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The Role of the Environment in the Civil Architecture in Istanbul during the Ottoman Period a Comparative Study with Rosetta

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***Abstract*:** *There are many factorsthat affect the structure of architecture in general, and civil buildingsin particular, like the economic circumstances, ethnicity, jurisprudence, political issues, as well as the founder's perspective and his capability to afford the expense to create a structure with soul and heart. In this regard, this paperaimsatspecifically highlightingthe different environmental factorsaffecting civil architecture such as the geographic nature and climate. All these features can revealmuch about the building, to point out whether it is original or not.This is reflected in the materials and ideas as well,whichprovide insights on if the plan of any buildingis original or affected by a certain region or foreign effects and basics, which could have the main control over the work.Such factors played impressive roles in house planning.Thus,the study refers to all of the effects, with special focus on the climate and location of those houses, which resulted in having these master pieces in both cities. Remarkable palaces and houses planning showed thatthe windows'distribution, balconies, roofs made in different shapes and forms; and all the other elements were used to complete the structure of buildings.*

***Keywords*:** *Turkey, Egypt, Biosphere, River Nile, the Mediterranean*

I. Introduction

The environment means the different circumstances which affect growth and life, including nature, and everything in the geographic surface, like animals, plants, and mankind. For that, this paper aims to explain all the roles played by the environment in the structure of the building (1, p.17). Thus, the environment here refers to all roles taking part in the surroundings, such as religious, social, and cultural factors (2, p24). In fact, an observation of the importance of the environment helps in specifying the outline of any building, especially civil ones due to the close relation between the needs of individual and his buildings.

As a matter of fact, the importance of Istanbul as the Ottoman Capital of the Muslim Caliph is known, but the aim here is to study the civil architecture aboard theBosporus, which divides the city into two parts Asian and European. Those two parts are affected by the sea climate, which is similar to the location of Rosetta that is bounded by the sea and the river Nile. These were the reasons behind the choice of Rosetta for the comparison, to highlight similarities and contradictions between the civil architecture in those cities, referring to the movement of mutual influences between them in the Ottoman Era. Many researcher studied both of the cities individually like (3) (4) and (5) but my paper will go through the role of the climate on the civil architecture then the comparison between both of them according to the effect of the location on the architecture in general.

I.1Statement of the problem

Can architecture be considered as a result of the environment in general, and what is the role that the environment plays to establish a unique perspective of architecture according to the geographic location? Where can be the similarities and differences observed between both cities?

I.2Case study (scope of the study)

This study will focus on Rosetta, a city in Egypt, which is put in comparison with Istanbul, focusing on the area around Biosphere. The idea behind this choice is the geological and political circumstances when Egypt was governed by the Ottoman. Meanwhile, the paper will study the architecture of the houses in the both countries, with specific focus on the types of the houses in Rosetta and Istanbul.

I.2 The objective

The paper aims to answer some research questions related to architecture and the environment;

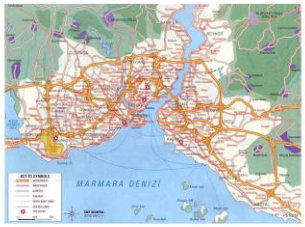
- Is there an environmental effect of on architecture?
- Is there any antagonism between the environment and culture or the society?
- What if the architecture did not match the environment, what does that mean?
- What characterizes Rosetta's architecture in Egypt?
- What are the reasons behind the choice of Istanbul for the application of comparison with Rosetta?

I.3Method

The research will follow each individual feature of the city location; its overall planning, the houses planning, the materials, and the distribution of inside and outside units at the houses to answer the main research questions by explaining the role of the environment in affecting such features.

II. Istanbul Location

Istanbul is located in North Western Turkey within the Marmara Region on an area of 5,343 square kilometers (pl.No.1). Bosporus is the area which connects the Sea of Marmara to the Black Sea, and divides the city into European side, Asian side and Anatolian side (pl-No.1). Istanbul has a Mediterranean climate, although its climate becomes more nautical towards the North West. Temperature in Istanbul is influenced by two competing seafaring winds, "the Black Sea and the Mediterranean".



