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Değerli Okurlar,

2018 yılı cilt, sayı 1’de yayınlanan “Acoustics and Speech Privacy in Open-Plan Offices: A Case Study on Computer-Based Task Performance” başlıklı makalenin yazar isimlerinden biri sehven unutulmuştur.

Yazarların nazik uyarıları dikkate alınarak bu yanlışlık ekteki sayfadaki şekilde düzeltilmiştir. Saygılarımızla.

Editör

Dear Readers,

The name of one of the authors titled “Acoustics and Speech Privacy in Open-Plan Offices: A Case Study on Computer-Based Task Performance”, published in 2018, vol.1, issue 1 has been forgotten inadvertently.

Taking into consideration the polite warnings of the authors, the necessary corrections has been made as seen in the following page.

Best regards.

Editor

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## Acoustics and Speech Privacy in Open-Plan Offices: A Case Study on Computer-Based Task Performance

Kıvanç KİTAPÇI\* Semiha YILMAZER \*\*

### Abstract

The aim of this study is to find out the effects of speech and speech intelligibility on computer-based task performance in open-plan offices. The research was conducted in a real open-plan office environment to include the open-office experience of subjects to the analysis. STM Bilkent Office was selected as the case, and 40 available open-office occupants were participated to the study. The experiment consists of two main phases. In the first phase, acoustical simulation of the site was done, to derive distribution graphs for speech related room acoustics parameters. In the second phase, occupants' computer-based task performances were tested under three different sound environments, which are continuous noise, speech and masked speech. According to statistical analysis of the performance test, and the acoustical properties of the case STM, suggestions for renovation were discussed. It was found that effects of intelligible speech on occupants' task performance are only psychological, because it is significant that there is no difference between results of performance test. However, all of the occupants respond to the questionnaires that speech sound environment was the most distracting one. Proposal for renovation was given to minimize the effects of intelligible speech on occupants for preventing the long-term effects on occupants' health.

<sup>1</sup>This paper is based on the master's thesis 'Effects of Speech Intelligibility on Computer-based Task Performance in Open-Plan Offices' and has been prepared with the technical and academic support of İhsan Dođramacı Bilkent University.



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**Exploring Problematic Issues of Housing Design in Hot Humid  
Climate: Libyan Case**

Eman A. SASI\*, Gülsu Ulukavak HARPUTLUGİL\*\*

**Abstract**

Contemporary housing has suffered from several problematic issues in hot humid climate, therefore; this paper aims to highlight the environmental, social and economic issues of contemporary housing in hot humid region. The methodology depends on questionnaire that helps to discover these problems which are facing users in their housing and case study on contemporary housing for people who has experience of living in two kinds of housing: traditional and contemporary housing. The significance of the study is related to comprehensively detailed presentation of these issues which affect the user`s comfort, user`s needs and the cost of living. The main objective is to reduce increasing these problems in future as well as pay attention to the specialists in the aim to develop environmental, social and economic solutions for future housing in hot humid climate. The results of this paper will be useful for users and specialists as well as author in order to find development sustainable solutions in future studies.

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**Sıcak Nemli İklimdeki Konut Tasarımı Sorunları Üzerine Bir İnceleme: Libya Örneği**

Eman A. SASI\*

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**Öz**

Çağdaş konutlar, sıcak nemli iklimde çeşitli sorunlarla karşılaşmaktadır. Bu nedenle bu çalışma, sıcak nemli bölgedeki çağdaş konutlarla ilgili çevresel, sosyal ve ekonomik sorunların ortaya çıkartılmasını amaçlamaktadır. Yöntem, geleneksel ve çağdaş konutlarda konut sakinlerinin karşılaştığı sorunları anlamaya yardımcı olan ve iki tür konutta da yaşama deneyimine sahip kullanıcılara yönelik bir anket çalışmasını içermektedir. Çalışmanın önemi, kullanıcının rahatını, kullanıcının ihtiyaçlarını ve gelecekte yaşanacak sorunları daha da azaltmak için yaşam maliyetini etkileyen bu konuların kapsamlı bir şekilde sunulmasıdır. Aynı zamanda, sıcak nemli iklimde gelecekteki konutlar için çevresel, sosyal ve ekonomik çözümler geliştirmeyi amaçlayan uzmanlara da yol göstermektedir. Bu çalışmanın sonuçları, gelecekteki çalışmalarda sürdürülebilir çözümleri bulmak için kullanıcılar ve uzmanlara faydalı olacaktır.

## **1. INTRODUCTION**

In the last decade the developed world suffers from environmental and economic housing issues that lead to high energy consumption, therefore many sustainability strategies in coldest countries call for reducing building energy consumption to the lowest levels on residences. On the other hand, Arab countries have a harsh climate, which is extremely between hot dry and hot humid climate. In the past, most traditional Arab houses had unique features of vernacular architecture which helped people to live comfortably with their local environment and met their social needs. Thus, housing reflected their identity, culture and people's needs. Unfortunately, after urbanization due to population growth, urban expansion and economic development, everything has changed in the built environment of urban cities, specifically in housing due to following the contemporary world in their experience and their characters of form, without considering differences in the climate, local environment and social needs. Therefore, this study aims to highlight the principal environmental problems of contemporary housing. The research methodology will dependent on questionnaire and case study in the aim to discover the problems of environmental, social and economic which are facing people in the contemporary Libyan housing in hot humid region. The results of the study will present comprehensive results for environmental, social and economic issues which are important for future studies.

