



## **Ecology and environment, an urban scale comparative study between contemporary and vernacular city of Nablus**

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**ABSTRACT:** The harmony between environment and buildings is the strongest point of vernacular architecture. In this context, the Mediterranean vernacular architecture is harmonized with its local context, including culture and traditions. In addition, it respects environmental and climatic factors, construction materials and morphology. In the past, people in Palestine built their houses according to their possibilities, needs, available materials, topography, and culture. Without any control from the government or any legal limitations or architects, it was people architecture, simple architecture. This paper discusses the differences between vernacular and contemporary cities of Palestine at the urban scale. The research methodology adopts explanatory qualitative analysis and comparative synthesis methods for both the old and the new area of the city of Nablus and considers many parameters of the cities such as the city layout, skyline, infrastructure and public spaces. The outcomes of this research allow understanding how the new city is far away from the sustainability principles and how the old city is closer to it and how the architects and stakeholders could learn from the strategies of vernacular architecture. The paper draws a set of recommendations for more in-depth studies, based on quantitative survey with energy efficiency measurements in the Mediterranean climate.

**Keywords** *sustainability, urban scale, vernacular buildings, Palestine.*

## 1. INTRODUCTION

There is no doubt that Mediterranean countries, in general, have some common aspects regarding vernacular architecture like climate, materials, and building technologies. As an example and having in mind the specific characteristics of the vernacular architecture found in Mediterranean countries, this paper is focused in Palestinian vernacular architecture.

Nowadays, vernacular architecture is considered as a model for sustainable architecture and the strategies that are now the basis of sustainable construction are derived from aspects and characteristics of this type of architecture (Fernandes et al. 2014).

The Palestinian vernacular architecture was studied before by other authors. For example, (Hussein, Barlet, and Semidor 2010) highlighted the socio-environmental characteristics of private outdoor spaces in contemporary Palestinian housing, comparing it with the traditional outdoor spaces, with the goal of improving living quality of future housing design in Palestine. This comparative study was carried out in two different cities located in two different climatic zones of Palestine: Jericho and Nablus (Kottek et al. 2006). The study is focusing on courtyard concept and in the importance of reintroducing consciously this concept in the design of new residential buildings and in the retrofitting of existing ones. This study is based in a survey that covers 300 dwellings of different housing typologies such as detached houses and multi-family buildings, which are the most common typologies of contemporary housing in Palestine. As main conclusion, this study highlights that the private outdoor spaces are an important and main element for improving and achieving housing sustainability and that contemporary outdoor spaces are not designed to meet the inhabitants needs.

Another comparative study discusses high-density housing in Palestine and the lack of land, by comparing between contemporary and traditional typologies and identifying the use of land parameters of traditional housing to improve contemporary housing in Palestine (Itma 2014). This study analyzes different housing, such as courtyard houses, single houses, and attached houses, in addition, it defines the following typologies for Palestinian buildings: i) Low-rise-low-density housing; ii) High-rise-high-density housing; and iii) Courtyard housing.

One of the most recent studies in this field (Fernandes et al. 2014) reviews the importance of vernacular architecture as a type of construction that should be studied from a sustainability point of view (Fernandes et al. 2014). The study is based on a comparative analysis between the vernacular architecture of southern Portugal and north of Egypt.

The study concluded that Mediterranean vernacular architecture was developed in many perspectives and affected by many factors, such as climatic, environmental and cultural aspects, and that it is possible to find similar vernacular strategies through the Mediterranean regions even if the culture is based on Roman or Arab cultures. The study also presents other works which highlight the good thermal performance of vernacular buildings in Mediterranean climate context (e.g. Fathy 1986), and emphasise the benefits of using local materials (e.g. Weber and Yannas 2013). This paper concludes that climate is an important issue to consider in building design and that some of the cooling passive strategies found in the Mediterranean vernacular architecture are relevant principles to consider in the design of energy efficient buildings. Nevertheless, the current building

design is depending majorly on fossil energy due to the role given to mechanical equipment to control the indoor climate.

## **2. METHODOLOGY**

The paper is applying a qualitative approach through explanatory qualitative analysis and comparative synthesis methods for vernacular sustainable strategies used in Palestinian vernacular architecture at the urban scale. The application of this method and the comparison is focused on both the old city and new urban areas of Nablus. The comparative analysis was based on a systematic comparison of different design principles used with a focus on urban design scale strategies to understand similarities and differences. This analysis allowed the development of a set of guidance principles to be considered in the design of more sustainable urban areas in Palestine. From the results it was also concluded that it is necessary to develop future in-situ qualitative surveys for more robust evaluation of such strategies.

