

# Islamic traditional architecture environment overlapping the modern architecture design

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**Abstract:** This paper investigates the purpose and the functions of buildings and their compatibility with Islamic culture and the environment. An analysis from ecological and environmental points of view is carried out. The challenge is how these traditional outlines can best fit the functions of the building and the facilities intended to be offered, and how the new building has satisfied the requirements of the traditional environment. The investigation also shows the increasing usage of modern design materials for the hospital, which does not offer sufficient heat insulation or reasonable lighting. Although the Mashiakhet Al Azhar and Dar El Eftaa establishments have completely different functions, their designs consider and recognize the environmental requirements and the historical background. The sites of the Mashiakhet Al Azhar and Dar El Eftaa compound have achieved complete harmony with the surrounding environment. The hospital may meet its utilitarian needs and functions, but lacks a general environmental and traditional balance with the whole district. However, functional and traditional aspects can be combined successfully at the same time.

**Key words:** Islamic environment; historical landscape; traditional outlines and environmental requirement

**doi:** 10.3969/j.issn.1003-7985.2014.03.026

The architecture history of Egypt represents a range of the civilizations and cultures of the people in this region. It bears witness to ages of great supremacy and the dramatic decline of dynasties that ruled during a long history beginning from the ancient Egyptians to modern times. The Islamic architecture in Egypt has changed the previous famous architecture styles of Greece, Byzantium, Persia and Rome<sup>[1]</sup>. Islamic influence was a major contributing factor to architectural development in Andalusia and the whole of Europe during the Renaissance. Islamic architecture in essence encompassed a wide range of both secular and religious styles. Cairo as the capital of Islamic Egypt represented the dynasties of a long Islamic history since its establishment. Several quarters were distinguished by its Dynasty Style. The conservation of this

heritage in such a historical town is, therefore, of vital importance, not only for Egyptians but also for humanity. Although this principle has been violated in many ages in several districts, the survival of many structures is still a great human legacy. The foundation of the Children's Oncology Hospital is a violation of the principle of preservation of human heritage and its environment. This study has a comparative and an analytical purpose to show the degrees of difference in the dominant Islamic styles in the region.

## 1 Environmental Background

The core and the surroundings of Cairo City are the sum of several elements including the environmental, religious, economic, social and political. Islamic culture with its social and traditional character is one of the most important aspects that influence and characterize the region. Islam religion nature as the relation between God and the individual is forming a way of life with special respect to neighbors and the conservative attitudes of families. These characteristics are reflected in the dominant architectural types. The location of Cairo is under arid hot conditions, which has affected the urban and the architectural pattern. This pattern is clear in its adoption of some elements such as building thick walls, Malkafs, domes, courtyards, Mashrabia and the urban tissue including the organic system.

## 2 Historical Background

### 2.1 The Fatimid Dynasty

The city of Cairo has witnessed a sequence of historical events since its establishment by the Fatimid Commander Jawhar al Siqilli as a new quarter (969—973) in Fostat (the capital of Egypt since Islamic conquest by Amr Ibn El Ass in 640, which was founded beside the Babylon Fortress)<sup>[2]</sup>.

During the Fatimid Dynasty, a number of magnificent buildings were constructed including the Al Azhar mosque, a famous mosque and at the same time the oldest university teaching the Islamic faith in its various sects. Other surviving Fatimid structures include the Mosque of Al Aqmar (1125) as well as the monumental gates of Cairo City walls commissioned by the powerful Fatimid Emir Vizer Badr Al Jamali. Beside these elegant constructions, elaborate funerary monuments were also

**Received** 2014-03-11.

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**Citation:** Ma Albeetar Rami. Islamic traditional architecture environment overlapping the modern architecture design[J]. Journal of Southeast University (English Edition), 2014, 30(3): 396 – 402. [doi: 10.3969/j.issn.1003-7985.2014.03.026]

founded. The houses were simple and closed, characterized by open courtyards and crooked entrances. Fountains were also erected in the courtyards together with the use of Malkaf (ventilation) and Mashrabia. It is worth to say that since the Fatimid became powerful, the city expanded gradually with each age, particularly in the architecture style, which are their imprints of Islamic art. This art in general is strongly affected by the Islamic faith and traditions and stands in harmony with climatic and environmental aspects. Islamic architecture elements facilitated codes of conduct within the multiple and historical contexts of the Islamic world.