## **2. LITERATURE REVIEW**

### **2.1. The sustainable housing in developed countries**

From environmental point of view, Europe countries identified the problematic issue of housing as, energy consumption and its impact on the environment. Therefore, most building have 30% of energy consumption in the UK, and 40% in EU, moreover the main sources of energy consumption in homes are heating/cooling, lighting and hot water, in that case, this issue will increase in future and consume more energy. Erhorn, (2014) However in the United States most building consume of 70% electricity while commercial buildings consume double between (1980 -2000) and this issue will be increase by 2025 approximately 50% of electricity consumption. Shortly, the world consumption will increase in the coming years if does not decompose environmentally. Steinbock, (2006) As a result, in the developed world, energy consumption and its bad effect on the environment are considered as one of the biggest problems that housing sector is facing from the perspective of sustainability.

### **2.2. The sustainable housing in Arab countries**

In the beginning, the big problem of the "westernization" as author of Kite (2011) mentioned has taken place in architecture form as well as urban cities in the most Arab cities. The "westernization" occurred after the political independence of Arab world, so the western

model established in the most cities which constricted with western technology even the urban planning of street and public spaces was all based upon the standards of the western style. According to that, traditional form had faded and the Muslim identity effected by modern style as well as the culture of Muslim people, this issue appeared due to destruction the traditional cities, and it had taken place. At this time, modern cities have neglected the traditional historic centers, as result, Kite`s study finding that; first, there is a gap between the traditional planning and contemporary planning in Arab cities. Second, most traditional historic architecture has been deteriorated by modern architecture or by modern planning. Kite, (2011). On other hand the study of Al Sayyed (2011) analyzed the problematic issue of contemporary housing in Arab world as he pointed out the way of building problems using modern materials instead of local materials as Rasem Badran (*he is a contemporary architect who is using the traditional theory in contemporary design*) so he used to transform elements of traditional architecture into contemporary forms by using technology Al sayyed,(2011). Moreover, the study of Pugnaroni (2014) presented the issue of the modern building which does not consider the climate condition of hot zone, which led to designing a poor indoor environment that have negatively impact on the human being and the environment, as well as increasing energy consumption, impact the environment, and the cost of people living. Pugnaroni, (2014) Furthermore, Waziry (2004) presented some important criteria that are available in contemporary housing which does not provide privacy at several levels of; first the contemporary housing dose not separate visitor spaces from family spaces as it done in traditional housing. Second, contemporary housing does not provide visual privacy from outside by visual insulation of windows and balcony because he focused on sustainable architecture in the Islamic perspective Waziry (2004) Finally, Hassan Fathy (1986) (he is the most famous Arab architect who using the traditional theory in traditional design, AL Sayyed, (2011) criticized modern buildings due to the use of modern materials that are not suitable for the environment however he call for using traditional solution which rely on local environment by using natural material and reflect social culture in his projects (without using technology). Hassan Fathy, (1986) As a result of the problems identified in the hot zone are; first, using modern materials which led to high energy consumption, second loss of privacy inside and outside the building.

### **2.3. The sustainable housing in Libya**

Libya has a harsh climate, which is extremely hot dry in the south and hot humid in the north. In the past, most traditional Libyan houses had unique features of sustainable environmental solutions which helped people to live comfortably with their local environment and met their social needs. Thus, housing reflected their identity, culture and people`s needs. For example, the Courtyard House (*Housh*) is a coastal house. This type of housing is located primarily in

coastal cities, such as Darna and Benghazi in the east and Tripoli in the west. This sort of housing reflects the culture, heritage and identity of the city from the 16th century until now. The urban fabric of the old city is characterized by a group of court yard houses, which are separated by public and private space. Courtyard houses have an irregular form with a courtyard shape in the square. Moreover, most houses have one façade that opened in to narrow streets providing shadow and facing the desired wind. Finally, this type of housing reflects the idea of people's needs for separate private and public spaces Gabriel, (2014). Unfortunately, after urbanization due to population growth, urban expansion and economic development, everything has changed in the built environment of urban cities, especially housing due to follow the contemporary world in their experience and their characters of form, without considering differences in climate, local environment and social needs (Sasi 2013).