## **3. URBAN SCALE STRATEGIES USED IN VERNACULAR AND CONTEMPORARY CITY OF NABLUS**

With a deeper insight, the difference grows and expands in terms of achieving sustainable concepts and observing the needs of the people, culture, and place. Unlike the modern part of the city, this is the case in the old city areas. These differences are clarified in table 1 as a comparison between the urban scale strategies used in the old and new urban areas of the Nablus city.

### **3.1 City layout**

From the analysis of table 1 it is clear the differences between the old and the new urban areas of Nablus. As presented in Figures A and B the compact urban layout and the contiguous buildings are characteristics of the old city. Buildings shade the streets, and buildings are shading each other as presented in Figure C. In the new urban areas there are wide and open streets (Figure F), buildings are separated and the layout is completely different (Figures D and E).

### **3.2 City skyline**

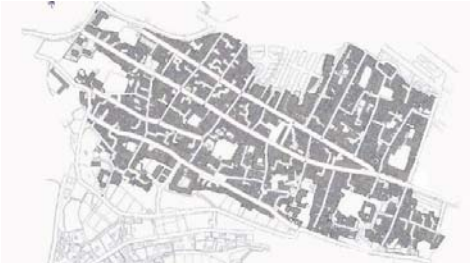


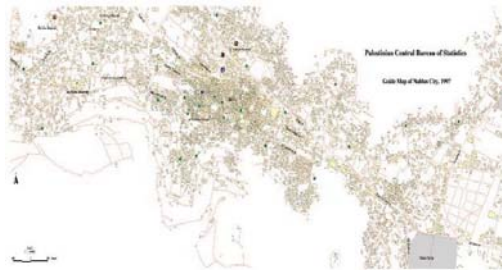


The difference is clear through table 2 between the heights of buildings in both contexts. Buildings in the old city are not very high, 2-3 floors maximum (Figures A, B, C), and generally are of equal height, unlike buildings in the new city area, with 6-12 floors and not with the same height (figures D, E and F).

### **3.3 Urban public and green spaces**

As seen in table 3, there are a significative number of green and public spaces in the old city of Nablus (Figures A, B and C) that are still in use as public spaces and are suitable for cultural activities. On the other hand, in the new city, these spaces are fragmented into small spaces, depending on the legal rebound ruled by municipality (Figures E and F). In the new urban areas these spaces are not considered as a public space, neither as green spaces, and

the inhabitants do generally not use them and therefore such spaces are completely neglected (Figure D).






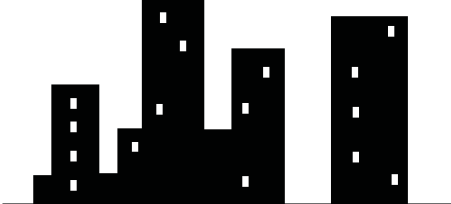
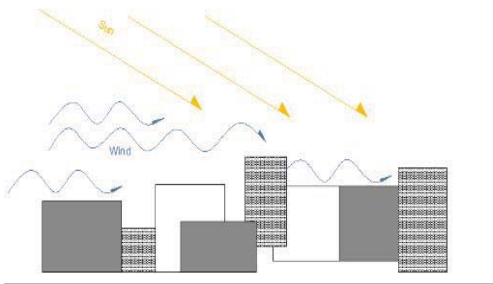
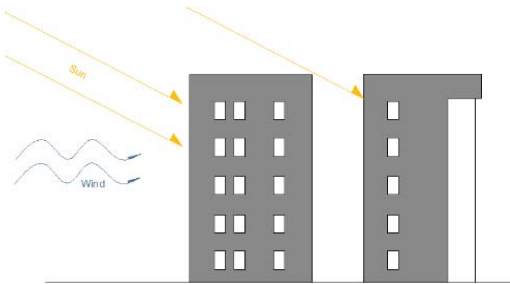
Table 1. City layout comparison between the old city and new urban areas of Nablus (Sources – figures A and E: “Http://www.nablus.org/” 2011; D, C and F: “DOOZ” 2016).