Plan (1) Istanbul map; (6)

II.1City planning

Istanbul is a great capital with a great history. Its buildings reflect various peoples and the empires that have ruled its predecessors. It is not easy to talk about its city planning, but it is easier and more focused to talk about a variety of its civil buildings. It should be noticed that the establishment of the buildings at the side of the sea began in Istanbul as soon as Muhammad al-Fatih entered the city and transformed it into an Islamic city. But, the aim here to focus on the edge the Bosporus, which marked the beginning of the European influence with a huge number of civil buildings at the end of the 17th century A.D. this area is chosen since the various imperial families abandoned the center of the city to become the city of the people, containing bazaars and many shops. In short, it became a crowded city with no trace of good planning, having slum housing, which compared with the European new cities. Thus, the imperial family transferred their location to a new one, the Bosporus edge. For that, many palaces and houses were built at the new location since the 18th century A.D (pl-N). There are differences in its planning, units and decorations from what was seen in the buildings of the main capital, especially at the sea side. There are plenty of palaces, houses and Ottoman kiosks that are known as "Maslak", which used to be built at the empire garden on the side of Bosporus. In some areas like Beşiktas, Bebek, Nisantasi, and some of those Maslak have a history and have been built in memory of victory or for a festival like Bagdat Koschku, Revan Koschku, and Sunnet Koschku (5, p.61-71) (pl-N. 1). Those constraction were connected through a balcony at the sea side. There are other Koschku in many other places in Istanbul overlooking the sea, all have the same features.

III. Houses Planning

The Turkish house contains a main unit used at the Rosetta houses, as in sallamlek, haramlek to separate between men and women (Fig.1, 2). More than one Ewan opens at the centre of the court, with rooms surrounding its hall. It is easy to say in general that it reflects the character of the Islamic houses (7), which respect values and ethics of Islam, along with meeting the needs of the owner [1] (2, p. 27). While planning, the architect put into consideration the rooms' distribution. Winter room were located at the South and East, with small windows and roofs, while summer rooms were at the North and West with long big several windows Fig-N.1, 2, 3). This was done to receive good air, considered that the wind in Istanbul came from the North and West like Rosetta. In reference also to the houses at Bosporus, they were not always used as around the year residence place, but sometimes the owner assigned them for summer only. There is a big difference between Rosetta and Istanbul, which affects at some point the entire distribution of the rooms in both cities, but at the same time there are many palaces that used to be a residence place for the Sultan and his family like Dolmabahçe [2]. The planning of the Turkish houses follow the cross design that has a centre with a

perpendicular axis, with this central space sometimes roofed by a different dome in shape or decoration. This method is originally Turkish dating back to ancient times and appears in many houses across the Bosporus (2, p.57). To know more about the planning of the palaces on the side of the Bosporus, the researcher traced the Dolmabahçe palace planning to refer to its design. The planning is organized around a series of large central halls aligning the longitudinal axis surrounded by smaller rooms and linked by corridors. The administrative section is entered through a formal garden to the west. It has a highly formalized and symmetrical plan which consists of four major halls on two floors, linked by a monumental staircase at the centre. The entrance hall (MedhalSalonu) and the ambassadorial hall (SeferaSalonu) above have identical cross-shaped plans adorned with crystal fireplaces at the inner corners. The ambassadorial hall and smaller rooms around it were used for the reception and entertainment of foreign guests; a part of the planning of the palace which is built over a great space (Fig.1, 2).

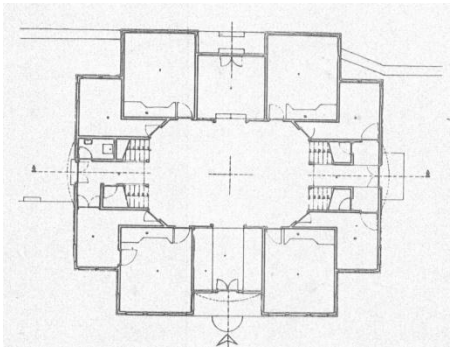


Fig (1) Yali house plan (7)

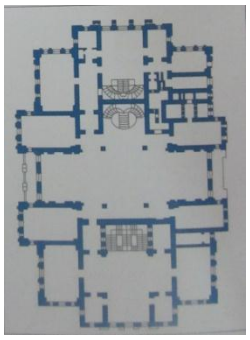


Fig (2) Beylerbei palace plan (7)

IV. Materials

Turkish architects used local materials, stones, and wood of good quality, which is why many houses are made of wood. In fact, Bosporus is completely built from wood (8, pp. 665-714). As for stone, they used limestone for buildings foundation, with width 60-80 cm and approximately the same in height. Wall thickness was of average 30-40 cm, depending on how many floors exist. The first floor walls are characterized by being covered in white and yellow colours with different shapes, porous stone, glow and regular shapes, used to fill the spaces (5, p.61, p79-81). The presence of quarries in Istanbul made it possible for marble to be used in floors, fountains and furniture's borders.

