

Courtyard concept: A sustainable strategy for the future housing buildings in Palestine.

Abstract

Since the British mandate, particularly after the foundation of the Palestinian national authority (PNA) in 1994, Palestine has been witnessing enormous transformation of political, economical, social and cultural nature. As a result, the forms and the concepts of residences are changing from introverted schemes into extraverted ones. In general, the contemporary housing is poorly adjusted to local conditions and also failed to meet the expectations of the dwellers. Moreover, this modern transformation has caused an obvious divorce between the internal spaces and the external ones (balconies, verandas and yards). Herein, the vital connection between these spaces has been lost as opposite to the traditional courtyard houses where these spaces formed an extension of each other. This paper investigates the concept of outdoor spaces in contemporary and traditional housing in term of sustainability. The socio-cultural, economical, functional and environmental dimensions were examined to study the potentials for reincorporating the distinctive qualities of courtyard concept in the design of future housing. In order to address this issue, a comparison of outdoor spaces' features between traditional and contemporary housing in two different cities of two climatic zones of Palestine was carried out. Contemporary housing was evaluated by conducting a survey over 300 dwellings of different housing typologies (detached/apartment flats). The characteristics of traditional concept were analyzed from the old historical part of these cities. Results of this paper demonstrate that the concept of traditional outdoor spaces is a culturally, economically and environmentally responsive design that could be reintegrated in term of sustainability for our future Palestinian housing. Traditional architecture is still the source of inspiration to design an environmentally and culturally responsive housing, which will contribute in improving the quality of life of the residents.

Keywords: *Sustainable design, Courtyard, Modern Outdoor spaces, Housing building, Palestine.*

1 Introduction

Houses are not only physical space in which people live, but also a space where social interactions and rituals take place (Ozaki, 2002). Although housing typologies depend on multiple determinants, climate and culture are the two most important determinants (Rapoport, 1969). In this perspective, outdoor space, which is a buffer zone between building and outside, could provide a safe place where inhabitants can exercise their socio-cultural activities away from the undesirable climatic conditions. Thus, a good housing development should not concentrate only the physical aspects of design but also be sensitive to human needs (Lee, 2004).

Traditionally, a central courtyard open to sky, which is locally called *Hosh*, *wast ed-dar* and *sahn ed-dar*, represented the Palestinian private outdoor space (Canaan, 1933). In addition to its principal function as spatial organizing element due to its location in the heart of the dwelling, courtyards are environmentally used as multi-functional spaces, including circulation, children's playground, eating, sleeping, relaxing, entertaining, family and women meeting and guest welcoming. Besides providing shade for the interior spaces, reducing the direct heat from the sun and collecting cool air (Evans, 1980), the courtyard is highly protected from the pedestrians' looking in the streets and then provides high levels of privacy.

However, since the British mandate till today, the architectural production has been transformed gradually from clustered units with central courtyard (i.e.; introverted scheme) into scattered and detached buildings with small balconies or verandas (i.e.; extraverted scheme). This transformation of building concept and forms, which came as a response for land scarcity, urgent demand and growing needs for dwellings, has ignored the issues related to social, cultural, economical and ecological changes within the Palestinian society (Ghadban, 1998)

Today, the multistory apartment housing (5-6 floors) is adopted as a model of residential building in Palestine, where the balconies, verandas and ground yards on the perimeter of buildings represent the dominant forms of the outdoor spaces in these contemporary models. These spaces are mostly considered as the only outlet for inhabitants where they could be in contact with the exterior environment and nature in their closed housing units, because of the lack of open spaces at the city level. This model has somewhat failed to compete the traditional ones in terms of cultural, social and environmental aspects. The vital connection between outdoor spaces and interior ones, which has characterized the traditional courtyard house, has been lost in the contemporary housing. Hence, if traditional architecture is analyzed in terms of concepts (e.g. responses to climate, responses to site, spatial distribution as it relates to notions of public and private place, cultural identity, etc.) then lessons can be derived and applied to contemporary design. (Rapoport, 1980)

This paper suggests that a return to the traditional architectural strategy of courtyards in the modern apartment blocks can improve their design concept in

terms of sustainability. Therefore, this paper is intended to reveal the distinctive qualities of traditional concepts of outdoor spaces in comparison to the modern ones and explore potentials for reintroducing these qualities in the design of our future housing.