## 2.2 The Mamluk Dynasty

The Mamluk Dynasty began at the end of the Ayubid dynasty of Saladin (1169—1252) after his outstanding triumphs over many crusaders campaigns. The reign of Mamluks (1250—1517)<sup>[3]</sup> marked a breathtaking flourishing of Islamic art which is most visible in old Cairo. Religious concepts offered them generous patterns of architecture and art with majestic domes, courtyards and soaring minarets spreading across the city. The Mamluk architecture's decorative arts included enamel, gilded glass, inlaid metalwork, woodwork and textiles which flourished under their rule. They had a profound impact and influence around Mediterranean both in North (Europe) and South (African north coast). Distinguished Mamluk rulers established a patronage of public and pious foundations including madarases (schools), mausolea, minarets and pemarestans hospitals<sup>[1]</sup>.

## 3 Elements of the Architecture Style during the Fatimid and Mamluk Dynasties

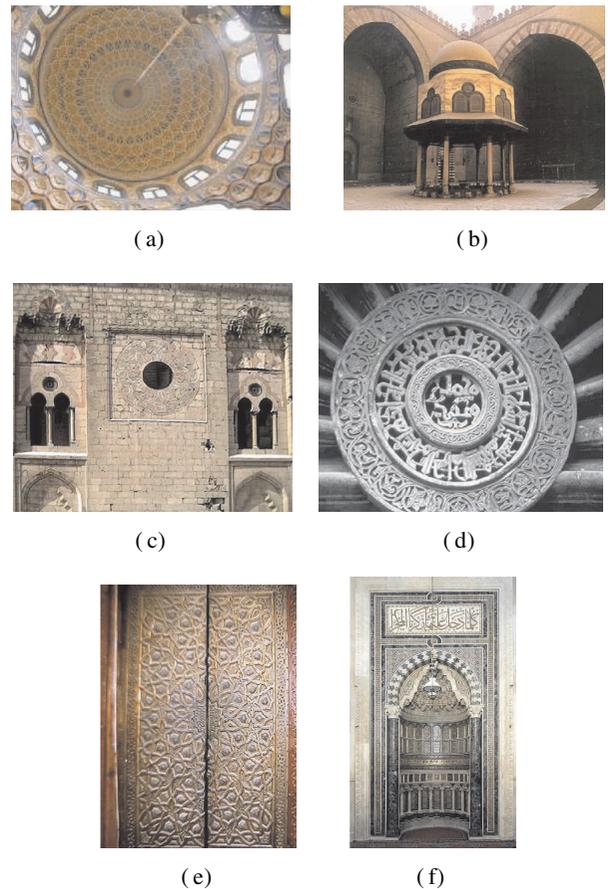
The Islamic architecture style during the Fatimid and Mamluk Dynasties can be identified by the following elements (see Fig. 1):

- 1) Minarates as towers and Mihrabs indicating qibla.
- 2) Sahn(courtyard).
- 3) Central fountains (Maida) used for ablutions.
- 4) Iwan to connect different sections.
- 5) Domes, vaults, moqarnas and arches.
- 6) The use of geometric shapes and repetitive art (Arabesque)

## 4 A Comparative Analytical Study of Modern Institutions

### 4.1 A case study of the Children's Oncology Hospital

The hospital is located at a short distance from Cairo Fostat west of the Magra El Oyoun wall (Saladin Fortification) in the centre of a random urban district. The area of the building and surroundings is about  $1.0 \times 10^4$  m<sup>2</sup>. Three entrances lead to the main building. The site was also surrounded, mainly at the front, by tracts of green lawns and parking lots. In order to establish better surro-



**Fig. 1** Fatimid interior design characteristics. (a) Use of ornaments; (b) Vaulted Iwans and a fountain in the middle of the sahn; (c) A style of window; (d) Use of calligraphy with arch and moqarnas; (e) Use of Arabesque decoration; (f) Bright ornaments at Mihrab

undings, several unplanned (randomly planned) blocks of buildings and houses were demolished. However, the neighbouring areas consist of slaughter yards and their relevant industries creat a serious source of pollution(see Fig. 2).

### 4.2 Hospital elements and components

The hospital is a building of eight stories with a total area of  $1.0 \times 10^4$  m<sup>2</sup>. Clinics, emergency rooms and the reception constitute the ground floor. These units are accessed by separate entrances from the main street. Other medical departments are distributed over the upper floors according to their functions. The hospital is provided with modern electromechanical systems including lighting, air conditioning, a computer network and an efficient system for water treatment and waste disposal, beside the highly sophisticated medical equipments (see Fig. 3).