Earthquakes affected the construction badly, therefore, sometimes wood [3] (3, p.193) was used in the whole house or just in some sections. The architect used chestnut and pine trees at the structure of the main columns, while used less hard wood in the rest of the building. This difference between material kinds is due to the difference in the expansion and contraction of the space between the sheets of wood. Also, such design gave the building flexibility and stability to bear natural factors. The architect used wood to bind the outside façade which faced the open air, using it with different techniques but with the same materials. There is no big difference between the mortars used in Istanbul and in Rosetta, except for in the materials, which were brought from Bosporus at Istanbul. The mortar here is covered with insulating materials like gluten, wax, and zinc to prevent wind and cold air from penetrating the houses, and they used to make bricks to use them at the roof in a gabled pattern. There are some differences in the units used only in Istanbul houses.

V. Distribution Of Architectural Units Outside Houses

V.1The Façades

The façade of the first floor contains wood sheets organized vertically for ventilation. On the contrary, at Rosetta houses, rising second and third floors are seen to have more air and sun light from all directions, for a better vision. The method of binding the external façade exposes to the wind and the duel windows were kept there until the 19th century A.D, which later changed at many levels to cover the whole façade [4] (5, p.87) (Fig.3) (photo.1).

For example, at Dolmabahçe Palace, the ceremonial and harem quarters of the main palace have separate back gardens protected by high walls to prevent snooping, respecting the sanctity of women, and the four halls facing the Bosporus have elaborate and distinct decorative schemes.

Fig (3) façade styles in Istanbul; both Façade in Istanbul and Rosetta explain the role of the Façade in distributing light and shadow in between on the building

Photo (1)Amcazade Hüseyin Pasa Seaside Mansion, represent Istanbul wooden houses on Bosporus (9)

V.2 Windows and Mashrabia"kafaes"

This is the most important unit controlling light and air. Used at the Mashrabia[5] (3, p.195) is the circular billet "barmq" (Fig. 4), which plays an important role with the narrow billet to attract cold air and send the heat outside the room (1, p.10). The shape of the upper windows changed by the European influence on the Ottoman architecture, but the standards of its shape were always the same; squared and small at the lower part. There are many kinds of windows at Istanbul like "Gumba", which rise at the façade, allowing to have a bigger space in the second or third floor, and also to allow air and light to enter the building and to have more than one vision of the field like those at Kobrile house. The opened window design spread in the 13th and 19th centuries, with closed windows part of the Ewan. The pinnacle windows had 5-6 ribs, while the corner windows were part of two façades, extending to the upper floor (5, p.71). Kabuls were finely used to raise the windows in the upper floor for more air and to have bigger space (5, p.16). Since the roofs were high in the buildings, they need more light, and that is why the windows are seen in the palaces at the upper part of wall (9, p.17). All these features appeared in Rosetta houses but with different distribution according to importance.

The Turkish architectskept the spacesand the form ofwindows, wherethere is always afixed relationship betweenthe upper and lowerwindows, wheretheupper is smaller than thelower. It took a shape closer to thebox in the 17th century A.D., and itwas fromstained glass. Then, it became bigger and higher taking a rectangle shape until it was equal with the lower one with a frame of glass in the 18th century A.D., then it returned back to the old design again. Finally, the two parts were attached together to take the rectangular, circular, or square shape (9, p.79).

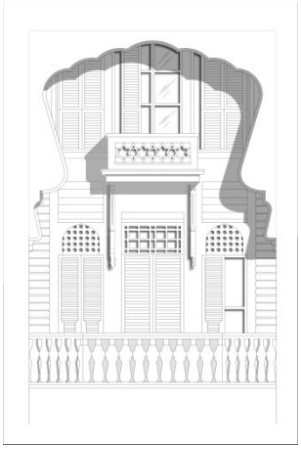


Fig (4) style of Ottoman Mashrabia in Istanbul

V.3 Roofs

In the buildings, architects used the double, gabled roof covered by some kind of bricks suitable to rains and snow in winter, protecting the entire dome. The architect used the double diagonal dome (10, p.139). There is a point worth reference here; using the rattle is rare in Istanbul houses, but it is seen in Egyptians houses of owners who have houses in Istanbul as well, like Said Helme House at YniKowie, and Palace of Abbes Helme the Second at Gobklwo, which are recognized as Egyptian units used for Egyptian houses in Istanbul.