2 Methodology and case studies

2.1 Three sets of data

The methodology of this study consists of crossing three sets of data: climatic characteristics of sites, spatial analysis of dwellings and results from questionnaire in the aim of defining the appropriate characteristics needed for sustainable future housing in Palestine. This paper deals with application of this methodology to two cities in Palestine: Jericho and Nablus.

The questionnaire applied to this research is elaborated by researchers from the laboratory GRECAU. In this questionnaire the contemporary housing was investigated by conducting a survey over 300 dwellings (240 questionnaires in Nablus and 60 questionnaires in Jericho) of different housing typologies (detached houses, apartment blocks) in different parts of the two cities. This questionnaire looks for evaluating the cultural and environmental responses of the contemporary housing and the role of private outdoor spaces on this issue. Also, it aims to determine the significant factors that could guide the future housing typologies and the outdoor spaces concept design in terms of sustainability. To this end, different themes have developed in this questionnaire, which covered general information about residents and their housing; architectural, cultural and environmental assessments for both interior design and exterior spaces and their interrelationship and the suggested improvements and residents' expectations for future housing.

The characteristics of traditional housing were derived through an analytical study for the old historical part of these cities. Herein, plans, elevations and sections of different traditional houses have studied and analyzed in terms of conceptual, functional and environmental qualities.

In order to achieve the purpose of this paper, a comparison study between the characteristics of traditional and contemporary outdoor spaces in these cities was adopted. This comparison provides a method of assessing the role of these spaces in improving the residents' quality of life inside their house units. To this end, the main characteristics for this comparison research are defined as follows:

1. Configurations and layout of traditional and contemporary housing.
2. Spatial, visual distribution and relationship.
3. Privacy and communality.
4. Accommodation of occupants' activities.
5. Environmental considerations.

2.2 Climatic characteristics of sites

Palestine is a Mediterranean country, where the Palestinian territories (6100km²) represent 23.11% of the total area of Palestine. Seven climatic zones were defined in this small area of territories (i.e.; five in West Bank and two in Gaza) (ARIJ, 2003). Moreover, Jericho and Nablus were taken as representative case studies for two of these climatic zones. (see Figure1).

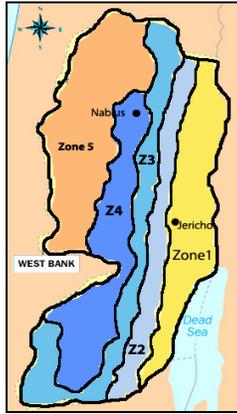


Figure 1: The five climatic zones of West Bank.

Jericho, located in Jordan Valley, is characterized by a hot-dry summer and warm winter. While Nablus, located in the mountain region, is characterized by a warm sub-humid summer and cold winter (see Table 1).

Table 1: Climatic data for the two investigated cities. (PCBS, 2008)

CITY	Monthly Main Temperature		Relative Humidity	Prevailing Winds		Precipitation
	January	August		Speed	Direction	
Zone 1 "Jericho"	8.2°C	38.8°C	54.6%	3.4km/h	E & N	125mm
Zone 4 "Nablus"	5.3°C	30°C	61%	5.5km/h	W & NW	715mm

3 First comparison results

3.1 Configurations and layout of traditional and contemporary housing

Indigenous was keen to set up their homes in harmony with the environment. Consequently, different traditional housing typologies were observed in the Palestinian cities where the family's structure, lifestyle, culture, environmental factors and building materials had gotten involved.

