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Sustainability and the Urban Planning Context: Housing Development in Algeria

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ABSTRACT

This paper describes research into the development of housing in Algeria. It focuses on the history of traditional dwellings and the importance of outdoor space located inside the building: typically in the form of a courtyard. Courtyard dwellings in the city of Constantine are examined in some detail. The rapid urbanisation process taking place in Algeria in recent years together with difficulties in the planning system since colonial times has caused difficulties in responding to housing needs. The concentration of the population in smaller areas of cities has led to the need for more compact yet comfortable dwellings. The paper describes how the situation might be dealt with in the township of Jijel. A number of stakeholders are being consulted and the key results of in-depth interviews with architects are reported. The findings from the review of the existing housing areas and survey are then interpreted to make suggestions for development in the future.

Keywords: housing, urban, courtyards, design, Algeria

1. INTRODUCTION

Algeria has experienced a number of invasions and colonisations through history and this has brought new peoples and new cultures to the area with consequently new commercial and demographic inputs. These have combined with the already rich variation created by climatic regions and traditional cultures to produce a wide variety of traditional dwelling form.

In modern interpretations of architectural history, traditional architecture is often considered to be an expression of sustainability as previous generations were forced by circumstance, to build in harmony with nature and climate. Further the products were matched to cultural and social values in a much more linked way than generally occurs in the present day (Makani and Talebi, 2011). As a result traditional settlements are often considered a source of sustainable design principles because they were built using locally available materials, and with respect to thermal comfort and cultural needs of the local community (Bouchair and Dupagne, 2003).

An interesting facet of many traditional housing designs was the attempt to have some kind of outdoor space indoors; the most successful exemplar of which is the courtyard house. Courtyard houses can have many beneficial attributes – in cultural terms and also in providing the means to reduce discomfort associated with climate.

In modern dwellings there is often an attempt to bring together elements of tradition together with modern needs and also to match to the needs of urbanisation. In rapid urbanisation it is frequently the need to produce smaller and more densely packed accommodation and in such circumstances the ability to create any kind of courtyard environment is severely limited. One way of creating some kind of

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outdoor-indoor space is through the provision of individual balconies. Balconies can be left open or can be enclosed.

This paper consists of three main components: firstly examples of traditionally designed dwellings which have been researched are described and evaluated; secondly particular examples of the courtyard house are examined in more detail; and thirdly, the attitudes of architects to sustainability and the ability of current urban and housing design policies to meet needs is reported following interviews.

2. TRADITIONAL DWELLING TYPES

Examples of older style traditional houses in Algeria according to Benmatti (1982) can often be divided into three categories: courtyard houses in the towns of north of the country which can be seen in the medina of Constantine for example; housing to be found in the rural and semi-urban areas of the North (this form of housing is less homogeneous than the first category and includes the example of Kabylia); and a third category associated with housing settlements in the South; examples being M'zab, Souf and Hoggar.

It is interesting to note in the following descriptions how the old styles of dwelling accommodated social and cultural needs whilst also dealing with the excesses of the climate. Some dwellings had only private interior space; some had both private and more public interior space; and in some cases the means of achieving all requirements was the use of a courtyard.

2.1 The Kabylia House

The Kabylia Berber villages are situated in the summit, slopes of mountains or in high plateaus where a dense population live from land exploitation. Topography and climate are the factors that determine spatial structure of the village, streets and alleys which follow the geographic configuration of the site. The urban fabric is often constrained by a circular road around the summits of hills, and the houses or 'Axxam' are organised along radiants or alleys that are perpendicular to the circular road. The dwellings are often grouped and link to each other to form a larger family house.

The family house shelters the whole extended family, with the overall dwelling extended by the construction of new houses sometimes in the courtyards of the parent's house. In these traditional forms where space is not limited in the same way as in modern development, two or three generations may live together and form a sub-quarter (Toubal and Dahli, 2009).

In such rudimentary houses the family, its animals, its furniture, artifacts, equipment and products all come together (Maunier, 1926). Humans and animals are juxtaposed with minimal vertical or horizontal separation. The dwelling typically had three different spaces: a high living room for people with a fireplace, a low stable area for animals and water storage, and a shed for faring equipment and crops. The rooms are used by both male and female as the men typically spend the whole day outside working on the land and only come to the house to eat and sleep. The relationship between public and private space is not well determined in the plan as the house is effectively considered as a private place.