VI. Distribution Of Architectural Units Inside The House

Houses of Istanbul had courts in bigger space, garden with a big scale and a fountain. Fountains also existed inside houses to cool the heat of summer air, and were sometimes replaced by "Salsabil". This variety in open space and water units provided good ventilation inside the house that was not seen in Rosetta (Fig.5), because of the lack of horizontal space to build, which was replaced by vertical expansion. That is why Turkish houses do not exceed a 9 m. length, but can reach height up to 17 m. in houses of Rosetta. The unit of houses planning contains a first floor that has a hall named "Hayat", and this floor is used as storage. The second floor has the central hall "qaa" which is characterised by cemetery and has a cross shape. It has a fountain in its centre at "salamllek" the men section, but it is simpler in "haramlek" the women section. The floor of these halls is approximately 15 cm lower than the rest of the ewans and rooms surrounding it. With a double roof like Qberieley Pasha at Bosporus, "oda" always connected to the haramlek (9, p. 75). It has a square shape featured by connecting between haramlek and salamlek like the one existing in Mostaea Fadel Palace (10, p. 145). It is opened at the garden, the pool and the river, occupying the best location. Diwan as a unit is similar to Ewan in planning and location. Finally, the houses have many entrances, the most common feature among them is that they are open to the river, and the distribution of the entrances at the Bosporus houses characterizes those buildings as being like the houses planning in Islamic period in terms of the general view.

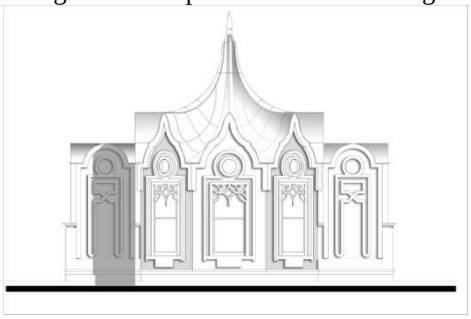


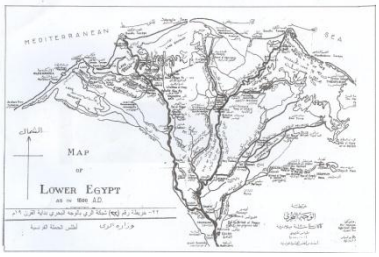
Fig (5) Kiosk linked to houses show how architecture use the location on the seaside to gain view and good ventilation

Many examples can be seen to support the discretion of Istanbul's houses like Dolmabahçe Palace, like the Palace of the Crown Prince which is a separate structure located immediately to the east of the harem section. It is nearly identical to the Bosporus wing of the harem. The two structures are separated by a wall, closer to the water, in which sometimes even the architect located the bathroom to view the water and a fence. Yet, it appears as an extension of the main palace when viewed from the water.

VII. Rosetta Location

Located at longitude 31º 24´ 34″, south of Latitude 28º 8´ 35″, it represents one of Behaiera Cities, with site at distance of 12 km [6] above the Nile River (11, p.13, p224) (12, pp.1-2). It is bounded on the North by the Mediterranean Sea, from East by the Nile River, the West by Abu Kier Bay and from the South by Abu Mandour hill (13, p29) (plan,2).

Upon observation, it can be noticed that there is a big change between Ottoman Rosetta and the current Rosetta. On one hand, the change came in demography and urban design that were caused by the change in Nile direction and city site by the sea. The city was moved from the South to the North due to the bilateral relationship between the sea and river [7]. So, buildings that used to overlook the river directly became 2 or 3 streets far from it.



Plan (2) Map of Lower Egypt as it was at 1800 A.D, by the French campaign, Ministry of irrigation, Egypt

This was an overview of the city location. The research focused on Rosetta of the Ottoman period which spread over the length of the river up to 900 m., and a depth of about 250 m.

VII.1 Urban Planning of Rosetta

Planning the city is different from the Islamic urban planning, in which the mosque was the main interest, surrounded by Harets, Zoqaqs and markets. Rosetta streets were organized from South to North and interrupted by side streets [8]. The main street is parallel to the Nile River at long, interrupted by an episodic street named "Dehleze Al Moulk" beginning from west to the river. But, the main avenue that is parallel to the Nile is "Al-Souq Al-Omomeiy". The city has been divided into four sections; North, South, West and Middle [9] (pl.N.3).

