

## Urban Courtyard Housing Form as a Response to Human Need, Culture and Environment in Hot Climate Regions: Baghdad as a Case Study

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### ABSTRACT

Courtyard housing is an important dwelling type in human history. It was founded in many ancient histories of different countries and climate zones. Many factors influenced certain types and forms of urban courtyard houses in order to create better living environments. This study try to explore some criticize points about basic human needs of courtyards. Which it refers to environmental and social backgrounds during past times, which it selected to analyze two contemporary types of traditional sample work in Baghdad.

Drawings and framework used to understand the ideology of courtyards as well as other factors related to territory, society, psychology, culture and environment. Religion and traditions of Baghdad have played a special role. Through time and across cultures, territorial and environmental factors were found to be highly relevant to almost all the courtyard-housing forms. This study might be helpful for architects where they undertake contemporary design works.

**Keywords:** courtyard housing, territorial, social-psychology, cultural and Environment

### I. INTRODUCTION

A court or courtyard is an enclosed area, often a space enclosed by buildings that's open to the sky and has direct contact with the nature (Edwards, B. and et al 2006). For hundreds of years, many urban civilizations have been constructed courtyard houses. They were traditional inheritance house types where found in Asia, European, North Africa and South American countries.

The initial idea and purpose of the courtyard in ancient buildings was for protecting and saving people from dangers come from outside such as wild animals and wars (Figure 1) (Edwards,

B. and et al 2006). Since then and gradually, courtyard has improved in both design and main purpose, which are social places, environment and cultures. In Islamic culture, privacy is considerably a vital factor in the house designing; therefore, courtyard has been used to satisfy this condition. In additions, in inns and public buildings, courtyards were also used as the primary meeting places for variety purposes. In 1986, Fathy stated that urban housing design in the traditional architecture is universally applied the courtyard concept in rural area and also for countries in hot arid regions stretching from Iran in the East to the shores of the Atlantic Ocean in the west.

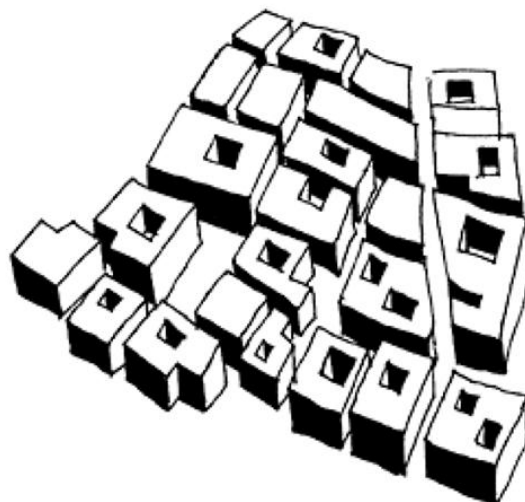


Figure 1: Traditional Courtyard Houses

**Source:** (Edwards, B. and et al 2006).

The nature of the courtyard is to provide security and privacy for the residents that can be well defined as an open space surrounded by buildings on all sides. Usually it includes planting trees and a shallow pool in the middle of the yard. Edrees (2001) stated that, after sunset courtyard is a fresh and cool environment for family gathering and social interchange. Blaser (1985) mentioned that courtyard can be counted as the oldest spaces used for sharing social activities in all seasons, day and night, different cultures and climate zones.

There are many factor and aspects affecting the design of courtyard housing. Roderick J. Lawrence in his book *Housing, dwellings and Homes* (1987) identified some of historical perspectives like cultural, social and psychological variables to examine the life in house and domestics. Lawrence (1987) was theoretically examined the effect of social, psychological and cultural factors on the design of courtyard housing. Many other approaches can be found in the literature about history and architectural design form of courtyards, while only few researches have been conducted on courtyard housing form with design and social theory background as well as the effect of environmental factors and how they benefit architects in terms of design. However, global development and massive immigration lead to cultural exchange in the world and the life style has changed through time, thus more studies are required to further examine the effect of different factors on the design of courtyard housing.

To further investigate the courtyard and the influencing design parameters, this paper explores the relationships between human needs, cultural and environmental factors and the courtyard house through a study of design form. The main goal is to explain human needs with social concept 'home' regards to culture and environmental issues as well as to architectural and traditional concept with landscape elements such as site planning and vegetation.