Additionally, in the last four decades, contemporary housing has been constructed in all Libyan cities. These houses were designed by a foreign company, the housing has two floors with a garden around them as well as it include high walls, in order to provide privacy for residents, and there is no courtyard inside the house and most of the materials are concrete and steel which are used for the roof, columns and floor, while hollow cement blocks are used for the walls Shawesh, (1996,). Conversely, the issue with this type of housing, as Shawesh indicated, is that *"Most, if not all, projects fail to a greater or lesser extent to respond to the needs of the user, particularly where large families are involved. The essential requirements of adequate space are rarely considered. The traditional, culture and social background of the residents are not considered. Climate and local building materials are disregarded"* Shawesh, (1996). Furthermore, regarding the housing issue Sasi (2013) suggested that the same housing is built in all cities, without considering differences in climate, culture and needs. Moreover, foreign experts studied the social life in the capital, Tripoli and applied it to all coastal and desert cities. Thirdly, inadequate funding for housing projects led to most of the houses not being completed. Finally, in the last two decades, the lack of housing has become a considerable problem facing all Libyan cities and led to new families building rooms on top of their parent's homes. (Sasi 2013)



**Figure 1** Libyan housing issues Source: Sasi, 2013

In the study of Elwefati (2007) the author criticized the cotemporary concrete buildings in Libya which were not suitable to the local climatic and led to other problems such as uncomfortable indoor spaces and had a high energy-consumption. In other hand the author



highlighted the advantage of traditional houses which were responsive to the local environment. Unfortunately, the result data were shown that, the cooling of the modern housing depended on artificial air conditioning especially in the summer. According to this study follow the western architecture led to losing identity of the local architecture Elwefati, (2007)



**Figure 2** Contemporary house in Tripoli Source: Elwefati, 2007



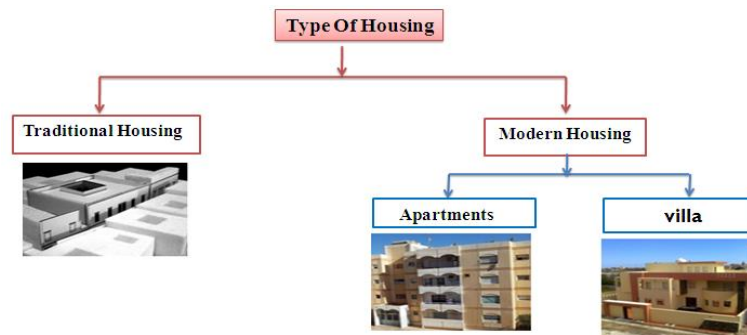
**Figure 3** Contemporary house in Gharyan Source: Elwefati, 2007

The study of Almansuri (2010) discussed the problem of new construction of Libyan housing in Tripoli city from the angle of energy consumption, as the flowing; *“it applied without complete understanding of their side effects.”* Almansuia (2010). Therefore, it presented the issue of a new form and construction which have many environmental problems such as; indoor spaces rely on the mechanical air conditioning to provide thermal comfort. Moreover, designing the housing without consideration of the local environment has a huge side effect. Almansuia, (2010) the research paper of Nura (2011) exposed the problem of housing as the most important problem facing Libyan country. The study explained some issues of low income and population growth which help to increase housing problem in many Libyan cities Nura (2011). In the general case, the most common issue of Third World Countries is still the high cost of the houses and the low income which help to emerge other problems in the aim of providing own houses. In the same way Azlitni (2009) explains the issue of new design of the contemporary buildings which have no courtyards and have glass facades with decorated materials. Azlitni, (2009) in paper of Alzubidi (2002), she criticizes the use of concrete structure and materials that are inappropriate with the local environment. She aimed to view the significant details such as; materials, construction systems, walls thickness, type of roofing, openings, etc. in goal of how could these details or architectural elements created thermal comfort spaces in the hottest arid regions Alzubidi, (2002) , Azzuz (2000) also had same view as he said in his work that; *“Outside experts where brought in. They played a major role in the shaping of the now exiting environment. without proper understanding of or empathy for the*

*cultural, social and religious characteristics of a country, western technologies, often innocently but forcefully and efficiently propose the direct use of Western mass production” (Azzuz, 2000,) Therefore cultural values as Aburouna (2010) mentioned here should be reflected inside the housing more than outside. However, the issue of modern Libyan housing losing their value of local culture as he mentioned here “modern housing design did not appropriately consider these local cultural values”. Aburouna, (2010)*

### 3. METHODOLOGY

The research methodology is divided into two steps; i Questionnaire and ii Case study. First of all, the Questionnaire have been given to the sample of people who live in coastal region in Libya and take advantages of their answer in the aim to discover any environment, social and economic problems. The results of the questionnaire were analyzed based on each type of housing; specifically, Traditional Housing (TH) and contemporary housing such as Apartment (AP) and Villa (V) as shown in (figure; 4).



**Figure 4** Type of housing

In order to achieve the goal of this study, several important questions have been established. The questions in the study have two purposes: first to identify the problems that people have faced in various sorts of housing. Second, to identify the treatments that will be used in propose housing in future. These strategies are also particular to the elements which were developed at the beginning of this study, such as environmental, social and economic elements, as demonstrated in (figure 5)

In the beginning, questions were designed by the researcher to gain a greater understanding of user’s experiences of housing. Therefore, questionnaire was applied to number of people most of which were living in Libya and an online system was used to get the answers (social media groups) as presented in (Figure 6).