### 4.3 Conceptual design

The architecture concept adopted is to build a construction with integrated and functional facilities. The core was originally a block of Falluka (boat) form with its sails inspired by its location near the Nile River. The concept achieved the optimum level of service efficiency but failed to be in harmony with the prevailing Islamic style



(a)



(b)



(c)



(d)



(e)

**Fig. 2** Site plan of the hospital area satellite image and surrounding streets and building frontal shots



(a)



(b)

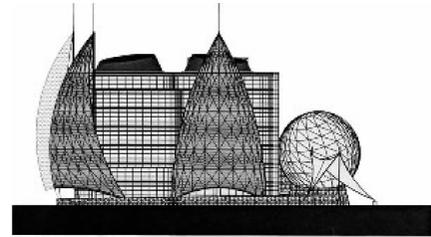
**Fig. 3** Hospital design plan and the first floor entrance

in the region. The designer (Jonathan Bailey)<sup>[4]</sup> created an architectural construction which appears a little strange for the environment. The establishment does not contain any Islamic elements and the main building is a mere block of Western style. The Islamic style, however, reveals a dynamic relationship between the blocks and spaces. To introduce Islamic elements to a modern hospital is a great challenge for the designer who can be inspired by the surrounding Islamic architecture (see Fig. 4).

The double-layered glass facades the hospital did not, in fact, accomplish shaded and/or air-conditioned interiors.



(a)



(b)

**Fig. 4** The 3D preceding project model of the hospital and main elevation

Curtains and centralized air-conditioning were extensively used. For attaining shade and light refraction, metal structures were used in many parts of the frontal facades. These structures included some parts which were called “sails”, quite different from any Islamic style in the surroundings.

Fewer openings of limited lengths are in the frontal facades of both Islamic constructions, and using Islamic features such as Mashrabiya, ornaments, finishing coloured materials, and other elements, this all came in harmony with the Islamic architectural style(see Fig. 5).



(a)



(b)

**Fig. 5** External facades of the entrance of the hospital and the entrance from the top

## 5 Compounds of Mashiakhet Al Azhar and Dar El Eftaa

This modern compound is replacing the separate old in-

stitutions of both buildings. These two institutions are under the control of the Al Azhar establishment. The first one (Mashiakhat Al Azhar) is the head-quarters of the grand Sheiks' (Imams') offices and the host of specialized centres for research, publications, faith dissemination, and international relations. The other one (Dar El Eftaa) is formally recognized as the only source of fatwas (interpretations of Islamic laws). The two institutions were formerly occupying the old buildings, but lacked enough space and suitable facades. These are the main reasons for having another site with enough space for several extended facilities.

The location of the Mashiakhet Al Azhar and Dar El Eftaa was chosen because the new structures in the region of the Fatimid Cairo are at a short distance from the Al Azhar Mosque (the famous Fatimid mosque in Cairo). The hilltop was elevated higher than the surrounding streets and grave-yards at the cross road of Salah Salim and Al Azhar street. The Islamic surrounding environment has had the greatest impact on the planning and architectural design of both buildings. The compound forms an engineering architectural model integrating all elements of Islamic architectural style and art, taking into general consideration the historical Islamic landscape (see Fig. 6).



(a)



(b)



(c)



(d)



(e)

**Fig. 6** Site plan of the compound of Mashiakhet Al Azhar and Dar El Eftaa satellite image, and terrestrial shots of the surrounding streets and buildings

### 5.1 Elements of Mashiakhet Al Azhar

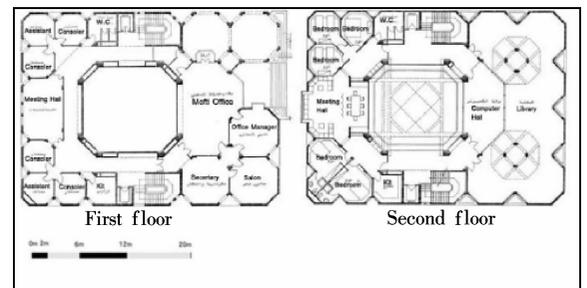
The building is an administrative construction occupying an area of 6 000 m<sup>2</sup> with dimensions of 1.8 × 10<sup>4</sup> m<sup>2</sup>. It is composed of 8 stories to accommodate the various administrations according to the program of its utilitarian needs and functions (see Fig. 7).