This research examine too examples both from far east of Islamic and west, which it links to architectural and theory forms in different countries, and the main reason behind it is to compare in culture and environment contemporary to urban courtyards for this study. The context of this study organizes and covers basic human needs, traditional and architectural form response to basic human need in courtyard housing, cultural influence and the physical environment which it

described in two different examples and culture context. Next phase analyzes and discuss the findings with limitation of the study and summary of recommendations with future researches.

#### **The case study and the sample:**

Traditional old Baghdad courtyard houses have been chosen as samples for this case study. The principles strategies for showing the house cases are used by authors to analyze data collected from the previews researches.

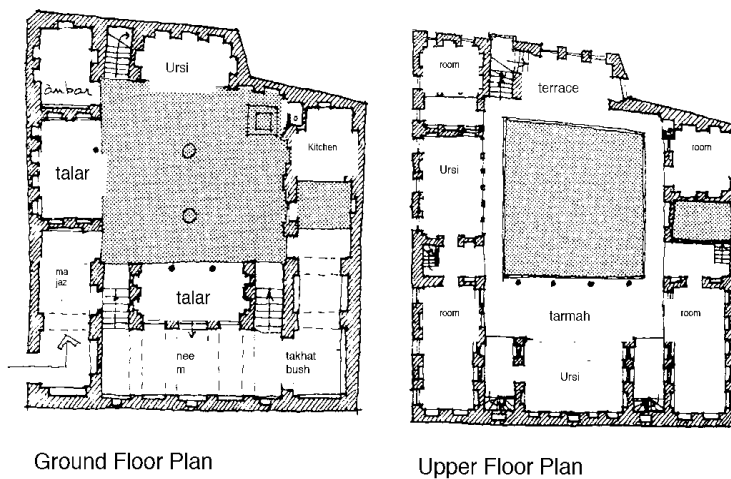
#### **History of courtyard house in Iraq**

As known that civilization in Iraq and Mesopotamian is one of the oldest civilizations in the world, which dated back to about 5000 years ago (Haraty et al. 2015). The earliest courtyards in this region refer to Ur civilization 2700 B.C (Blaser1985). Ur courtyard houses were retained and developed by the Moorish later because of "the plan is a lasting solution to urban life". The house is insulated against the bustle of the street, defended against marauders, and protected against the fierce climate" (Cantacuzino, 1969). Therefor, history of building the courtyard houses in Iraq is not new. "The civilization during this era had built a stunning development for urban and culture. The Sumerian courtyard house, with its indoor looking to the sky and the closed outdoor is notably identified as the most famous courtyard house in Mesopotamia" (Haraty et al. 2015). The style and design of these courtyard houses have changed through the history. The type of the courtyard house remains the same as in previous centuries. The reason for this remaining relates to the peoples' attitude in this country, same environment and they have not totally changed their cultures (Hussein, 2013).

#### **Courtyard housing:**

A single-unit urban dwelling that interacts with the outdoor climate through the courtyard; which in turn, is a relatively roofless space directly related to and formed (in part or full) by the geometry of the house. It is a limited access to landscapes manicured plants with distinct boundaries that relates to the building (Reynolds and Lowry, 1995).

As it is clear, urban courtyard housing is a historical evolution that selected in this section and include of far Eastern, Islamic and contemporary courtyard houses.



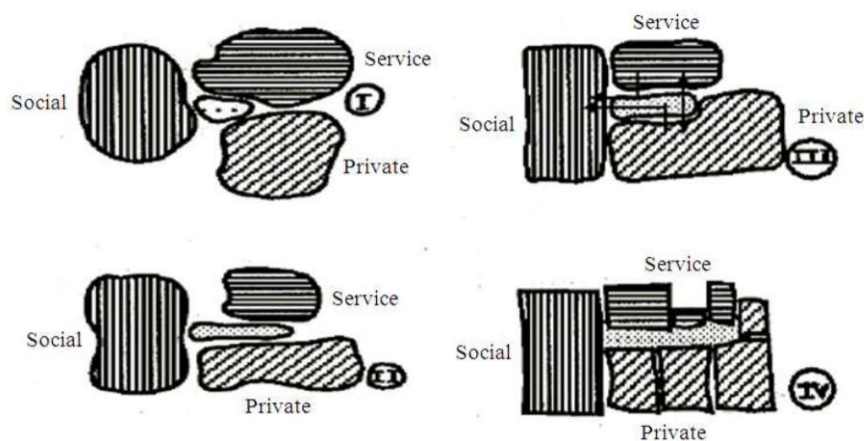
**Figure 2:** regular geometry sample of the courtyard house in Baghdad  
**Source:** (Al-Zubaidi, 2007)