Old city (Nablus)	New city
<p>A</p>  <p>Nablus old city map showing the compact layout</p>	<p>D</p>  <p>Separated building in the new urban areas</p>
<p>B</p>  <p>3D model of Nablus showing the compact layout</p>	<p>E</p>  <p>2D map for the new urban areas showing the disperse layout</p>
<p>C</p>  <p>Shaded streets and walkways as a result of compact layout</p>	<p>F</p>  <p>Streets and walkways exposed to direct solar radiation due to wrong city layout</p>

### 3.4 Infrastructure

As presented in Table 4, the new technology is giving some positive inputs to the new urban areas, such as an improved sewerage network (Figures D and E), in contrast with old sewerage network created by the Romans and that is still in use in the old urban areas (Figures I and J). Regarding the water distribution system, in the new urban areas both the higher population density and higher buildings height turned necessary the use of solutions higher environmental impact and not always so well integrated in the urban layout as the traditional water distribution systems (Figure B and C compared with G and H).

Table 2. sky line comparison between the old city and new urban areas of Nablus (Sources – figure A: “[Http://www.nablus.org/](http://www.nablus.org/)” 2011; B: “Presidentsmedals” 2016; D and H: “Tawayha, Bragança, and Mateus 2015”).

Old city (Nablus)	New city
<p>A</p>  <p>Buildings height at the old city of Nablus.</p>	<p>D</p>  <p>Buildings height at the new urban areas.</p>
<p>B</p>   <p>Section showing composition and heights.</p>	<p>E</p>   <p>3D and 2D view for the new urban areas.</p>
<p>C</p>  <p>The effect of the buildings height on the wind and sunlight access.</p>	<p>F</p>  <p>The effect of the buildings height on preventing the wind and sunlight access.</p>

#### 4. DISCUSSION

For a developing and growing country such as Palestine, it is necessary to begin and to grow in a right way and to build on strong and clear foundations to reach suitable and sustainable buildings for the people, especially when there is a very rich and vivid background that still exists. The empirical experience that was applied by our ancestrals in the design of vernacular cities has potential to be applied in the design of new building areas.

Nevertheless, it is necessary to prior analyse and scientifically validate the performance of the vernacular design principles.

Contemporary buildings in Palestine are far away from being sustainable buildings. Architects and other stakeholders are too much concentrated in the financial characteristics of their projects that they forget other important principles that should be base of the building design, such as: local climate, local materials, and population culture and needs. Therefore, such “modern” designs are doomed to be a failure. As presented before, there are many strategies, used in urban design scale of the old cities of Palestine that can be used in contemporary design. Those strategies are summarized and discussed below at the following levels: i) city layout; ii) city skyline; iii) urban public and green spaces; and iv) infrastructures;

Table 3. urban public and green spaces comparison between the old city and new urban areas of Nablus (Sources - figure A: “Presidentsmedals” 2016; figure D “DOOZ” 2016; figure E “Google Maps” 2016).







Old city (Nablus and Hebron)	New city
<p>A</p>  <p>Public spaces and gardens distributed all around the old city of Nablus.</p>	<p>D</p>  <p>Neglected gardens at the new urban areas.</p>
<p>B</p>  <p>Semi-public spaces between buildings.</p>	<p>E</p>  <p>Urban spaces caused by rebounds.</p>
<p>C</p>  <p>Semi-private spaces for extended families</p>	<p>F</p>  <p>Spaces between buildings caused by rebounds.</p>

Table 4. infrastructure networks comparison between the old city and new urban areas of Nablus (Sources – figure F: “Google Maps” 2016; figure A: Tawayha, Bragança, and Mateus 2015; figures D, E, I, J: “The Applied Research Institute Jerusalem - Home” 2016).



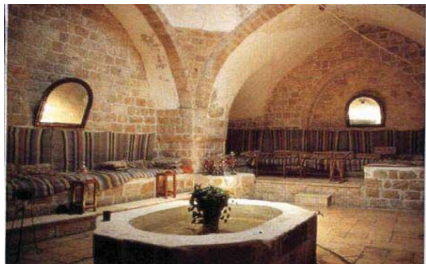






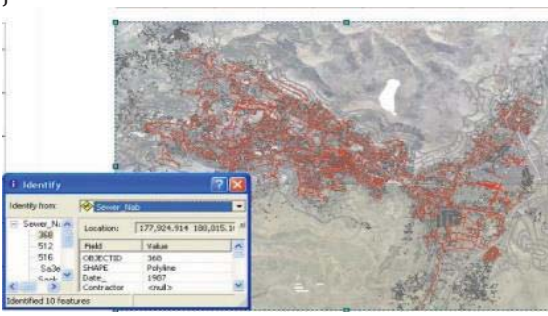
Old city (Nablus)	New city
<b>1) Roads and transportation</b>	
<p>A</p>  <p>Top view picture for the transportation network the old city of Nablus.</p>	<p>F</p>  <p>Top view picture for the transportation network the new urban areas of Nablus.</p>
<b>2) Water distribution</b>	
<p>B</p>  <p>Water elements in the public buildings of Nablus.</p>	<p>G</p>  <p>Water tanks above buildings of the new urban areas.</p>
<p>C</p>  <p>“Sabil” public free water element.</p>	<p>H</p>  <p>Electric pumps for water distribution.</p>
<b>3) Sewer network</b>	
<p>D</p>  <p>Old roman canal for water distribution.</p>	<p>I</p>  <p>New water network at the new urban areas.</p>