**Fig. 7** Design elements of Mashiakhet Al Azhar building on the ground and first floors

### 5.2 Elements of Dar El Eftaa

This is essentially an administrative building, where consultant services are offered to citizens and authorities. Its area is about 2 000 m<sup>2</sup>, and it is composed of five stories. The administration offices are accommodated according to the sequence of functions. The internal courtyard is used as a prayer yard surrounded by lateral courts. The office of Mufti (Azharian Sheikh) occupies a central and special location at the main facade facing outside via a magnificent Mashrabia (a famous Mamluk architectural element representing the modern balcony) (see Fig. 8).



**Fig. 8** Design elements of the El Eftaa building on the first and second floors

### 5.3 Conceptual design

The conceptual design of these two constructions is compatible with the Islamic heritage of the Mamluk Cairo. The concept adopted by the designer (AB-DTC, Local Bureau) depended on achieving an Islamic style in a modern and contemporary spirit, integrating at the same time with many surrounding Islamic buildings and a historical landscape. It incorporates the common elements of the Fatimid and Mamluk monuments nearby.

## 6 A Comparative Analytical Study of Architectural Forms and Elements in the Three Institutions

### 6.1 External facades

All outside facades of the hospital are mainly of glass, giving an impression of transparency from a distance which is strongly contradictory with the Islamic design concept of external facades. These have fewer openings looking outside while the main and important openings are looking over internal courtyards, which meet the important Islamic principle of privacy. The design of both the Mashiakhat Al Azhar and Dar El Eftaa wonderfully represents this preceding principle (see Fig. 9).



**Fig. 9** Terrestrial photos showing the external facades of the three institutions. (a) External facades of the hospital; (b) External facades of Al Mashiakhet; (c) External facades of Dar El Eftaa

### 6.2 Openings

Due to the extensive surface areas of the openings of the facades of the hospital, sun rays and glare become a problem in day time due to the wide spaces in the structure. To overcome this obstacle, heavy curtains and double glass sheets with argon gas inbetween them as a filter of harmful sun rays are essential in cancer treatment for the children who are exposed to radiation and chemotherapy. The use of wide glass planes did not result in successful heat insulation. Accordingly, the hospital is using mechanical and electrical means in all times to achieve the previous objectives (see Fig. 10).

### 6.3 The entrance

Since Islamic architecture has a common characteristic style, concerning the main entrances which are generally with almost the same height of the building or the first floor, this entrance design is strong and assertive. In an Islamic compound like Al Azhar, the two institutions are



**Fig. 10** The glare from extensive use of wide glass openings in patient room and the patient room curtains

designed with this style of entrances at the front, facing onto the main streets. Every entrance is clear and lintelled with a pointed arch.

However, in the hospital case, metal structures were used to define and reinforce the main entrances. Other entrances are simple and usually have front and intermediate glass doors (see Fig. 11).



**Fig. 11** Extensive use of wide glass at the entrance and the wide open glass floors space design

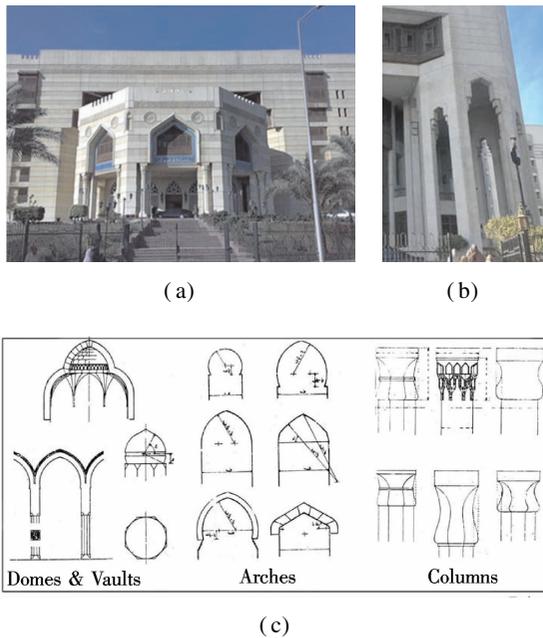
### 6.4 Elements of structural form (columns, domes and arches)

Islamic architecture in the vicinity has known to embrace important and characteristic structural elements. Columns are one of these elements and were adopted in the earlier decades of Islam from Churches and Temples (Abd El Gawad, 1987)<sup>[5]</sup>. In later periods, the columns were modified, particularly during the Mamluk Dynasty and exhibited elaborate forms. The designer of those Islamic institutions inspired different forms of columns using modern materials for coating, such as marble and some other manufactured materials. Dome elements were successfully used to cover the bulk of the main building. Also Aqoud (Arches) of Islamic style was used in similar scales during the Fatimid and Mamluk Dynasty with some modifications to give a contemporary style to the construction (see Fig. 12).