In common, the design plans were designed in regular geometry with a central courtyard surrounded by the rooms and passage. The courtyard has a great role for family while the daily activities (Al-Zubaidi, 2007).

The Islamic religion when arise and expanded during evolutions in old history, it was mixed with different philosophy and cultures, which it leads to change many architectural typology of housing and absorbed many other ancient cultures like Greek and Romans and reflected in the Islamic buildings. In addition, the climates respond in the Islamic countries and privacy, housing design respects environment physically and elements (Fisher, 1982). As it will be very natural in hot humid countries to plan of avoiding sun exposure in summer time and wind stack at the winter. Therefore, the way of thermal comfort inside their houses is very clearly reflected in the courtyard design strategy plans and functions.

#### The traditional courtyard house components:

According to the previews study to explain the main zones in the courtyard house, the traditional courtyard houses consist of three, four or five main sectors (zones) based on functional purposes as shown in Figure 3. Those functional zones can be living, sleeping and service or family, private and services if it is three zones; or it can be consist of four main spaces as quiet, noisy, dinning and formal spaces or it can be five zones they will be living, dinning, sleeping, kitchen and utility (Mustafa, F. A. AND Hassan, A. S., 2010). It is clear that most of them for dividing these houses that they have focused on the main functions not scale, areas or occupancy. Amorim, L. (1997) sketched these houses in four different ways that combined the occupancy and functional zone together. In his sketches, Social, private, service and connecting area are the main parts.



**Figure 3:** different zones of the courtyard house  
**Source:** Amorim, I. 1997

According to Edwards, B. et al (2006) courtyard house should be available and its function can be the following purposes:

- Separation limits of the property
- Family privacy space
- Places for movement and circulation
- Natural ventilation
- Green area and nice view
- Combination and conjunction the house spaces

Dividing the open or non-open spaces of courtyard house is also another analysis for the house types such as open space, partly open and close spaces. The open space is the courtyard partly open is corridor or Iwan that mostly exist around the courtyard. The closed spaces consist of the other rooms such as bedroom, kitchen and living room (Haraty et al 2015).

## II. METHODOLOGY

This paper investigates and analyzes cultural and environmental influence on two cases

of traditional courtyard houses in Iraq as a case study. Data analysis provides important insight on the special characteristics, programming and zoning of essential spaces linked to the courtyard spaces. In each case, the drawings plans of every floor were examined based on specific factors.

Both case studies are respectively located in Baghdad, which are rich with the historical traditional courtyard constructions. The courtyard houses are covering the central of these cities. That classified some parts of Baghdad and few other Iraqi areas as the most valuable and rich heritage places.

The research steps were;

- 1- Select framework of the study based on examining social psychology, cultural and environmental factors for the courtyard housing forms, and make a comparison between their characters as it is summarized in table 1;

Territorial factors	security control personalization identity
Social-psychological factors	privacy social status
Cultural factors	religion tradition daily routine gender
Environmental factors	climate

**Table 1 - Framework for Assessing Courtyard Housing**

- 2- Data collection summarized for this case study in two different geographical and cultural areas, where they selected as a specific places of different inherited urban courtyard function and context based on the available data.
- 3- In the third stage the data analyzed the comparison forms of both courtyard housings types based on culture, environment and human need with referring to drawings and describing each one separately.
- 4- Research findings conclude methods that driven in Baghdad With contemporary courtyard houses and explain frameworks refer to cultural, environmental territorial and social psychology factors with descriptive drawings.

