhtabush* is added to the southern part of the first floor of the house and opens to the courtyard from one side. It is used mainly by the residents especially in the summer due to the hot weather. In the same notion of the *Takhtabush*, *Maqad* is another element added in the second floor beside the *Haramlik*. It is an arcaded loggia that overlooks the courtyard and allows south-facing for the prevailing breezes from the north. At times, to improve thermal comfort, the upper floors partly open to the outside through windows to provide shade and to reduce the effects of hot heat.

4 Basic Components of Cairene Houses

4.1 Sahn (Courtyard)

It is located at the center of the house and enclosed spatially so as to be separated visually from the outside, providing privacy for the residents. It plays a significant role in mitigating the hot weather while providing sufficient daylight. It also acts as a natural ventilation system to enhance convective airflow through. The courtyard also stores cool air at night to avoid the daytime hot weather. In some cases, it contains trees, plants, and fountains to purify air and give psychological comfort. These characteristics have led architects to minimize the openings and maximize the inner courtyard to balance the weather. Typically, the level of the courtyard floor is lower than the surroundings. Because cool air is heavier than warm air, it stays on the court and does not let the cool air infiltrate the other spaces. At times, the inner courtyard is covered. It is possible that the covered roofing in courtyards is designed to collect and maintain the cold air acquired at night and to cool indoor rooms during the daytime (Basyoun 2017) (Fig. 5).

4.2 Magaz (Refracted Entrance)

Magaz is an indirectly accessible corridor that connects to the inner open courtyard. It is designed to open into a blank wall and formed by one to two turnings to improve privacy protection for the residents so that the people outside cannot see those inside. While it provides the effects of minimizing dust and noise from the outside, it also allows the air to circulate the house. In some houses, an evacuation door that is connected to the corridors is installed to be used in an emergency (Fig. 6).

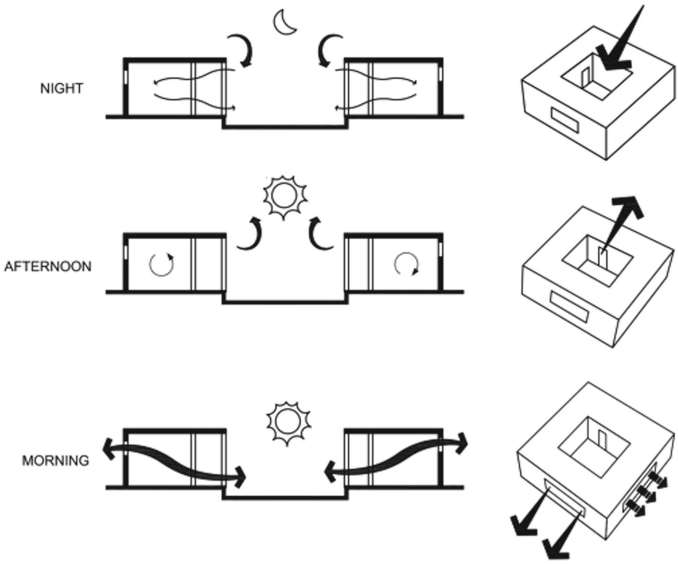

Fig. 5. Courtyard mechanism through the daytime.

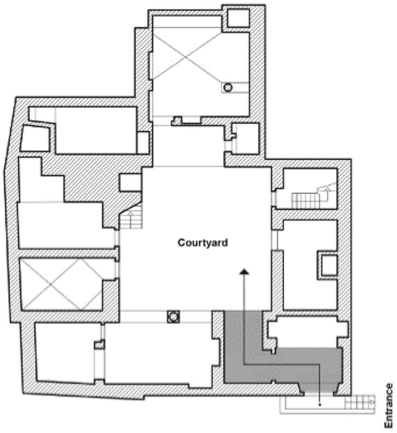

Fig. 6. Magaz in Shabshiri House.

4.3 Mashrabiya (Projecting Oriel Window)

Mashrabiya is a prominent wooden window that contains geometric patterns. It provides privacy for the household by letting the family see the street while preventing people in the street or the neighbors from observing the inside of their own house. It exists mainly in the facades to provide privacy especially for women's rooms, but can also exist inside the house facing the inner courtyard. The *Mashrabiya* has a very particular use because it juts over the street and can be made as an extension of the room. That area is filled

with cushions where people can sit comfortably to enjoy the view over the street while facing and feeling the wind breeze directly. (Abdelkader and Park 2018).