Plan (3) Rosetta city plan, (12)

VIII. Houses Planning

Rosetta houses planning are closer to the 14th century houses planning in the West than it is in the East. They are characterized by great look from the outside, due to proper use of brick, and the right distribution of Roshan that made harmony in colour and shape. Despite the existence of a direct effect between home building in method at Rosetta and Istanbul, there probably are local architectural models known as the "model of the Nile Delta", which are similar the houses in Sinai and Jeddah cities (14, pp.94-97) (photo. 2).

The location of the city affects the design and planning of all types of buildings, due to the site of the Nile and the sea. Not enough space was available to build on, which is why the architect intended to build in vertical height, with many floors, like "Mizonie and Galal Houses", taking into account strengthening the walls and doors to cope with the coastal city climate. Lack of streets' widening aspect is one of the bases of Islamic city planning (15, p12) (photo.3). This does not make the observer forget the effect of the many lakes surrounding Rosetta like Mdcure Lake that affects the wind, transferring it to another direction. That is why the wind that blows at Rosetta is North and Western North wind, setting most of the houses façades in the same direction. In cases of which houses had Southern façades, the architect intended by this to provide them with "Rochan" as will be seen next.

Before moving to talk about houses' elements, an overview of the houses' design and influential factors, along with the commercial and economical importance of the city is worth reference. The first floor is used for caravansaries or shops and stores, which plan from the hall "Qaa", under which is the water tank that is built at the same street level with walls of width 2m approximately. It is covered with some kind of mortar "Khafekee" to prevent water from touching the rest of the house's walls (16, p176). This tank supplies the Sabil with water and reaches up to the third floor through deep pipelines to serve women's needs. At the same floor, there is the bath at the most private area which goes up through the second floor. Other floors contained Ewan,

surrounded by rooms, similar to the Takhitabush which appears in Cairo houses. The Ewan is situated within the lintier court which faces the sun all through the morning and afternoon. This court is a hall, smaller than Ewan, bringing cold air to the Ewan from a window at the end of it. The movement between cold and hot air takes place by the light hot air that goes out to be replaced with cold air. That reflects the architect's ecology and climate knowledge. This can be seen in buildings like Tuqatli, Ramadan, Manadili, Amasyli, Ilwan, Arab Kulli and Makie houses (17, p.16). The top floor, which is outside the front of the house, is similar to some kind of compartment; a unit that allows a view to the river and the sea. Representing an interior park with fresh air is a decorative polygon rattle made of wood with ornamented decorations. All the units in the houses are distributed from South to North, facing the Northern wind. The organization of houses being side by side has it effect in provision of heat in summer, shade in winter, and Islamic architecture ethics in city planning.

Photo (2) distribution of the houses in Rosetta; by Google earth 2010

Photo (3)Islamic city planning, lack of the street wide according to the society and climate (2)

IX. Materials

Local materials were used in the buildings, like fired brick "Agur" [10] to cope with the sea weather, wood to prevent water from reaching the foundation and help setting the building, and white mortar "kohela" (3,p179). Each will be referred to separately (photo. 4).

The Red-black brick (18, p.88) [11] is important as it is moisture resistant, and its colour turns into red and black because of $feco_3$, and fe_2o_3 [12] (photo.4). Organic material are added to the bricks during each of those steps "drying, baking, sifting and fusion", all of which affects the brick, making it capable of resisting and strengthening it against disintegration and disruptive forces. Using glasses inside the mud helps gluing quartz and mulite (17, pp.53-55, p231)˙The architect replaced ordinary sand with black sand at the coast of Rosetta's city to increase the proportion of porous bricks (18, pp.391-393). It was noticed that the specifications of brick included good, flat and smooth surface, homogeneous colours, complete combustion, amorphous, and cracking-resistant, with dimensions of 22×10×6 cm (17, p. 34). The architect intended to differentiate between the bricks which are used at the façade and the ones used to build houses, to decorate the façade and make it distinguished. The architect was also concerned to make thick walls to fit the construction circumstances. The carpenter made wall cabinets to make use of every space existing in the building, while the architect focused on reducing the weight of the walls, making them unequal on the inside and outside, building them upon the parts. Walls were made as an extension to the roof, like Manadile, Toqatlie, and Amasile houses. This trick was used in the houses of Istanbul (19, p.211) (20, p. 89) (21, p. 96).