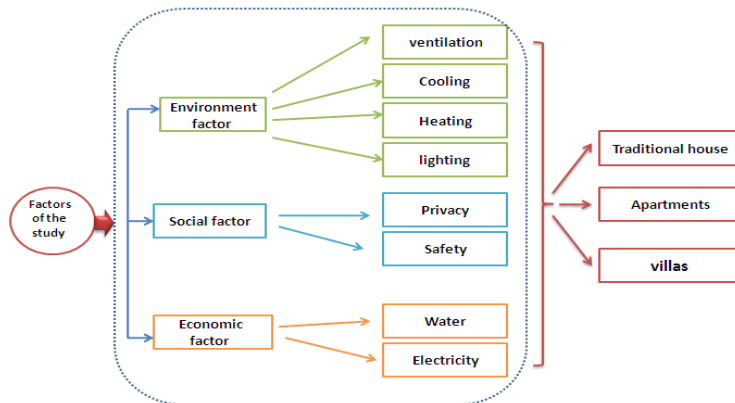


Figure 5 Types of factors

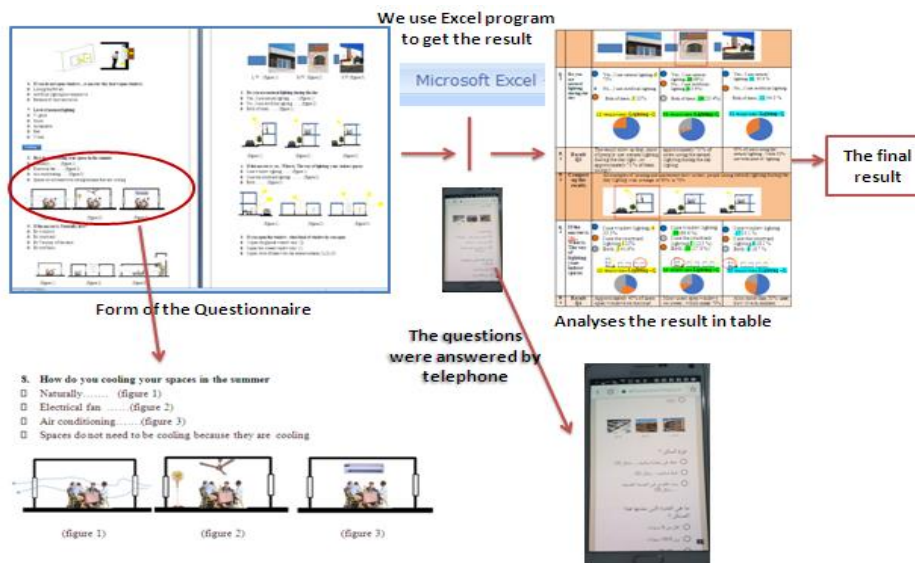


Figure 6 Result of the questionnaire

### 3.1. Data discussion and analysis

#### 3.1.1. Environmental factor

This section of the study examines the users opinion about main environmental systems such as cooling, ventilation, heating and natural lighting, as it illustrative in the following part;

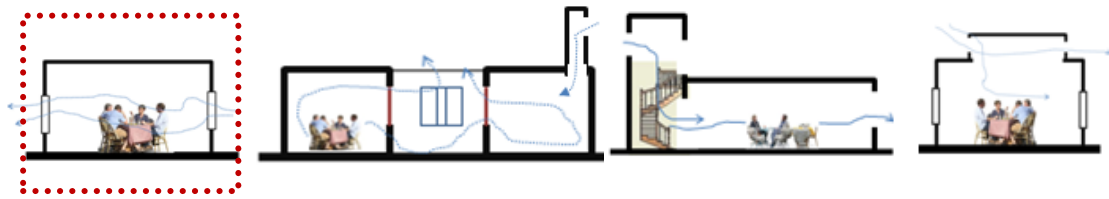
- a. **Cooling system:** The result of the cooling system shows that 90% of users in TH are using air conditioning to cool their spaces; however, 60% of users in AP use air conditioning to cool their spaces, while 80% of users in V use air conditioning to cool their spaces as presented in (Figure 7).



Figure 7 All users cooling their spaces by opening window on street more than other ways

- b. **Natural ventilation system:** All users in TH apply natural ventilation and 90% ventilate their spaces by using windows. Roughly 80% of users use natural ventilation in their spaces, while 20% use artificial ventilation. Approximately 90% of residents open windows to ventilate places. However, in V 95% of users employ natural ventilation in their spaces. Moreover, 90% of people who live in these sorts of houses use natural ventilation via their windows as presented in (Figure 8)

c.



**Figure 8** Approximately 90% of users in a different kind of housing using the windows to ventilation their spaces

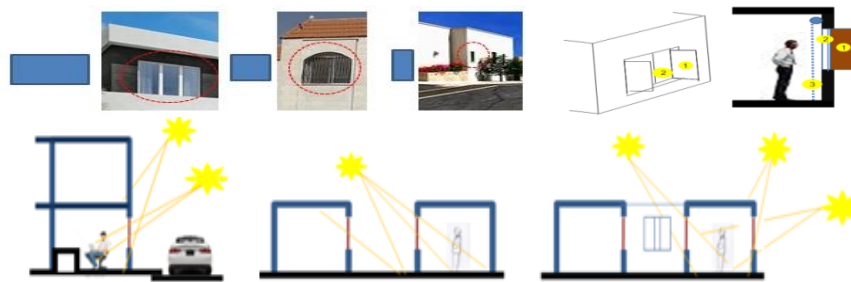
- d. **Heating system:** Users in AP depend on electrical energy to heat their spaces with an average of 75%, more than 75% of the users in V are using electrical boilers, while 25% are utilizing air condition, which means that the users depend on electrical energy to heat their spaces, with an average of 100% as shown in (figure 9).