In Kabylia houses, high humidities can be found in spaces and activities related to water such as the kitchen and bathrooms. The Brasier or 'Kanun' occupied the driest places (Loeckx, 1998). The courtyard in the kabylia house is located exterior to the house where traditional summer activities such as pottery making are performed.

The house has a rectangular form and the dimensions are typically: exterior 7 to 7.5m length and approximately 5m wide with wall-height of about 3.5m walls. The dimension can vary depending on the needs of families and the wealth or otherwise of the household. The external walls of dwellings are thick and are normally constructed without windows and thus permit protection of the interior house from cold in winter and heat in summer; the only opening is the door. The walls are constructed from local stone and the roofs have two slopes and generally use roman tiles or clay. The structural frame is based on wooden Ash beams and olive branches, and is supported by its low side walls (Maunier, 1926).

2.2 Soufi House

The traditional houses of Oued Souf are known as Soufi Houses. The Soufis or the inhabitants of Oued Souf were originally from Yemen; looking for water and better climatic living conditions, they crossed Egypt and Tunisia to settle in Oued Souf a city in the Algerian Sahara which borders Tunisia and Libya. The city is 620 km southeast of the capital Algiers. The city is located within the Oriental Grand

Erg (Great East Sand Sea).

Oued Souf is known as the 'city of a thousand and one domes' for its particular architecture characterised by the uniformity of styles using cupolas, domes and vaults. The old city is situated in the city centre and surrounded by three main roads, which separate the traditional urban fabric from the new town. The old city also exhibits a traditional architecture showing a compact urban structure which is characterised by a dense network of narrow twisting alleys, different in width and direction providing shaded movement between neighbourhoods (Bourbia and Awbi, 2004).

The houses are arranged around a central courtyard covered by palms branches. They are constructed by using locally available materials particularly the desert rose, stones and plaster. The original traditional dwelling of Oued Souf is called Haouch and designated to house extended families. The house is surrounded by its external thick windowless walls and attached to three other houses in order to provide a minimum exposure to solar radiation. The walls are constructed making use of local materials such as 'gypse' which helps to ameliorate thermal discomfort in summer by absorbing the heat during the day and releasing it at night. Also, as sand does not store much heat due to the air between its particles. It cools down quickly after sunset and may even generate morning fog in desert conditions.

The thermal performance of 'isothermal' flat roofs can be improved by adding thick layers of earth. In the case when the roof is a dome (the area of a half sphere is three times that of a flat terrace), it will receive relatively much less solar radiation. Therefore, it warms more slowly than a flat terrace (Fezzai et al, 2012).

The traditional house of Oued Souf comprises a semi-public transitional space 'skiffa' which provides privacy for the courtyard from external strangers. The skiffa is often endowed by 'khamisa': a traditional way to protect the house from bad-eyes of other people. The doorstep/doorway signifies the separation between the indoors and outdoors. Also, the house includes a kitchen, a cellar or 'khabia' and a number of rooms 'ghorfa' or 'damsa'; if the ceiling has a form of a vault, the rooms will gradually grouped together in order to satisfy the increased needs of the households.

In the North and South parts of the house, two covered spaces called 'sabat' open onto the courtyard. The North Sabat permits a maximum exposition to solar radiations in winter while the South Sabat and an excavated underground area provide the protection from heat in hot seasons (Nabila, 2007).

2.3 Hoggar Dwelling

The Touareg are the people who live in Hoggar; their origin is a mixture of Sudanese, Berber and Arabic. The Touareg are a group of tribes who live in the high mountains of Hoggar in the extreme south of the Algerian Sahara (Benmatti, 1982). The region of Hoggar is the highest land region in the Sahara where many summits exceed 2500m. Despite the southerly location, the region is relatively favoured in terms of climate, and in comparison to other parts of the desert it is less hot and experiences higher rainfall.

The Touareg live in tents or in small buildings called 'zeriba'. The tents are relatively primitive and consist of a wide leather velum envelope formed by assembling tanned goat or sheep skins painted in red and sewn together. This roof is supported by a tall wooden column in the centre and generally three other columns shorter than the first: one in the middle of the open side of the tent, the two others in the two extremities from that point. Despite its primitive form, the tent can be closed at night almost completely which can protect the inhabitants from the cold nights of winter. One half of the tent is reserved for male use (storage of clothes, saddle and weapons); the other part is occupied by the woman (clothes, personal items, and kitchenware); however the two parts of the tent are not separated by any physical barrier (Demoulin, 1928).