Its narrow openings break sun rays and let airflows enter the building. At night, the *Mashrabiya* holds moisture passed on by the wind through the geometrically patterned interstices. When heated by sunlight, it emits the moisture into the air, to maintain proper indoor humidity and temperature. As such, the *Mashrabiya*'s key functions include daylighting and thermal control, and social privacy. (Mohamed and Ali 2014) In the old times, a clay pot of water was installed in front of openings and cooled through the vaporization of water caused by wind movement through the openings. (Hakim 1986; Masaud 1996).

The *Mashrabiya* also contributes to the buildings with its beauty. In addition to the social, environmental, and economical aspects, the *Mashrabiya* adds aesthetic value with its unique geometrical patterns, plant ornaments, and Arabic writings inspired by Islamic arts. Through its patterns, the *Mashrabiya* added a local identity to each country as its wooden latticework designs differ from region to region. (Sidawi 2013).

4.4 Takhtabush

Takhtabush is a covered area at the ground level to accommodate the air flow. Figure 7 shows that the area is designed to welcome visitors, especially in the summer. To ensure air flow, *Takhtabush* is located between the courtyard and the back garden, opening completely onto the courtyard. Through a *Mashrabiya* onto the back garden, it warrants a constant flow of air by convection (Fathy 1986). Because the back garden is larger and less shaded than the courtyard, air heats up in this area more than it does in the courtyard. It quickly elevates the surface temperature of the air inside the yard. The heated air from the back garden draws cool air from the courtyard through the *Takhtabush*, creating a steady breeze. Otherwise, it could produce maximum heat unless cool air flow through the yard (Mohamed 2010).

Fig. 7. Takhtabush and its location in the Al-Suhaymi House.

4.5 Shokhshekha

Shokhshekha is a wooden skylight at the base of the roof that enhances lighting. The *Shokhshekha* has various shapes such as square, hexagon, octagon, and others. It is generally used to cover *Durqaa* to provide light for its double height. Its main concept is to allow a difference in the ceiling level and to create upper windows where hot air exits. It captures the cool air entering through other lower openings and pushes the rising hot air through the skylight, there providing thermal comfort in the room.

4.6 Malqaf (Wind Catcher)

Malqaf is an inclined ending tower that acts as an air shaft or wind catcher (Fig. 8). It is easy to notice from the top of the roof. It is covered with gratings or screens to filter sand and dust and to protect from insects. This shaft is placed behind the wall of the main *Iwan* and located at the roof level with a sloping outlet (Behrens-Abouseif 1989). It is normally oriented to the north to catch the prevailing wind in order to reduce indoor air temperature.

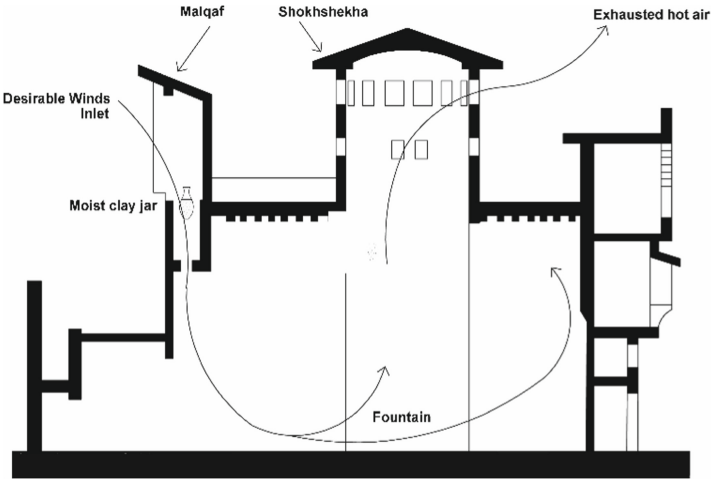

Fig. 8. Section drawing of Shokhshekha and Malqaf.