**Figure 9** All users how to live in two kinds of housing and apartment using electrical boilers in the same average of 75%, while other using air condition with average between 12% and 18%.

**Note;** users depending on electrical energy to heating their spaces by average of 100%

- e. **Lighting system:** Approximately 70% of users in TH are employing natural lighting during the day. They are lighting their space by means of the windows, which face on to the streets. 65% of users are using natural lighting, while 30% use both types of lighting. Additionally, more than 50% of users who live in the modern housing are employing windows that open on to the streets, in contrast to windows, which open in the courtyards.



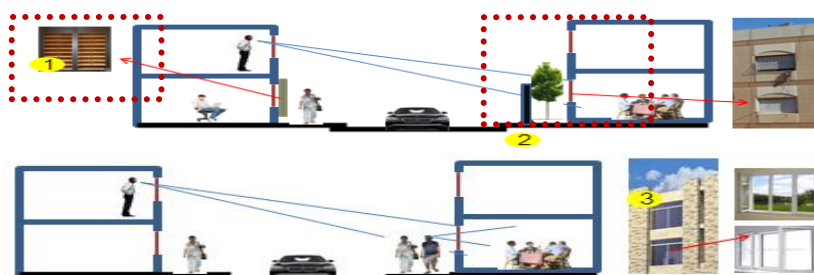
*On two kinds of AP and AP users prefer to use windows that are open on the street.*

**Figure 10** All users using mid-size windows between 70% and 80%, the results show that users open windows on the street without covering them. While the users in traditional housing open the glasses windows only.

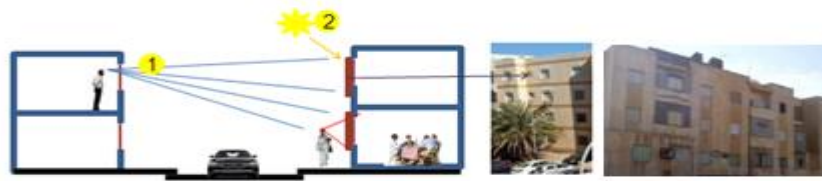
### 3.1.2. Social factor

The main social factors that studied here were privacy and safety, in the aim to discover why users are closing their windows during the day time, surrounding the villa with a high wall and closing most of their balconies as it illustrative in the following part;

- a. **Privacy system:** More than 80% of people in the TH prefer a partition between women and men in their spaces. As a result, 60% of users said the level of privacy is very good, while 40% said it is good. The design of the house achieved privacy with respect to the central courtyard, in windows that open inwards and regarding the indirect entrance. Virtually 70% of apartments are surrounded by walls, while 30% do not have walls. Indeed, most windows with a degree of 70% obscure the vision. The reason that users do not like to be seen by neighbors revealed an average of 50%, whereas 40% prefer to close out windows (figure 3.9 as shown in form 1). Furthermore, virtually 85% of new housing (V) have fences, while 15% do not have fences. Practically 35% of users have glass windows (3) and fences which obscure the vision, whereas 25 % of houses have walls that obscure inhabitants' views. Moreover, 24 out of 65 users, which means 35% of all users close the windows during the day. Their reason for that was that practically a third of users do not like to be seen by neighbors, whilst 60% of users prefer to close windows for no obvious reason.

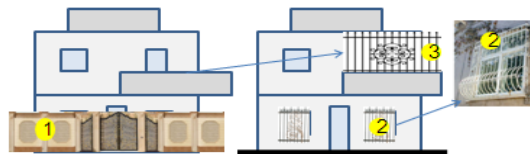


**Figure 11** Privacy system analysis 1; 58% of users in TH have windows that obscure the vision, while 35% of users in AP have windows that obscure the vision. However,60% of V have walls



**Figure 12** Privacy system analysis 2; 45% of users don't like to be seen by neighbours, while 40 % of users prefer to close windows without any reason.

- b. **Safety system:** 85% of users in TH are satisfied with the degree of safety, although they made several modifications. However, the result shows that 50% of users in AP prefer to live near their relatives. 30% of users made their homes more secure by enclosing their balcony, while 35% prefer to close off their balcony, close their windows (wooden windows) and build high walls. Additionally, 70% of users in AP employ a high fence, closed balcony and closed windows.