In Jericho, an oasis settlement, the inhabitants had built their simple mud houses near the water resources, which were essentially used for their agricultural activities and preparing their construction material (Nazer, 2006). The simplicity of these houses is a reflection of the primitive lifestyle founded there. The traditional house, which frequently consisted of one story, was generally composed of a big and private outdoor space -*Hosh*- enclosed from all sides with an irregular layout. The living and service spaces and additional peripheral wall, in most cases, have defined the enclosure concept of the house. Since the borders of the living spaces were not sufficient for providing a continuous enclosure around the outdoor space, additional peripheral walls which usually could exceed the eye's level, were constructed in order to define the domestic territory of the house as well as to ensure the needed level of privacy for inhabitants inside their houses. In addition to this simplest form of open courtyard used in this region, another covered outdoor spaces which called *Mastabeh*, were used by inhabitants to provide a comfortable outdoor sleeping space (see Figure 2) (Hanbali, 1999).

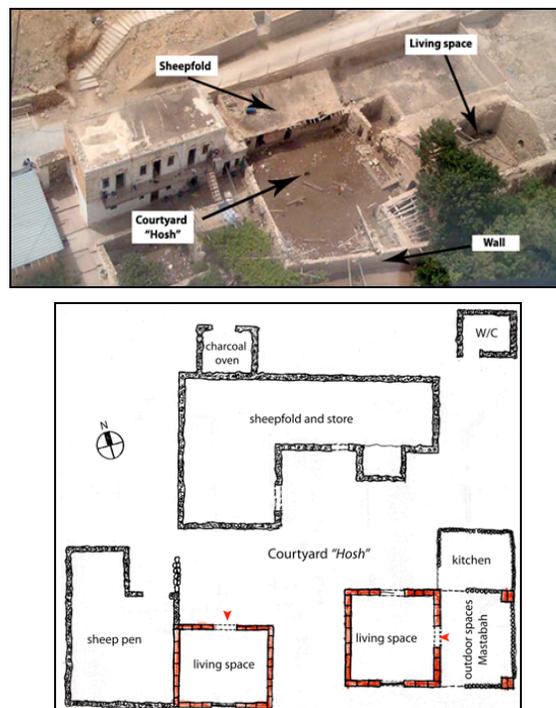


Figure 2: Configurations and layout of traditional houses in Jericho.

Nablus is considered as Damascus of Palestine due to its strong economical and social relationships with Damascus of Syria. The relationships between the two cities had played a substantial role in the Nablus lifestyle in addition to its architectural concept (Khasawneh, 2001). The compact historical core of Nablus was composed of clustered houses, which are formed with a courtyard (square and rectangular) surrounded by house's spaces (Awad, 2003). These spaces, which have inward looking into the courtyard, are usually perpendicular to each other whatever the plot geometry is (see Figure 3). The height of these traditional houses could be varied from one to three stories as maximum, where the first floor is usually used for commercial and industrial activities (Ahmad, 2008). Adoption of introverted scheme for housing design has led to an effective planning that used the entire building plot and minimized the urban land waste to the minimum (Amad, 2003).

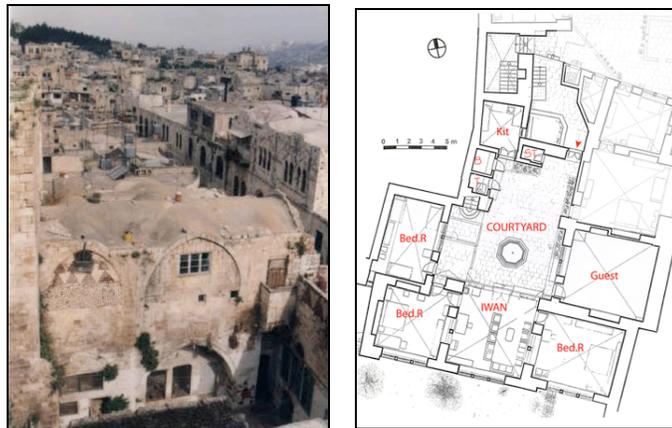


Figure 3: Traditional houses in Nablus.