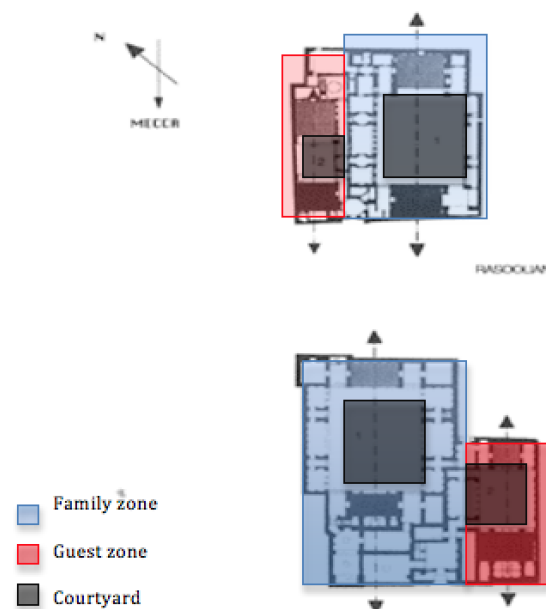
## III. ORIENTATIONS OF THE COURTYARD HOUSES

The main aim of orientation of the buildings in hot climate country especially Arabic countries is to produce shading in the exterior living spaces and minimize the temperature inside building. There are two main objectives should be considered in design which is wind direction and sun position. In another words, the sun angle and declination for the all of the four seasons and each

hour in the day have to be considered in design. Without known this data it not easy to provide the shading in the outdoor living spaces. Also, the orientation of the building is very important to which part of the house will be shad at which time. As known that the indoor of shaded part have the lower temperature than the sunny part. For the wind direction, also orientation has a big role for getting the benefits of wind inside the houses. In addition, there is a badger system inside the many courtyard houses that they have a big role to create natural ventilation and cooling the rooms and yards if it is built against the wind-borne dust to catch the wind (Al-Zubaidi, 2007)

Orientation of the courtyard houses is different from each other. There is two different building examples in Baghdad show the orientation towards Mecca (Figure 4). As its known, that the orientation of the buildings has a huge effects on the building environment especially for the badger systems. Building around the courtyard used as appear solution for the creation shading inside the yard.

In the first example the public or guest place toward the Mecca otherwise the second one the private part come before the public zone.



**Figure 4:** Comparison between plans of two courtyard houses in Baghdad showing the orientation on Mecca and the zoning into public and private areas

**Source:** (Edwards, B. et al 2006 and Analyzed by Authors)

From the above analyses, it can be seen that the courtyard houses in Baghdad have different orientations. There are solutions for all of them especially inside the courtyard spaces by the surrounding room spaces.

#### IV. FACTORS OF THE BUILDING FORM: SOCIALLY AND ENVIRONMENTALLY- NATURAL VENTILATION

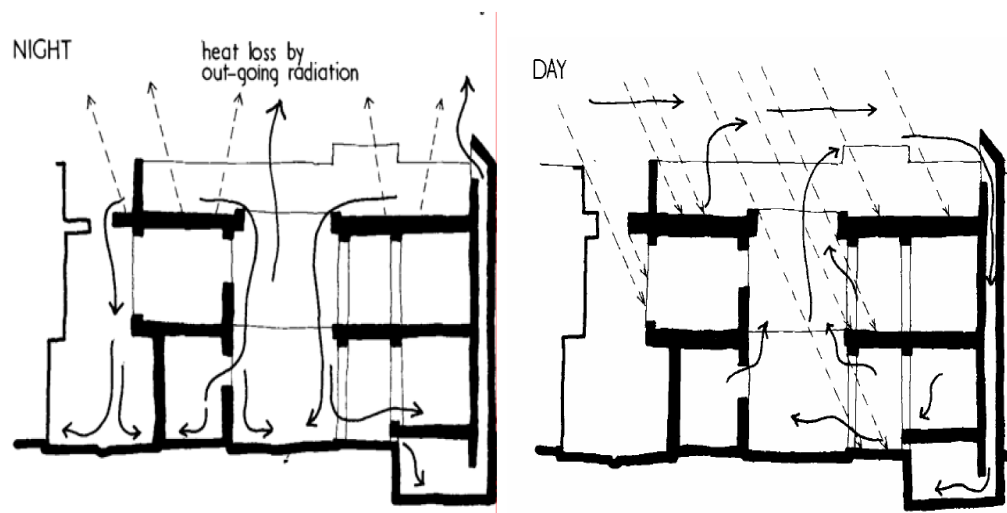
As a general, there are two main factors that they have significant effect on the building forms which are social-culture factors and physical-environment factors. As known that one of the side that social relates to is faith (religion) (Rapoport, A, 1969). In the courtyard house, it can be seen both of them:

**Socially:** the primary factor for the building form is social-culture factor. Culture, ethos, worldview and national characters are the main principle concepts of culture (Rapoport, A, 1969). All of them relate to the human attitude directly as personality, who people look out upon the word and nation. With those factors there are a number of aspects that have a great impact on the building form that they are: some basic need, family, position of women, privacy and social intercourse (Rapoport, A, 1969). Courtyard space of this type of buildings can be measured as a very interesting space for social activity. It is a space for segregation of the family member and in some time with the guests also (Al-Zubaidi, 2007). To illustrate; children can play

freely and safely in this space –courtyard- at the same their mothers can look at them and see their activity.

**Environmentally- natural ventilation:** In general, the traditional courtyard houses have a specific thermal performance. There is a complete cycle during day and night for cooling the house in hot seasons. It can be divided into three different times that they are night, mid-day and later afternoon.

In the night, the cool air goes down into inside the house that they are courtyard spaces and the rooms that arranged around the courtyard. They will be cooled and remain cool till nearly afternoon. Not just air of the room spaces will be cold even the furniture, building structure will get same cases. Those heats that exist in the courtyard are loosed directly and go to the open sky- as shown in the figure below (Figure 5). In the second phase, which is mid-day that the temperature is too high, the sun radiation strikes the courtyard. The cool air goes out from the rooms to the courtyard and goes up. The building loses some of this cool air and courtyard work as a chimney in this time. Latter after noon will be the third and complete part of the cycle. The buildings get hotter in this time because most of the cool air is lost. Sirdab or Neem-Sardab role the better place for comfortable indoor climate. In general, in this time the sun sets and most of the structure get shading and the temperature goes down. The cool air goes down into inside the house the cycle repeatedly (Al-Zubaidi, M. S.S., 2007).



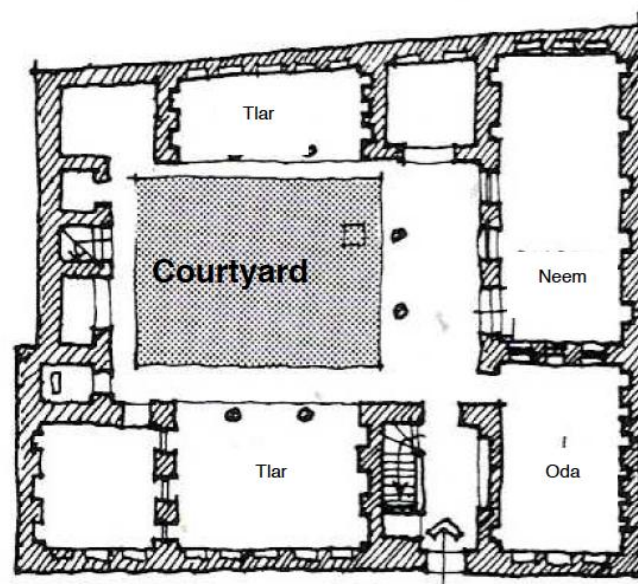
**Figure 5:** Day and night thermal situation in the courtyard house  
**Source:** (Al-Zubaidi, M. S.S., 2007).

Badger is a clear system that used for the natural ventilation. It is built vertically. One of the side open from the roof which is upper side. The other side may be open in ground floor or first floor. Some time will be open in both floor that is depends on the design. The system can be controlled by opened and closed the openings (Al-Zubaidi, M. S.S., 2007).

## V. BAGHDAD COURTYARD HOUSE Case Study No 1

Located in the middle west of Iraq, it has

private Islamic custom, which there houses conserved the medieval Islamic essential features of housing; as it shown in the figure below (Figure 6). It includes a large central court that surrounded by a corridor with a column and arcades; also it is traditionally have a rectangular or square shape. The courtyard building material include of sun-dried bricks with a marble or mosaic façade (Figure 7). (Lehrman, 1980). In the center or near around have a fountain of water with green vegetation that called house paradise.