**Figure 13** Between 33% to 68% using all solutions that achieve the safety goal in their housing or apartments

### 3.1.3. Economic factor

The issue of economic factor determined in two things water and electricity needs especially after the war of 1911. Thus, this part of study discovers the issue of economic factor as the following part;

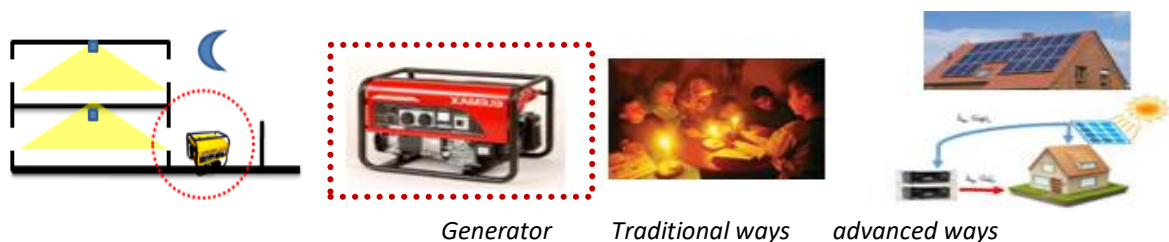
- a. **Water system:** Concerning this issue, 40% of people who live in TH said the level of water is poor. As a result, 90% buy water from the private sector. That means people face another problem concerning water availability. However, 60% of users in AP pay water bills to the government, whilst, 40% did not pay. Regarding the availability of water, 70% of users said it is available, while 40% of users buy their water. Finally, 75% of users in V said that water is available, whereas 25% said it is not available. Consequently, 30% of users buy the water, while approximately 70% have wells.



**Figure 14** most users, buy the water



- b. **Electricity system:** In the case of war now, 65% of users in TH are lighting their housings by means of traditional ways of candles, while 40% of them are lighting their houses by generator. All 56 users who stated that the electricity is not available presently are lighting their homes using generators (80%), whilst 20% of users are lighting their housing via traditional ways. However, 56% of users said that the electricity is not available currently. In addition, 28 of 56 users who said that the electricity is not available at the moment are lighting their homes using generators (80%), whereas 20% of users are lighting their housing by means of traditional ways.



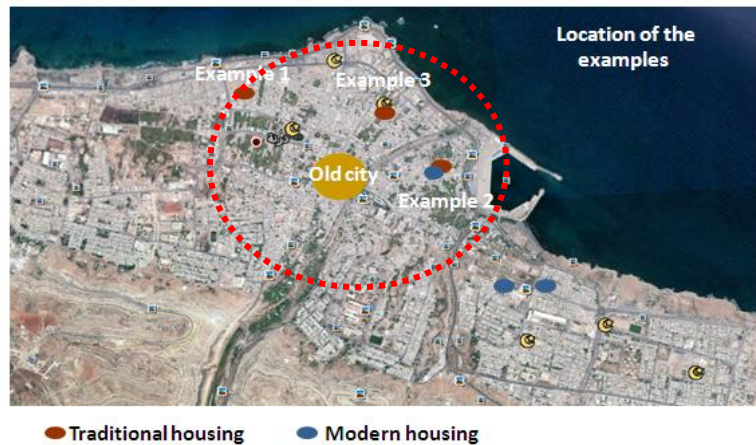
**Figure 15** Electricity system; Most users are lighting their houses by means of generators

#### 3.1.4. People's needs

People in different types of housing have various needs. First, people need privacy and safety solutions as essential elements. Second, they need solutions for lighting and ventilation systems. Third, they prefer housing with gardens more than courtyards. Finally, they prefer high fences in contrast to low fences.

### 3.2. Case study and methodology

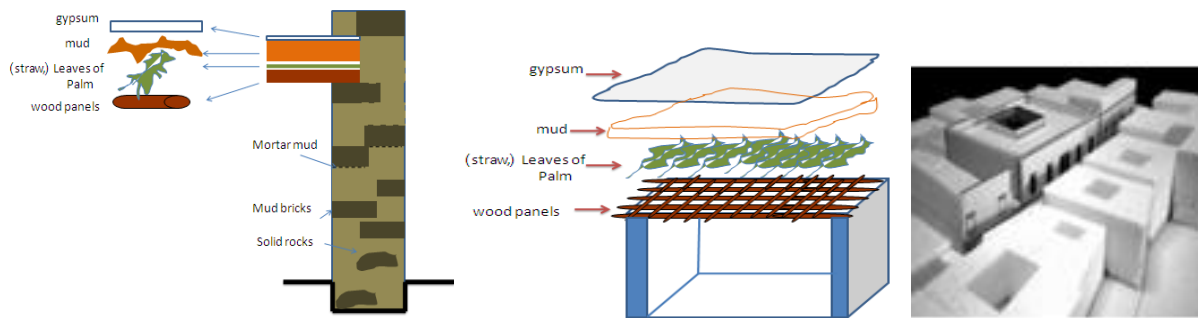
The case study area is in DERNA city in the coastal area of hot -humid climate in northeastern in Libya on latitude 32 north and longitude 22 east. It is limited by Mediterranean Sea in the north and Green Mountain in the south. The old traditional city located in the center of the contemporary city and the case study housing is located near the old city in three areas around it as will illustrate later. (Sasi 2007) the average of temperature is 19.4 Celsius degree and about 252 mm of rain falls annually.