Table 4 (cont.). Infrastructure networks comparison between the old city and new urban areas of Nablus (Sources – figure F: “Google Maps” 2016; figure A: Tawayha, Bragança, and Mateus 2015; figures D, E, I, J: “The Applied Research Institute Jerusalem - Home” 2016).

Old city (Nablus)	New city
<p>E</p>  <p>Natural springs used for water supply.</p>	<p>J</p>  <p>New water network plan of Nablus.</p>

#### 4.1 City layout

Comparing between the old and the new city reveals the huge differences at the city layout. In the old city, it is clear the compact urban layout which: reduces the number of surfaces exposed to the sun thus reducing the solar gains in summer and preventing the building from losing heat in winter; provides shaded pedestrian streets in summer; and also protects people from the hard wind and rain at the roads in winter. On the other hand, the layout of the new city is wide, streets are opened, the buildings are separated, and all are exposed to sunlight in the hot days of summer, and the cold wind and bad weather in winter.

#### 4.2 City skyline

The height of buildings controls and affects both wind movement and sunlight access. At the old city it is clear that no building rises more than 2-3 floors, which allows the sun to reach all the parts of the house, and also, the wind is able to reach all the spaces, making a good circulation and ventilation, providing a healthy environment all around the city. On the other hand, in the modern city areas there are higher buildings with 7-16 floors that prevent the wind and the sun to reach a huge part of the neighbour buildings. Therefore, in this case buildings are worst regarding healthy aspects.

#### 4.3 Urban public and green spaces

The old cities in Palestine are depending more on semi-public, semi-private and private spaces, which puts the responsibility of these spaces on people that really use them. In this case, the users are responsible by taking care of these spaces and even for trying to develop them.

On contrast, the new areas of the city are depending mainly on public spaces. In this case the poor local government is responsible by maintaining these spaces, which means poor care and abandonment of these areas.



## **4.4 Infrastructure**

The city infrastructure is divided into hard and soft elements. In this case, hard elements are discussed, which are roads, water distribution and supply and sewerage networks.

### **4.4.1 Roads and transportation**

As seen before, the old city of Nablus is depending mainly on pedestrian paths that are shaded, protecting people from rainy and sunny days. Only two main roads exist that pass along the old city, allowing people to reach their neighbourhoods. This allows protecting the city from pollution caused by vehicles. The design of the new city areas ignores completely the pedestrian paths and assumes that people depend on vehicles to reach every side of the city.

### **4.4.2 Water distribution**

The old city has a good water supply network, depending on the natural springs that there are all over the city. This network is based in a unique concept that is called “Sabil”, providing people with drinking water they need for free. On the other hand, although the new city areas have also a good water network, which is providing water to almost all the parts of the city, the image of the tanks in the top of the buildings is having a very bad aesthetic impact on the city.

### **4.4.3 Sewer networks**

Without any doubts, the sewerage network in the new city areas is much better than the old one. Nevertheless, the old network has no problems, and it is still working well.

## **5. CONCLUSION**

Generally, in order to develop something and to improve it, it is necessary to learn from previous experiences, to learn from the past for future, especially when talking about a very rich background, and a very poor reality. In this paper, some strategies were raised and explored in urban design scale, both in old and new context, comparing the old and the contemporary city areas of Nablus.

The study is trying to highlight these strategies in order to assess their potential to use them in improving the design of new urban areas. This study was focused in the urban scale strategies and since building scale strategies should also be studied, this is going to be developed in another study complementary to this one.

Using a comparative approach, this paper showed that some vernacular Palestinian architecture’s strategies have good potential to be used in the design of new urban areas in Palestine. These strategies much be used together with other contemporary design approaches and knowledge in order to satisfy inhabitant’s needs and expectations, thus contributing for the creation of a more sustainable built environment.

As main conclusions, this study highlights that:

- More intensive quantitative studies and surveys are needed to adapt vernacular strategies to modern applications;

- Vernacular strategies should be used as guidelines for our contemporary urban planning process;
- Currently, there are no national reference documents for vernacular strategies in both urban and building scale design.

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