The *Malqaf* is opened to the courtyard to accommodate continuous renewal of air. It offers several advantages over other openings and windows, including the following: first, the air passing through *Malqaf* is fairly dust-free because of its design. Second, the higher the air from the ground, the faster it moves. Accordingly, indoor ventilation is possible even in a windowless room, thereby moderating indoor temperature. Similar to the *Mashrabiya*, a clay jar with moisture is at times placed at the top of the *Malqaf* to cool the blowing air of the room. (Moore 1999) The amount of moisture in the air generally increases the humidity.

4.7 Windows and Openings

Due to the hot weather, the external façade has few openings. The percentage of openings is normally 10% to 20% of the façade. Mostly, they are covered by *Mashrabiya.* In the case of internal façades, they are designed to face the inner open courtyard. Windows and openings are narrow from the inside and wide on the outside to widen the view from the inside while avoiding direct sun rays from entering. It decreases the temperature inside the building and allows airflow and natural ventilation through the courtyard.

5 Analytic Outputs

The findings of this study indicate that Egyptian housing designs deal with climatic issues along with its unique culture. As a result, some common features are applied in the local and regional Egyptian Cairene houses.

From the entrance, the house is composed characteristically of the following spaces: (1) the refracted entrance as a transitional place between the entrance and the courtyard is used to avoid nosiness and to emphasize privacy for the residents away from neighbors and passersby; (2) the use of the inner courtyard as social and transitional space is emphasized, while the other rooms are distributed around the courtyard making it a core organizing element of the house, and acting as a mediator between different spaces inside the house; (3) going straight forward after the courtyard, *Takhtabush* can be exhibited as a sitting area, located between the courtyard and the back garden as it can be shown in the Al-Suhaymi House; and (4) corridors are mainly used as partitions between visitors and residents' rooms to ensure privacy, a principle confirmed by almost all of the traditional Egyptian houses.

Correspondingly, most of the Cairene houses are likely to feature some common characteristics that include the following: (1) the principles of hospitality and size balance which are always emphasized by Egyptian traditions can be seen clearly in many aspects through allocating specific rooms for visitors and providing thermal comfort not only for the residents' rooms but also throughout the entire house including the visitors' zone; (2) besides minimizing the usage of movement circulation, there exists a diversity of rooms; (3) plans depend mainly on using transitional spaces such as corridors and stairs as an organizational element to separate and connect between different spaces; (4) the houses achieve privacy by breaking sightlines and placing detours; (5) they provide alternative circulations to provide flexibility in movement, to avoid undesired encounters and limit the movement of visitors; (6) the plans of the houses provide different levels of privacy to balance and divide spaces between meetings or social interactions, or allowing for sleeping and other activities which require privacy; (8) rooms are optimized by not allowing any form of wastage, so that every room has to have a proper function and must be used accordingly; and (9) from the entrance to the rear, rooms become much more private and accessible to fewer people.

6 Conclusion

Egyptian contemporary architecture results from boring and repetitive forms not traditionally familiar to the people who live in it. To make it worse, the architecture is not

related to the environment and is unsuited to local social and cultural values. Additionally, the negligence of traditional architectural principles leads to the absence of distinct elements in contemporary Egyptian architecture. Therefore, much of the contemporary Egyptian housing is not well-respected.

This paper is a confirmation of the fundamental design features, unique local identity, and spatial characteristics of Egyptian architecture. Unfortunately, the foreign styles that have invaded Egypt in recent times have changed the image of the city, making it drift far away from its architectural heritage.

By studying Egyptian traditional residential designs, we figured out that the character of Egyptian architecture was influenced by climatic conditions in which little variation in temperature can be observed, with minimal rainfall and intense sunlight. These conditions led to architectural features including flat roofs, open inner courtyards, and ventilators to direct air inside the house, while windows were minimized and placed high in the walls to exhaust hot air outside the house. Through this kind of buildings, the local characteristics are highlighted and inherited through generations so as to fulfill social needs.

This paper also discusses the mutual effects and influences between Egypt's unique environment and Islamic architecture which influenced Egyptian housing in terms of providing a set of Islamic basic principles as a guide and framework for housing design. Along with these principles, Egyptian regional and environmental influences are responsible largely for determining the design of the traditional Egyptian house.

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