Wood has many architectural features, strengthening the construction against weather factors, and weakening earth factors, earthquake and other industrial causes (photo.4). It helps in distributing the weight of

the building on walls. It used to extend into reaching the building's foundation, before the construction of the Delta Dam during Muhammad Ali Pasha Era [13] (3, p.179) (17, p.124) (11, p.47). Wood was used in house's corners, to prevent the erosion caused by the wind.It was also utilized in many places outside and inside the houses, in many different units and elements such as the façade, windows, in arches, as an assisting material between two floors, etc.

The mortar and the filler played an important role to glue the bricks together, and settle the surfaces of the brick to make rows. Building's solidity depended on it, and it consists of silt, $CaSo_4$, 2 H_2O (17, p.72, P.77). The architect used several kinds of mortar like Hydraulic Lime Mortar, which can bear moisture and consists of organic materials and trash (17, p100, p.107). English bonds like "edia and shinawey" were also used alternately with Flemish bonds "Hamel and Shim" (22, pp.133-135) (17, p.34, p.115-116).

Finally, it can be said that the architect used local materials for thermal insulation, to commensurate with the environment and to meet the owner's needs.

Photo (4) local materials used in Rosetta houses

X. Distribution Of Architectural Units Outside The Houses

X.1 The Façades

To cope with the heat, the architect took part of the façade's height to insure shades rate standing by 1:2, 1:3, 1:4 between the houses and the street. He used visibility and recessions to direct the shade at the main street by breaking the sunlight. The Roshan used wooden windows which were attached to the façade, based on kabuls (photo.5). It helps aligning with the organization of the road, and plays a major role in the aesthetic values of Islamic architecture. The architect's respect for Islamic aesthetics appeared in the doors of houses being made not facing each other to achieve the Islamic privacy requirement, for neighbours not to expose each other. An example of this is the Baqaroley house which set the entrance at the most private street. Privacy is also seen at Arab Kolie, the Towkatlie house which rises by two Rawshan at the eastern and western façade, Ramadan house which raise the bath on the court of Maharem house in which the top floor bathes have no windows, Al-Jamal house which has an opened window at the bottom of the standout of Maharem house. The architect of Al-Jamal could not open side windows because of the neighbours "Maharem". This was also done in Ramadan house, HasiebaGazal house and Thabet house which turned back at the façade of the third floor. This means such houses had older foundation neighbours, respecting the precedence of others. Façade houses in Rosetta gave the city special feature and special tone, becoming almost like Istanbul houses (21, p.96) (23, p.272) (9, p.215).

Photo (5), Arab Koley and Ramadan Façade, show the high of the building and the distribution of the windows and Mashrbia

X.2Windows and Mashrabia

Rosetta architects intended to transfer the direction of windows from the South to the North and West making them bigger and higher than the southern windows (24, p .115) (25, pp.184, 185). Local architect observed that the width of the windows means the decrease in temperature, that is, by increasing the width of the walls, the shades will increase, helping in reducing temperature. Also, square windows are better when they are

thicker and taller [14], with the Mashrabia being narrow at the bottom, allowing cold air to enter the room. It is known that cold air is heavier than hot air; therefore, the upper part of Mashrabia is larger in space than the lower one. It is crystal clear that the architect at some point used “Sehrige” Turing wood at the store and first floor because of the vast types of it, like “Barmqs”, ”Maimonieitalic box” Turing wood, Hexagon Turing wood, empty Turing wood, the half Crusader Turing wood, Crusader Turing wood, “Alknanci” Turing wood, “Aernos” Turing wood, “Mufouk” Turing wood, "ring" and existing “Almakulai” Turing wood, etc. (fig.5) Each kind of those has its own usage to fit some windows more than others (26, p.124). There was a variety of house floors in their width and height. Side windows “Qoasf” made the rooms overlooking two façades become four and more, which helped in providing a broad vertical appearance (photo.6). Such design obtained a panorama by looking to the river and the sea. As long as there is variety in the Turing, there is also variety in mashrabia, as it took rectangle shape like Ramadan, Baqrolie, Arab Kolie, Galal, Kohia, and Dera houses, which are composed of 13 ribs, polygon forms of 5 ribs, or 10 ribs like in Qnadile house.