**Figure 18** Location of case study housing

There are typically two types of houses in Derna city; i) Traditional houses and, ii) Contemporary houses. Traditional courtyard housing in Derna were built before the advent of the Ottomans 1711 by the local population, so they used the nature local materials of stones, trees, soil etc. according to their social need and culture. The building was a residential adjacent building with one or two floors, featured by a central courtyard which was the main space for social interaction between family members. The courtyard provided a healthy environment for users related to natural ventilation, cooling, heating and lighting. The building structure was Load-bearing walls; this structure holds only two floors not more. Wall thickness ranges from 40-50 mm, additionally were built by limestone with mortar and most of them were painted in white as well as using the wood in a limited manner in the formation of roofs and openings. Almajri, (2010). There are two kinds of contemporary housing in Derna; Apartments and Villa. These kinds of housing have emerged after urbanization in the beginnings of 1970s. Villa mostly consists of two floors, while the Apartments consists four to eight floors, including balconies and service courtyard. Moreover, the structure includes concrete columns, ceilings and floors as well as concrete block spreader.





**Figure 16** Materials of traditional housing in DERNA city (Redrawing from original source of Almajri, (2010).

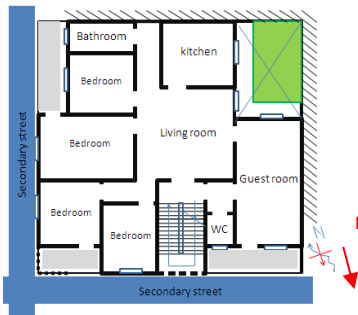
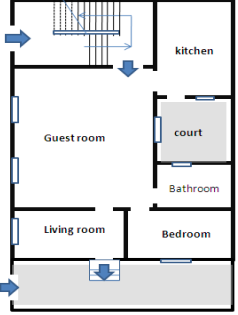
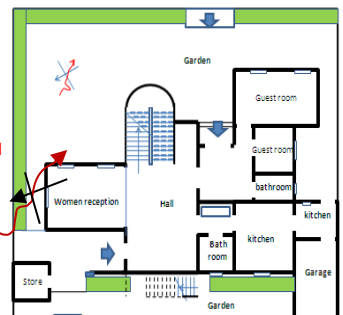
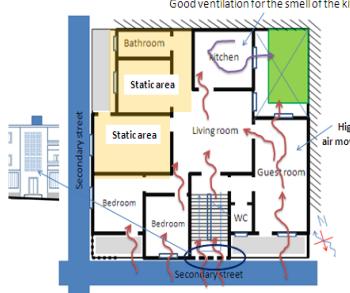
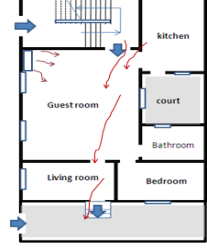
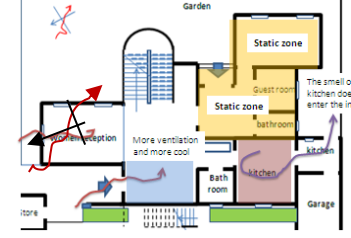


**Figure 17** Structure of the contemporary building <http://itcadel.gov.ly>

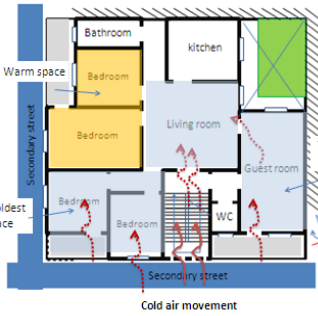
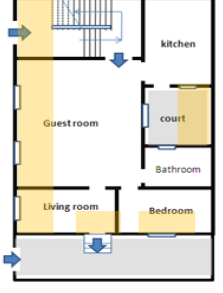

In this study, houses were selected for people who have experience of living in both kinds of traditional and contemporary houses. These houses were analyzed by some factors and compares with contemporary housing. The methodology of a case study part depended on analyzes three traditional and three contemporary houses. This part of the study consists of environment questions which have been asked in term of lighting, ventilation, cooling and heating and social questions of privacy and safety. The method depends on; asking users about previous factors, moreover, comparing the traditional houses with contemporary houses in the aim to know the reasons why users choose their answers.

In the following table illustrated brief analysis of the contemporary building according to the users' answers and according to their experience of living in both kind of housing traditional and contemporary;

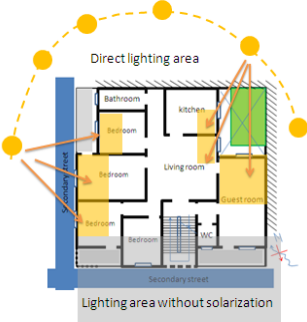
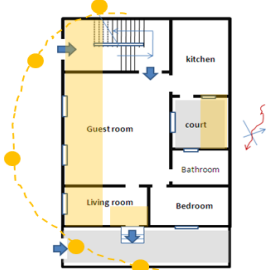

**Table 1** Analysis and Result

	Case Study House one	Case Study House two	Case Study House three
<b>The structure</b>	 <p>-Modern style that was built in 1970's -It has two apartments -It has service courtyard -Concrete structure system Consists of concrete columns, roof and floor. while the walls are built by Concrete Blocks which covered by cement mortar *</p>	 <p>-Modern style -Outward openness -The curt has only a service function -It has four apartments -Concrete structure; Consists of concrete columns, concrete roof and concrete floor. *</p>	 <p>-Modern style with garden and high wall -Two floors (Villa) -Same concrete structure system</p>
<b>Ventilation and cooling</b>	 <p>Good ventilation due to air flows through windows and stairs</p>	 <p>The air conditioner is used for cooling, and the users don't comfortable with the ventilation of the rooms because the kitchen fumes enter to other spaces.</p>	 <p>The spaces overlooking the northern and northwestern façades are characterized by good ventilation. While the southern rooms are semi-static.</p>