Unlike compact traditional settlement, the contemporary housing areas are scattered and dispersed. The detached houses and apartment blocks have dominated the urban environment in Jericho and Nablus respectively and disfigured their local identity (see Figure 4).

The findings of the survey reveal that 47% of buildings investigated in Nablus composed of five to seven floors while 70% of housing investigated in Jericho consist of two to three stories. According to the interviewed urban planners, those percentages seem to be a representative sample of the real urban environment of the case studies.

They are built in the center of the building plot leaving setbacks -according the new urban regulations- around each block to be used as common outdoor spaces. Unfortunately, these spaces, which are a waste area, have been left without any specific functions such as kid's playground, garden or private open spaces for inhabitants (Touffaha, 2009).



Figure 4: Examples of contemporary apartment blocks in Nablus and Jericho.

Regarding the private outdoor spaces, the balconies are the frequent forms that used in both cases of apartment flats and detached houses. Moreover, a private garden is created on the remained space of building plot in the case of detached houses (see Figure 5).

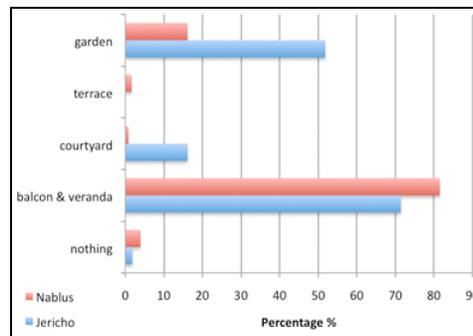


Figure 5: Percentage of current outdoor spaces in each city.

From this comparison, some financial benefits are closely associated with the courtyard form and construction. Courtyard housing of low-rise and high-density models has succeeded in proving its efficiency in land use. Besides, the sharing walls in these attached and grouped models require little cost of maintenance and construction. On the other hand, in contemporary housing forms, high-density is

achieved by multiplying the number of floors and apartments in each building and reducing the site area. It has shown that courtyard model was eventually better than the detached form in terms of efficiency in land use:

The court form is seen to place the same amount of floor space on the same site area with the same condition of building depth and in approximately one-third the height required by the detached form (Martin and March, 1972).

3.2 Spatial and visual relationship

The centre location of courtyard in the traditional housing design enhances the courtyard's advantage as the core organizing space of the house. Most of the house's spaces have their direct access on the courtyard, especially the living spaces "Iwan" where a fluid relationship between these two spaces was observed. This kind of fluidity ensures a functional continuity in the house where the two spaces have formed an extension to each other. Besides this spatial relationship created by the functional continuity, a visual relationship was ensured by the introduction of inward looking scheme in the courtyard housing design. This visual connectivity was accentuated between the central courtyard and the different indoor spaces through their windows, which are opened directly into the courtyard.

Nowadays, in the contemporary housing, the functional concept of traditional courtyard was substituted by an artificially lighted corridor in the centre of house, small balconies relegated to the periphery of the housing block and yards created on either the surrounding or the rear of the housing plot (see Figure 6). The survey's results reveal that the majority of new outdoor spaces (e.g. balcony, garden) are mostly connected to one indoor space like kitchen, bedrooms or guest room. While having two and three indoor spaces connected to the same outdoor space are rarely observed. Consequently, this transformation from introverted concept into extraverted one has limited both of spatial and visual relationship between indoor and outdoor spaces of the housing units.