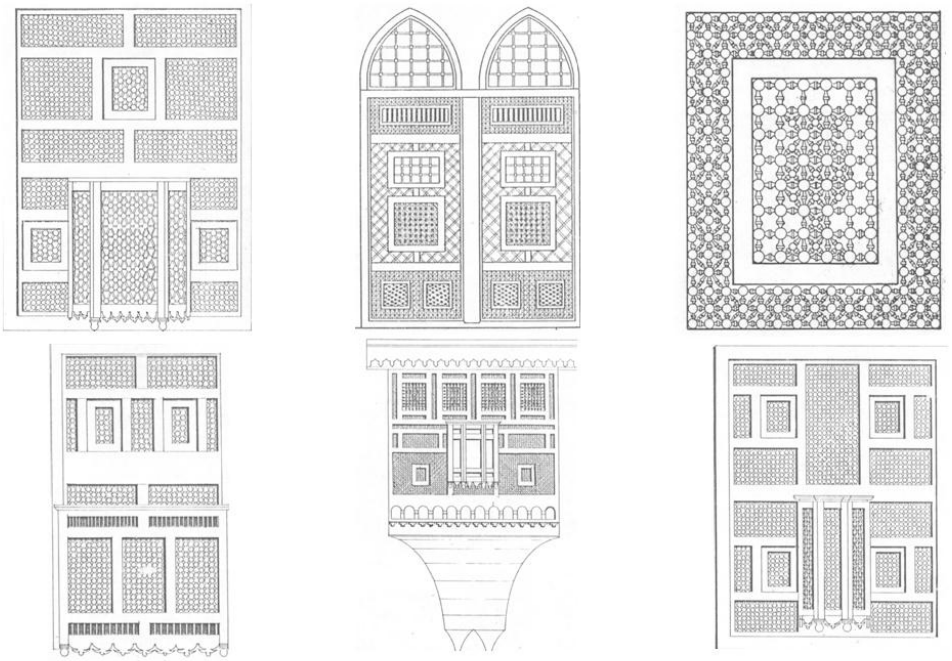


Fig (6) kind of using the pieces of wood to create windows and Mashrbia fit with socitey and climate (11)

Photo (6) Showkind of Mashrbia and Qoasf used at Rosetta houses

X.3 Roofs

Roofs are covered with limestone to prevent water absorption due to rains. There are many kinds of roofs, utilized in houses and flatscomposed of two levels around 50cm. The upper roof makes use of the ground

of the room, while the lower represents the roof of the room which helps in having a fine decorative roof. Cross vaulted roofs are used in storerooms, some halls and water tank.

X.4The Gutter

Gutter used for carved on the wall, is made of limestone to prevent water fall at the passage (27, p.17) (28, p.79). Rattle was placed at many roofs and floors in Rosetta houses, in rectangle form in Maizoney and Thabet houses, in square in Bqarolie, Mnadile, Twqatli, Mahrem, and octagonal in Mnadile, Elwan, Arab Kile, Asfour, Frahat, Abohm and Amasile houses.

XI. Distribution Of Architectural Units Inside The Houses

Courts are the most important units used to push air inside the rooms from the south façade. The architect used courts at the north side, with some double windows open, as Toqatlie house, to overcome the problem of indirect exposure to north wind, like the houses of Qanadilie, Thabit and Makie. This was done by planning two courts at the north with a window in the hall "dorqaa" on the first floor in Makie house, and double window in Qanadile house (17, p.15). Courts were used for getting sunlight and air, with no exposure to the neighbours. In Maharem house, the court was at the South side (photo. 7), while the Qanadile court and Makie planning was at the East side, and the rattle was closed in Thabet and Qanadile houses missing the neighbours' exposure role. At the main while court could be attached with other units serve to the houses like in Hasiba House (photo.8)

Photo (7) show the court unit in Mharem house

Photo (8) court at Hasiba house, show the mille linked to it

XII. Conclusion

Although Rosetta's urban design was not planned based on the Islamic standard, it respected all the Islamic ethics, like the Istanbul houses, which may also be due to the geographic relations between Rosetta and Istanbul, for the former was the nearest gap to Istanbul (29, part 11, p.75).

This is why common factors are observed between them. In fact, some art historians said, "There is no difference between the two cities except the materials that were used, like stone in Istanbul and brick in Delta building" (3, p.192). Thus, using the local materials of the two cities, and varieties of materials helped to create heterogeneous buildings, with modification of moisture by using water at fountain Salsabil in the houses. What has been used in both cities was wood to build and support walls, and the choice of wood for building was because of its ability to work as a parameter thermal storage, which helped store the temperature at the day and release it in the cold night (26, p.50).