However, in the hospital building case, a different concept and culture were adopted by the designer, who used a spherical form of glass and metal structures, for instance. He used these forms as constructional forms and as decorative patterns, which are not compatible with the style of the surroundings.

### 6.5 Internal facades

The design of the Islamic institutions depended on dec-



**Fig. 12** The development of Islamic prototypes. (a) Photo of Al Azhar entrance domes; (b) Photo of Al Azhar entrance vaults and arches; (c) Islamic architecture elements (columns, domes, arches) at the Al Azhar compound prototypes' development

orating the external facades with Islamic elements, as well as in the internal facades, using calligraphic patterns excessively. Mashrabiya and wooden arabesque are used to decorate the large openings in different facades. Marbles with geometric patterns and different colors are used in floors and walls. Ceilings are decorated with geometric units and colour finishing materials. Carpets and furniture decorated with Islamic repetitive patterns were spread in courtyards and reception halls. Yet for the hospital interiors, imported materials are used to cover walls and floors. Finishing materials used in covering walls are chemical products treated to resist bacteria and microbes<sup>[6]</sup>. These materials and treatments could be used in the interiors of the Islamic constructions without contradiction and could be modified to be in harmony with the Islamic spirit (see Fig. 13).

## 7 Results and Discussions

All aspects such as the arch science of architecture of the traditional Islamic and the modern design have to achieve complete harmony with the surrounding environments. The Hospital meets its utilitarian needs and functions, but lacks a general environmental and traditional balance with the whole district. Functional and traditional aspects, however, can be combined successfully at the same time. It is the task and the art of the designers to develop certain Islamic elements to fit the purpose of the construction. The reaction of local designers with the traditional and environmental requirements is noticed in many other establishments. The hospital is located in the expansion districts of Cairo. There is a certain need to be



**Fig. 13** Photo of the interior design. (a) Islamic traditional arch design; (b) The modern design of the hospital

present in the area; it should be compatible with its environment as well as Islamic traditional designs. The location of such a critical and highly sophisticated institution is greatly at odds with environmental and traditional requirements.

## 8 Conclusion

A complete compatibility with the environmental and traditional aspects is a challenge facing the designer who is also striving for the application of technological advancements in the relevant fields. The contradiction between the two cultures, the traditional and the contemporary, would call upon the architect to neglect one for the other. Environmental and traditional aspects should be carefully considered when great and important projects are to be implemented in the city. Different designs of a project should be displayed to the public for discussion and evaluation. Local architects are called for their role and duty in harmonizing between technological and traditional requirements. The advantage of cooperation and assistance with foreign experience was sought in the application of modern technology within a frame of an integrated system, satisfying both traditional and environmental needs. Architectural competition in important projects of national interest should necessarily be organized for this purpose.

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## 与伊斯兰传统建筑环境重叠的现代建筑设计

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**摘要:**从生态环境的角度分析建筑物的功能和伊斯兰文化、环境之间的兼容性. 所面临的挑战是如何使传统的外形最大程度上适应建筑物的功能和本来的用途, 以及新的建筑物如何满足传统环境的要求. 研究还表明, 目前医院建筑中越来越多地使用现代设计材料, 但这些材料并不能提供足够的保温隔热和适当的照明. 而 Mashikha Al Azhar 和 Dar El Eftaa 的建立有完全不同的功能, 其设计考虑和认识到了环保需求和历史背景. Mashikha Al Azhar 和 Dar El Eftaa 的场地已经与周边环境达到完全的和谐. 医院可能有非常适合的功利性需求和功能, 但缺乏与整个小区整体环境和传统的平衡, 然而功能和传统应该成功地同时满足.

**关键词:**伊斯兰环境; 历史景观; 传统轮廓和环境要求

**中图分类号:** TU2