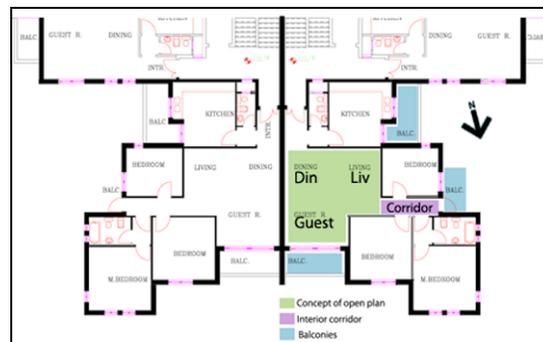


Figure 6: Example of contemporary apartment building.

Moreover, the traditional living space “*Iwan*” was replaced by an interior living room deprived of any connection with the exterior environment that reduced the quality of natural ventilation and lighting inside these spaces. As a solution for this problem, architects have been adopting the western concept of open plan in their housing design where no partitions are used between the living, dining, guest rooms and the kitchen in some cases (62% in Jericho and more than 45% in Nablus). Therefore, the question of privacy was deteriorated as an opposite of traditional concept where the separation between private and public spaces (i.e. guest room) was an important issue. By investigating this question, 64% of respondents reject this concept in their houses while for those who accept it; they refuse that the guest room to be one of the components of this concept. On the other hand, as away of improving the living quality inside the current family living room, the survey demonstrates that more than 55% of inhabitants highly desire to create a direct connection between their outdoor space and the living room rather than the guest room. The objectives of this tendency are to introduce a direct access both natural lighting and ventilation inside their living space and to get a spatial extension for the families’ living spaces with exterior environment.

3.3 Privacy and communality

The Palestinian cities, as well as the Arab ones, were created in accordance with the community values (religious, social and cultural), with the architecture and urban design principles that are found in harmony with those values. These principles have favored the communal life while respecting the privacy of each person. The traditional Palestinian settlements have succeeded to achieve the equilibrium between these two paradoxical principles (privacy and community). The courtyard, which considered the sacred space for privacy and comfort inside houses, shaped the basic element that organizing the whole city, while the shaded street were the place of communal life. In some cases of extended family that lives in the same house, the courtyard itself was used as a communal space, while each small family has its own private outdoor space (e.g. small courtyard or *Iwan* in Nablus, *Mastabeh* in Jericho).

Today, as a response to the lifestyle changes, the importation of occidental ideas and technologies, modern housing needs and economical development in the Palestinian cities, new concept of detached and free-standing blocks and shapeless urban spaces have replaced the traditional concept of compact courtyard housing. Apparently, these contemporary architectural and urban patterns have failed to encourage the communal life and social communication among inhabitants. The unplanted areas surrounding apartment blocks are not treated efficiently for the latter objectives due to lack of social activities (Ghadban, 1998), while streets have used today merely for transportation rather than communal living spaces.

Regarding the privacy issue, the inward looking concept and the enclosure principle of the traditional courtyard have enforced the satisfaction level of privacy for inhabitants who are protected from both of neighbours and passers-by overlooking. For the current outdoor 52.7 % of occupants in Nablus and 43.4% in Jericho are disappointed of the low level of privacy at their private outdoor spaces. Women are more affected by this issue of privacy where 66% of them show their dissatisfaction about this question. Besides, using periods of the outdoor spaces was strongly affected by the issue of privacy more than the orientation toward the sun irrespective of seasons. , To improve the level of privacy of current outdoor spaces, which is still obviously an important issue till today, individual modifications were held by residents themselves. Canopies, flower window box and glazing the outdoor spaces completely are some of the alterations applied by inhabitants to increase their feeling of privacy inside their outdoor spaces besides its importance in controlling the undesirable climatic factors (see Figure 7)



Figure 7: Individual alterations on the new outdoor spaces.

From this comparison we noted that the enclosure principle of courtyard (i.e. inwardness) has highly enhanced the level of privacy inside it while the outdoor exposure concept of current outdoor spaces has been reducing this feeling for occupants. Deep analysis of this concept of enclosure could provide a more private living situation that satisfies religious and cultural needs of inhabitants in the future housing project.