**Figure 6:** Ground floor plan drawing  
**Source:** (Al-Zubaidi, M. S.S., 2007)





**Figure 7:** Section showing the relationship between the three levels of the house, the underground, ground level, and first floor.

**Source:** (redrawn by the authors from Al-Zubaidi, M. S.S., 2007)

The important local domestic factors of Baghdad courtyard was referring to high walls surrounded the house as well as to the homerooms with a good privacy for the family members. The home decoration also one of the main parts consequently with Islamic ornaments that used to define emphasis the functional form with basic scale (Lehrman, 1980).

In the face of social and cultural factors; courtyards have a protected spaces with a high privacy for family, which it achieved through the architectural design and elements like doors, windows, walls that have a little open spaces especially on the street side (Mazumdar, 1997).

Social life is still traditional and Islamic religion has an intensive effect behind that factor.

The other important factor refers to environment and climate of courtyard housing. For instance; Baghdad have a dry summer with a mild winter then the houses grouped closely and during the time make courts smaller than earlier times in the past in order to minimize sun exposure, plant trees inside a court and water fountain to create a cooling zone inside the space area of the courtyard.

Consequently to the shade that produces from column and arcades around surrounding courtyards which it was strongly influenced by culture and climates (figure 8).



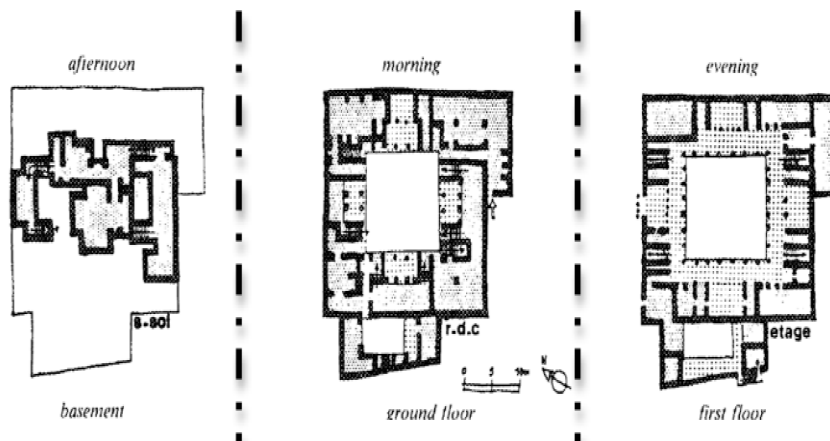
**Figure 8:** the courtyard, the core of the house where it ventilates and lit the house.

**Source:** (Warren & Fethi 1982)

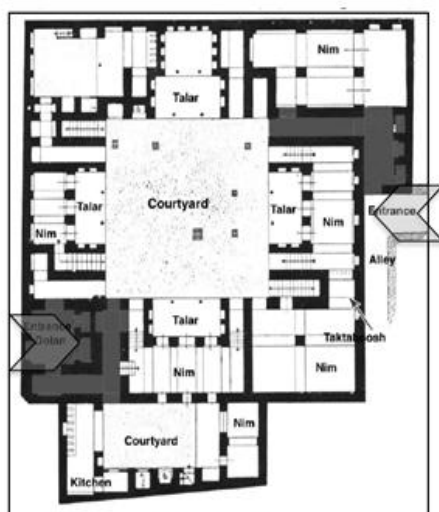
## Case Study No 2

The second example is a building consists of three floors that they are basement, ground and first floor. Two main courtyards can be seen clearly in the ground floor, the big courtyard surrounded

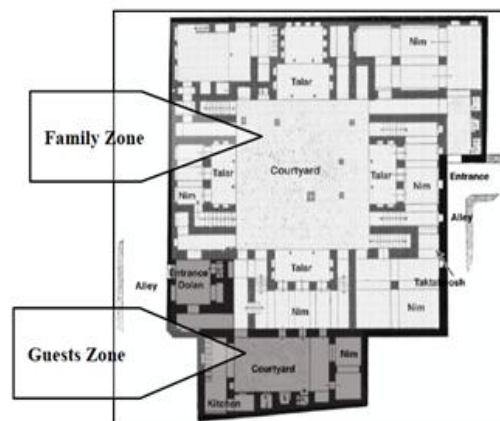
by Talars and stair-cases that goes to up stair-first floor. After that rooms come that they are closed spaces and located around the courtyard that located behind the Talars (Figure 9).