Also, the houses in the city planning are similar in terms of distribution of windows to open at the outside, not at the court, but in a different way. In Istanbul, windows open directly to the outside without any trace of covering, which is specially observed in palaces and big houses that follow the European design. On the other hand, in Rosetta, they follow the design of the ordinary houses in Istanbul, for although they have windows as part of the main facade, they are covered by Mashrabiaor Qafsa or some other covering to protect the people of the house. The resemblance between Istanbul and Rosetta houses lies in the variety of windows which open at the main street. Islamic houses standards which prevent women appearance, open its windows at the entire court, so windows came from the sea sided houses or river to provide the owner with good air and great view. Istanbul facade used "Kafes" to protect windows and it was used only in this city (4, p.195), but the Rosetta houses façade used Moucharabies. In both countries, to increase the upper space and provide it with cold air, the architect used the Kabules, but in different shapes.

The height of the upper floor helped in providing shade and good weather outside and inside the houses. From the point of the research, it is noticed that the height of Istanbul city did not exceed 9 m., which is the standard height in Islamic houses in the 18th century A.D. (3, p.195). Yet, in the same era, there are houses in Rosetta that reached height of 17 m., like Manadile house. Moreover, the houses in Istanbul contained from two to three floors maximum, but in Rosetta they reached five to seven floors sometimes.

Finally, the architect in both countries succeeded to express the environment influence that plays the main role in the building using the same units but in different shapes. Also, the research clarifies how the houses

of both countries were the result of some contributing factors as the climate, and social, economical, and ethical needs.

XIII. NOTES

[1] The Roman houses planning depend on the center "court" in which all the unit is surrounded by the room entrance, the windows, etc. There is no trace to the windows opening at the street, as this design of the Roman houses has its shape from the Mesopotamia

[2] The Dolmabahçe Palace is located along the European shore of the Bosporus between the ports of Kabatas and Besiktas. In 1846, upon the order of Abdelmecid I (1839-1861), it was built as a palace designed by Imperial Architect GarabetBalyan. Construction ended in 1855, following the death of Abdelmecid I, and the palace became a secondary residence for Abdul-Aziz I (1861-1876) who constructed two new palaces along the Bosporus at Beylerbeyi and Ciragan. His successor, Abdel Hamid II (1876-1909), chose to expand the Yildiz Palace Complex on the Besiktas hills. The imperial family moved back into the Dolmabahçe Palace during the rule of Muhammad V (1909-1918). (30, 228) (31, pp. 421-422)

[3] To know more about wooden architecture, see (5, p.89)

[4] There are many ways used to binding the façade, one of them is by simple stacking between wood plates, its thickness is 1.50 m., its height is 4m. The facade at this point was left without varnish until the 18th century A.D, or by interleave wood of thickness up to 2.50 m., its width is 25-30 cm., and its high is 4 m., vanished by oil, it and was used until the beginning of the 19th century A.D., or by leave space between the wood to allow lying on it and deflation, or finally by supporting the facade with the addition of wood leaf designed as a cross from above the binding. This way of supporting the facade was a protection from nature causes at the Bosporus houses.

[5] One of the most important units controlling light and temperature inside the house depending on the circular design of Barmq. It is sometimes narrow and at other times it is wide, which is determined by its location (32, p.10).

[6] Lezinesaid"we can say that Rosetta was like 12 km. far away from sea in 1962" (3, p.154),(33, p29-31)

[7] In the 9th century, Rosetta was by the sea directly, then it became far 7 km from it by the 16th century, then 9 km in the 17th century (4, p154).

[8] This was caused by air movement and distributions of the pressure areas of negative and positive, because of the Northern wind blowing at the city (33, pp85-87).

[9] The northern contains 30 streets, 138 houses, and the houses were at 2 sites. Its name was attributed to a trade or market, and it was the biggest, the southern contain 19 streets, 105 houses, and the houses were at one site only, the western contains 5 streets, and finally the middle contains 8 streets with 25 houses (29, p75-76)

[10] It fits the Delta environment, because of the climate, like in Alexandria, using limestone which eroded by the sea weather. Therefore, the architect intended to use the brick which is extracted from the Nile mud, which is behind the observation of the difference between the remaining houses in both cities.

[11] The composition of the Egyptian mud is clay of less than 2 mm. silt 2:2.5 mm., sand 20:2000 mm, gravel of more than 2 mm.(36, p.88).

[12] For more information (34, p.30) (35, p.230).

[13] It reaches the construction of the building up till 60-80 cm.

[14] It was a study done by Hoffman on the windows space (33, p.18).

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