3.4 Accommodation for occupants' activities

The courtyard, which is the heart and the focal space in the traditional Palestinian houses, derives its importance from its uses for private and social purposes as a multi-functional space. It's the place to serve the formal occasions as well as to accommodate the informal daily activities in and around it. Generally, the courtyard was the place of gathering for various social occasions like wedding

and funeral ceremonies on the one hand, accommodating the daily and domestic activities such as kid's playground, eating, collective cooking, sleeping, entertaining, family and women meeting on the other. In fact, the courtyard capacity for accommodating these activities was greatly affected by its sufficient area, which represented almost 20% of the total area of the house.

Nowadays, the outdoor spaces' area has been reducing approximately to 5% of the total area of the house unit. About 45.5% of the respondents are dissatisfied of the current area of their outdoor spaces and they accept to reduce the indoor's area of their apartment in return for increasing the exterior one. This small area has subsequently influenced the types of activities applied by occupants inside their outdoor spaces. In Nablus, these activities are confined primarily to sitting and laundry, while in Jericho, and due to the suitable area of outdoor space in the house, inhabitants used it as a private garden and a place for guest welcoming respectively. Unlike to the traditional courtyard house, the contemporary housing suffers from a lack of safety kids' play areas; so more than 75% of the responders believe that it is necessary to introduce this kind of activity in the future outdoor spaces, which means rethinking about the dimensions of these spaces.

3.5 Environmental considerations

The bioclimatic analysis derived on the two cities demonstrate the necessity for solar gain in winter and natural ventilation in summer at Nablus, while both of a solar protection and preventing the diurnal ventilation in summer is highly demanded in Jericho. Moreover, compact plans with courtyards are recommended as a layout and design concept for buildings in both cities (Haj Hussein, 2005).

Herein, in addition to the socio-cultural role of the courtyard, it was built to create a convenient microclimate and pleasant outdoor environments inside each individual house, which will subsequently improve the indoor comfort if design details were respected (Givoni,1998). The analysis of the traditional Palestinian housing reveals that the inward and enclosure concept of the courtyard provides most of house's spaces by their daylight and natural ventilation through their windows opening into the courtyard, whilst some windows on the exterior façades could be found. In Nablus, the living area (i.e. courtyard and *Iwan*) was generally oriented to capture as much as possible the northwest prevailing winds. Besides the northern openness of the *Iwan* into the courtyard, a south orientation was provided to allow a maximum gain of solar radiation in winter (see Figure 8). While in Jericho where the orientation of the house wasn't precise, the urban fabric and lots' boundaries have generally affected this issue.

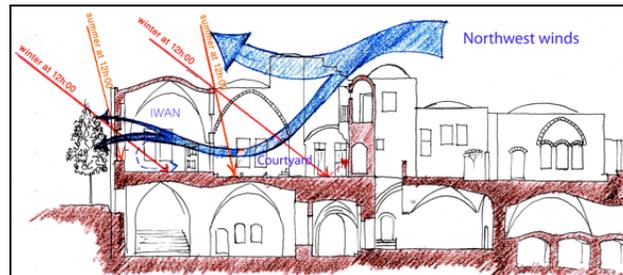


Figure 8: Environmental concept of the courtyard and Iwan, the solar angles were identified by the Solar Tool program.

In this regard, Schoenauer and Seeman (1962) underscore that "...the inward directed nature of courts enables the architect to orientate them in relation to sunlight". In effect, this inward concept has provided the courtyard by an opportunity of 360° of orientation of the house. Consequently, a freedom of orientation has helped in controlling and modifying the amount of daylight and clear air penetrating the courtyard houses (Bagneid, 1988).