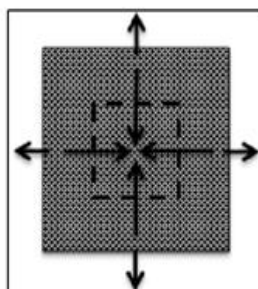
**Figure 9:** basement, ground floor and first floor of the courtyard house building No. 2  
**Source:** (Adebayo Y. R., Ed. (1991).



**Figure 3:** Morphological analyses, Accessibility  
(Source: Oscar Reuther, 2005), (Drawing: Author)  
(Source: Oscar Reuther, 2005), (Drawing: Author)



**Figure 2:** Morphological analyses, Zoning and segregation.  
(Source: Oscar Reuther, 2005), (Drawing: Author)



**Figure 4:** Morphological analyses, Orientation  
(Source: Oscar Reuther, 2005), (Drawing: Author)

**Figure 10:** morphology and orientation of the house  
**Source:** ( Haraty et al 2015)



There are a number of important points that can be pointed out through these diagrams. It has two main entrances. One of them is for family that is private and located in the right side. The other one is for private that located in the left side. They do not have direct link between them. In a number of sources say that those courtyard used as a second solution for ventilation and cooling which is done by using takhtaposh. This takhtaposh used for covering mediates space between them to make a shadow for seating under it and create different air pressure with cool and hot temperature to flow cycle the air in this space.

The house in general has smooth outside wall and rectangular courtyard shape. The orientation and openings of the buildings were not specific or it has just one direction. To illustrate one entrance is direct to southwest and the second one to the northwest. The room windows look at the courtyard in ground floor and a little to the outside with the Shanashel in the first floor.

As clear that the courtyard houses in Baghdad has Islamic style if compare with others especially western countries. In another words, this sample explains that there is a private place for family and the guests zone separate from other parts.

Both of them have their courtyard that they rounded by other part of houses as Talars and rooms. Environmentally, it can be clearly seen that these buildings and design have responsibility to the climate as shown in the (figure 9). In the morning, the ground floor is suitable for use. In the morning as usual the sun is not too hot and the angle of the sun does not go to the courtyard and covers all of the area. Otherwise in the afternoon, the angle of the sun will be nearly to perpendicular and the Sardab will be better to use. In the evening, the family can use first floor (Haraty et al 2015). The dimension and ratio of the yard designs efficiency and calculated with the sun angle.

## VI. DISCUSSION

It is clear that, culture and sociality, environment and human need are the significant factors that have effect on the house design and human attitude. All of them are used for creating more comfortable live inside the houses with natural energy. More comfortable with less energy are the main purpose. Sustainability also is the important issue especially for environment and society.

## VII. CONCLUSION AND RECOMMENDATION:

Through the history of architecture and Islamic architecture in Iraq, there are many types and styles can be seen in Baghdad that reflected the

character of materials, vegetation and decoration. Courtyard house style is one of the significant styles which take quite different forms, even though they all are tend to look inward and provide privacy. In Baghdad, houses were designed with one or two courtyards that rounded by buildings with one, two or more floors. Their style known as an Islamic courtyard house. This paper examined this type of courtyard housing to investigate the effect of different aspects and the following conclusions can be drawn:

**Implications for design:** This research shows that culture adapts the courtyard housing form which in turn responds to culture and environment.

**Social-psychological factors:** this type of housed have a great privacy which it preventing neighbors and passengers overlooking into courtyard. Windows are designed to face into the courtyard and not outside, as well as to preventing direct views.

**Cultural factors:** the most important points are religion and traditional figures of Iraq. Because of the Islamic culture influences, the arrangement of house courtyard rooms and directions should be towards to Mecca by architect or site planners.

**Environmental factors:** Environmental factors has influenced the form of the courtyard house which relates to the size of the courtyard, height of the building, architectural details as well as to vegetation and fountain design. Due to hot dry climate, courtyards were kept small and over shadowed by high walls to modify the high temperature.

**Design process:** according to the chosen area; the big challenges for designers is not only satisfy local culture or environment factors but also plan to design for many people with a lower income in a low cost limited area which it needs to understanding all above factors.

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