The Zeriba is a small hut representing an intermediate stage between the nomads' tent and more modern forms of house. It is made of stones and covered by palm leaves. The zeriba has generally a cubic form approximately 2.5 m square in plan but sometimes with a conical roof (Pandolfi, 1994).

2.4 Traditional Courtyard Houses

Courtyard housing is a universal type of habitat and it is not unique to the Arab world or to Algeria. It is widespread in diverse regions in different geographical locations, climates, societies and cultures: several civilisations have used it as the main design component of housing such as the Assyrians, Persians, Greeks, Romans, Byzantines and more recently found in Islamic architecture. However,

although courtyard housing was a key feature of traditional design in many parts of the world, there are significant differences of function and importance relating to the function of the interior courtyard in the Islamic region.

The importance of courtyards has increased under the influence of the Islamic religion and subsequently Arabic architecture took this to form a specific room/space characteristic in plan, in form and in decoration. In this, the courtyard became one of the main architectural features of Arabic houses and gave opportunity to develop a variety of associated features: loggias, galleries, high level openings, oriels and elaborate sun-shade ornamentation (Edwards et al, 2004).

The study will focus on the medina of Constantine as one of the oldest medinas in Algeria and in which fine examples of traditional forms of Courtyard Houses are to be found.

3. THE MEDINA OF CONSTANTINE

Constantine is one of the oldest cities of Algeria which dates from 3000 BC. It is situated in the centre of the North East of the country. The city was a base of the Phoenicians, Romans, Vandals, Arabs, Ottomans and finally the French. The medina of Constantine is classified as of national heritage significance. The urban fabric of the medina is extremely dense and the network of streets and routes in the medina follows directly the morphology of the site. Unlike the streets and boulevards of occidental countries, the layout of roads has an organic plan and has no regular geometric form.

An analysis of the plan of the medina shows that the urban fabric has two different urban forms: a central area of souks (markets) which is exclusively related to commerce and culture; and a private residential area. The division of these areas is explained by the principle of separation between public (commercial) and private (residential) zones.

The traditional quarter of Souika is situated in the South East of the Medina. It still retains the major part of its original urban structure. The plan of Souika is composed of a homogenous irregular urban fabric. The residential clusters form small neighbourhood units within which basic neighbourhood facilities were provided such as a bakery, public baths, mosque and a school. The clusters are formed by a maze of roads with a spatial hierarchy from winding alleyways ending by cul-de-sac which maintain the public/private relationship and separation.

Streets in residential areas are either partially covered by cantilevered volumes *sabat* or totally by additional living spaces. Overall the hierarchy of streets is as follows:

1. A commercial axis as a public street.
2. Secondary roads as semi-public streets.
3. Alleyways and small streets/cul-de-sacs as private roads.

The difference between the main commercial axis and the private cul-de-sacs is one of the important characteristics of the residential urban fabric of the Arab-Islamic medina. This variation allows the separation between the private domain of housing and the public areas in order to provide privacy of houses on the urban scale. See figure 1 for an image of a typical house in Constantine.



Figure 1 Traditional house in the City of Constantine, Algeria

4. SPATIAL ORGANISATION OF THE COURTYARD HOUSE

Traditional houses in the medina of Constantine have a simple irregular geometric form consisting of two or three-storey structures surrounded by external windowless walls and organised around the courtyard. The houses are in most cases provided with pitched roofs inclined to the patio/courtyard area. The plans of the houses are generally similar in their basic characteristics but may vary in detail, and spatial organisation and the hierarchy of spaces in the houses are very similar.

Courtyard houses of Constantine are generally found in three forms:

- Houses with columns and arches which indicate occupancy by more affluent families.
- House with large pillars, columns and lintels, which represent the more generally found dwellings occupied by intermediate households.
- The third form is similar to the second but is differentiated by the elevation of its patio from the floor to allow the use of the ground floor as a store area. This type of house is generally located in more commercial street areas.

Generally however there is no social or spatial segregation between poor and rich families and both live side by side with each other, the only signs of difference being the height of the house and the decoration of the external doors. In all cases the courtyard receives and distributes sunlight and fresh air to the other parts of the house.