Nowadays, the orientation of the contemporary outdoor spaces is determined by the implantation of building on the site and the number of apartment per floor more than the climatic factors (sun and winds) as in the past. Nevertheless, the findings of the survey demonstrate that the west orientation was more used than the other orientations for this question. Apparently, architects aim, by this orientation, to tackle the overheating problems in summer by encouraging the natural ventilation inside the houses. This orientation could be efficient in the case of Nablus where the dominant wind come from the northwest direction. But, this is not the case for Jericho where, the summer prevailing winds come from the east and north direction and the diurnal ventilation is not recommended due to the high air temperature that could deteriorate the internal thermal comfort of houses.

Regarding the current living rooms, the findings of the survey reveal that more than 43 % of these spaces (in Nablus) are located at the center of the house unit without any connection with exterior environment. For improving both of low lighting level and thermal discomfort inside these central living spaces, 96% of the occupants in Jericho and 57% in Nablus have used cooling mechanical and electrical devices in summer and 65% of respondents in Jericho and 78% in Nablus need heating equipments inside their living spaces and house in winter, though these devices are known costly and greedy in energy.

Furthermore, landscaping, which improve the aesthetic quality inside this traditional courtyard, have contributed in creating the pleasant outdoor environments mentioned by Givoni. Fountains and trees (e.g. citrus and palm)

were used to ensure a shaded place inside these spaces on the one hand and to humidify and cool the air by evaporation on the other (see Figure 9). Hence, the courtyard fulfilled its real function as a living space for family in interaction with nature.



Figure 9: Landscaping inside the traditional courtyard.

Nowadays, this concept of landscaping was limited in the current outdoor spaces, especially in the case of apartment buildings, to use small flowerpots. However, residents expressed their desire to possess a small private garden in their apartments.

The unplanted and leftover spaces at the perimeter of the housing blocks and wide streets are considered as a source of heat island problem in the city, while the courtyards and shaded and narrow streets in the traditional city reducing the influence of this phenomenon (Givoni, 1998).

So, environment and traditions are not supplementary to each other but are pre-requisites for sustainable solutions (Abdullah Eben Saleh, 2004). Herein, the courtyard considered as one of these sustainable solutions that could be reintroduced in our future housing as private or semi private outdoor spaces. Nevertheless, careful thought must be given as to how to orient, design, plant, size and enclose a courtyard in a given location for a particular geographical or cultural setting.

4 Conclusion

The present paper has studied the role of outdoor spaces in the housing buildings design in Palestine in terms of sustainability and highlighted the distinctive qualities of traditional spaces “courtyard” concept. The design of outdoor spaces does not influence only the inhabitants’ needs, but also, the typology of housing that affects in turn the urban structure of the city.

In contrast to the current free-standing blocks with balconies in Palestine, the courtyard house design provides satisfaction to inhabitants because the privacy

issue is highly respected. It also guarantees a comfortable living environment, which encourages the accommodation of different occupants' activities till now.

Hence, it has succeeded to offer a socio-cultural, economical, environmental and functional model of outdoor spaces. Generally inhabitants are more satisfied of their outdoor spaces in the cases of landed dwelling. Therefore, offering the possibility for inhabitants to own a new kind of outdoor spaces similar to those ones in the traditional landed dwelling but in high building will be appreciated. To this end, we have to properly manage the spaces between our buildings and rethinking to reintegrate and reuse them consciously in our future housing design.

Inward looking, enclosure, proportions, locations, orientation and spatial relationship to other building elements are important factors that helped the traditional outdoor spaces "courtyard" to achieve its conceptual, functional, visual and environmental qualities. Lack of concern for these factors in the design of our future outdoor spaces can lead to their under performance, while they could be used as effective passive solar heating or cooling means in our houses according to the climatic regions.

In this paper only qualitative aspects have been discussed. Further quantitative studies about the concept of outdoor spaces and housing design are necessary in order to develop new models that introduce the distinctive qualities of traditional forms and current requirements of inhabitants.

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