The courtyard also serves as the focus for the preparation of food, and as a laundry, children's play and outdoor living space. It also acts as a circulation space surrounded by alleyways and arched galleries which are designed to avoid any direct visual intrusion (from the semi public spaces into the private central space of the house). Further it provides a covered transitional space between the rooms and the open part of the court.

The courtyards of vernacular dwellings in Constantine have a regular form: square or rectangular. Their length is varies between 8-10m, whilst their depth is between 2-3m, possibly because of the limit of available cross-beam length.



Figure 2 Typical layout of a courtyard house in the City of Constantine, Algeria (ground floor left, first floor right) Key: 1 = Public (Bit, skiffa); 2 = Semi public (Services); 3 = Private (Female and family living, or bedroom); 4 = Open space (Courtyard); 5 = Transitional spaces (Riwak).

The rooms generally located at its two extremities are elevated doukana (storage places). The central area of the room (Kbu) is opposite to the door and is balanced by two lateral sitting bay areas. The house is accessed through the skiffa, a small angled space which connects the public (exterior), semi-public and private spaces of the house (Barkat, 2006). The skiffa is also the reception area for visitors, particularly men who are not allowed to enter into the house. This place is connected directly to a reception room which is the most decorated room in the house and designated to receive male guests. Figure 2 shows the generalised form of the courtyard house set on two storeys.

5. THE PROVINCE AND CITY OF JIJEL

The Province of Jijel is located in the north east of Algeria and until 1974 it was a sub-prefecture of

the Province of Constantine. It is bordered by the Mediterranean Sea to the North with a coastline of 120 kilometres, and the Provinces of Skikda in the East, Bejaia in the West, and of Setif and Mila in the South. It is divided into 28 communes and 18 sub-prefectures (Dairas) and has a total area of approximately 2400 km² of which 82% is mountains; it has an estimated population of 650,000, most of whom live in the North part of the Province. The actual City of Jijel has an estimated population of 134,000 inhabitants and occupies just 62 km² (2.6%) of the land area of the province, and this results on a high density of population of 2,140/km² (when the average density is just 264 persons/km² (Wilaya de Jijel, 2013).

Due to its strategic location, Jijel has been an attractive destination for colonists since the pre-Roman times. The city was prosperous in Phoenician, Carthaginian, Roman, Byzantine, and Arabic times. Following a large earthquake in 1856, the reconstruction of the city took place under the French occupation resulting in a new city designed by Scheslat in 1861. The city was built in an orthogonal plan focused around the military garrison 'the citadel'. The plan was similar to European cities with a triangular form constrained by the terrain form and also by the layout of ramparts, the rules of fortification, and the location of the gates into the city. According to the principles of Haussmann's urbanism, this plan included the key elements of urban fabric: the regularity of pathways, the alignment of the road structure, and the important role of public areas and squares.

The distribution of the population of showed a concentration of colonists in the North part of the triangle, close to the citadel, the Sea and around the already existing facilities. The native population was grouped in the South West part of the city and occupied a very dense area with very tight access from narrow streets. In 1885, the port was rebuilt and later the Eastern area became an expansion area for the colonists who built housing developments with beautiful villas facing the beach. On the local Arab side, informal settlements spread parallel and outside the triangle and created two new quarters: la Pепенiere and the Faubourg (Safrai, 2008).

After Algerian independence, Jijel witnessed an increase in population arising from a rural exodus towards the city. However, no spatial expansion was planned and little organized construction took place. This resulted in the densification of indigenous quarters and the appearance of other new spontaneous quarters: village Mustapha, la Crete, etc.

From 1974, with the nomination of Jijel to the status of provincial town and the implementation of a special development programme, there has been a considerable rise of population (the population has multiplied by 3 times in a period of 20 years, from between 1977 and 1998).

6. HOUSING POLICY AND HOUSING DEVELOPMENT IN JIJEL

Since the 1970s there has been a very sharp increase in demand for housing, particularly social housing. In this period the city initially grew haphazardly by juxtaposition of urban entities in particular informal housing. The urbanisation of the city occurred rapidly and without much detailed forward thinking on urban development in both medium and longer terms. This has impacted on the fragile balance between the urban system inherited from the colonial period and created morphological and functional failures that make urban management rather complex (Safrai, 2008).

From 1985, the increasing housing crisis and the emergence of informal settlements lead to the launch of a major public housing program and the creation of three new zones of urban habitat 'Zone d'Habitat Urbaine Nouvelle', each of which have been designed to accommodate 50,000 inhabitants (Hallal, 2007). These Zones were well intentioned; however their implementation has been less satisfactory because of the emergence of informal settlements. This situation was aggravated particularly in the period between 1990-2000 due to the civil war, the resulting insecurity, and the degradation of living conditions in rural villages and mountains. Urban and architectural decisions in Algeria and particularly in Jijel have sometimes been made according to political and personal evaluations which are sometimes more powerful than urban planning instruments, and this can have significant adverse impacts.

One of the key design features which is seen in the high density development to meet urgent social needs in Jijel has been the lack of development with regard to traditional design. This has led to multi-storey apartment blocks which have forms of outdoor-indoor spaces – balconies etc, but without the attributes understood and liked by the indigenous population, see for example Figure 3.



Figure 3: Example of ‘closed’ balconies

7. SURVEY OF BUILDING PROFESSIONALS

The research project, of which this paper reports a part, is involved in integrating the views of stakeholders into the design and construction process in a much more influential way. However in order to do this, existing knowledge and attitudes must be known. A number of detailed interviews have been carried out with stakeholders, and the results of the first phase of these, with an influential group of architects and other professionals is reported here.

The study was carried out with twenty-one architects and engineers working in either private bureau or public administrations. The aim of this questionnaire was to assess the knowledge of architects in Algeria in terms of sustainability which can affect the quality of design and the sustainability of the built environment. It also sought views and understanding on differences between traditional and modern design of dwellings.

- On the question concerning sustainable development objectives: 16 professionals answered that they have an idea of the objectives and on what makes a building sustainable; however, only 3 out of 21 gave a suitably detailed definition and the others just related the subject to energy consumption. In addition, 17 out of 21 think that the Algerian Government is not making sufficient effort to raise awareness amongst public and professionals on the topic of sustainability.
- In relation to comparisons between modern apartments and traditional courtyard houses in terms of sustainability, 14 respondents out of 21 preferred the traditional house and they argued that the traditional design respected the lifestyle of local inhabitants. Also, they stated that the courtyard provides more natural light and better ventilation to the dwelling.
- A majority of interviewees (14 out of 21) also agreed that traditional architecture satisfied the needs of the local population in terms of space, while only 7 out of 21 thought that modern design and construction met the needs of the inhabitants. 13 out of 21 interviewees claimed that traditional design met the needs of local population in terms of comfort. However, only 4 out 21 agreed that traditional design respected urban level regulations in Algeria. Some of the interviewees think that is because the regulations were only devised some time after traditional design had evolved.
- All the interviewees agreed that it was important to consider the opinion of future inhabitants in the design of new houses.
- It was clear that the majority of professionals do not have sufficient understanding of the subject of sustainable development which affects the quality of the built environment.
- The vast majority (20 out of 21) of the architects interviewed thought that the quality and impact of urbanism and the built environment in Algeria is poor and lacks respect of regulations.

- Some of the interviewees suggested that the design of future housing projects should fulfill the 'real needs' of households. They also believed that future design should consider the climatic and environmental factors of the region. Moreover, they thought that the Algerian government should improve the quality of construction in terms of space, comfort and aesthetics.

8. CONCLUSIONS

Vernacular houses in Algeria have varied according to different climatic and geographical regions. Houses design, the use of local building materials and construction system were adopted for each region separately in order to cope with different environmental factors and resource availability. Thus each type fulfilled social needs and society values and traditions in different ways.

However, it is not possible simply to use the systems and practices from previous generations but there is need to study and learn from their experiences and the sustainable systems they introduced (Eiraji and Nambar, 2011) but also to adapt. Human behaviour and culture should also be considered in modern housing design (Vaziritabar, 1990) and future cities should be created by learning from historic and traditional cities: conserving cultural heritage and promoting sustainable development in order to suit contemporary needs.

Urban policies which lead to new housing development need to take into account the older traditional forms but in new ways such as to introduce new forms that can replace the older courtyard form seen so successfully used in Constantine. New housing must also be sustainable and therefore new policies and actions must be informed by current stakeholder views but also seek to address and modify those stakeholders' opinions. The results of the interviews indicate areas which require attention and can be developed for more sophisticated analysis. This research ultimately aims to combine sustainability potential in traditional architecture with modern technologies and occupant needs to create new sustainable cities that suit present and future needs of the inhabitants.

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