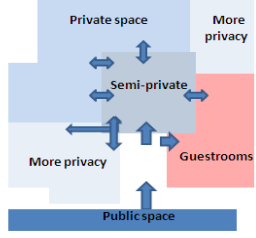
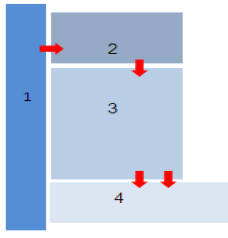
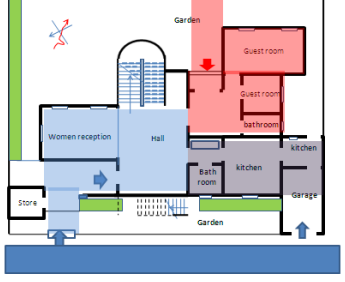
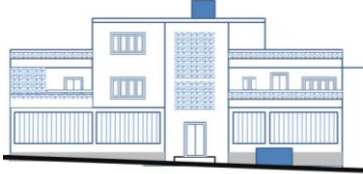
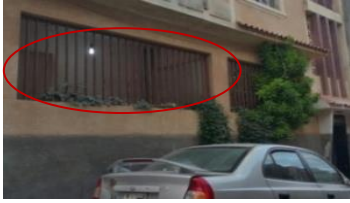


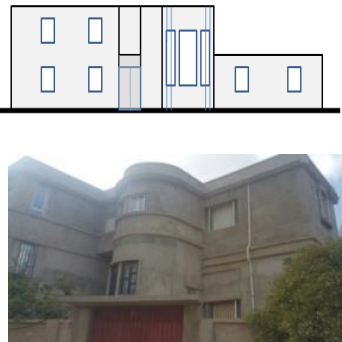
**Table 1** Analysis and Result (continued)

Users opinion about comparing between contemporary housing and traditional housing		
<p><b>Users opinion</b></p>	<ul style="list-style-type: none"> <li>Users thought that; contemporary housing is better than traditional housing, because the stairs hall helped to provide good ventilation in north façade.</li> </ul>	<ul style="list-style-type: none"> <li>Users thought that; traditional housing is better than contemporary housing because rooms of traditional housing were cool in summer. The wood materials that was used for roof and the thickness of walls, which has good for in insulation helps to cool the room.</li> </ul>
<p><b>Heating</b></p>	<div style="display: flex; justify-content: space-around;">   </div> <p>The movement of cold air creeps through the gaps of doors and windows help to make the rooms very cold</p> <p>However, routing to the south provides warmer spaces that allow the sun to enter in the winter, so users prefer the warmer of the traditional house due to thermal mass of the local materials which was used at the time.</p>	 <p>The traditional house is better than the contemporary house in the heating system due to the good insulation of the structure and local materials</p>

**Table 1** Analysis and Result (continued)

<p><b>Users opinion</b></p>	<p><b>Users opinion about comparing between contemporary housing and traditional housing</b></p>		
	<p>Users said that rooms of the traditional housing were warm in winter, and the traditional house is better than contemporary housing.</p>	<p>Users said that the traditional housing is better than contemporary housing in heating system.</p>	<p>Heating system in traditional housing is better than contemporary housing.</p>
<p><b>Lighting</b></p>	<p style="text-align: center;">Natural lighting</p>  <p style="text-align: center;">Direct lighting area</p> <p style="text-align: center;">Lighting area without solarization</p> <p>Contemporary housing has a good natural lighting during the day time</p>	<p style="text-align: center;">Natural lighting</p>  <p>Although all the space gets direct solar radiation, users prefer the lighting provided by the inner courtyard</p>	<p style="text-align: center;">Natural lighting</p>  <p>All rooms have a good share of sunshine.</p>
	<p><b>Users opinion about comparing between contemporary housing and traditional housing</b></p>		
<p><b>Users opinion</b></p>	<p>Both of housing have a good daylighting.</p>	<p>Users said that the traditional housing is better than contemporary housing in providing heating system.</p>	<p>the traditional housing is better than contemporary housing</p>

**Table 1** Analysis and Result (continued)

<p><b>Privacy</b></p>	 <p>The users prefer this system in the functional distribution of rooms</p>	 <p>Incorporate in the privacy of space, and it had a good privacy in spaces as users said.</p>	 <p>Space for men Space for women Service space</p>
<p><b>Users opinion</b></p>	<ul style="list-style-type: none"> <li>Users do not prefer the privacy of traditional housing</li> <li>The reason for that answer; The privacy of the rooms is not good</li> </ul>	<ul style="list-style-type: none"> <li>Users prefer the privacy of the traditional housing more than contemporary housing.</li> <li>The reason for that answer; <b>they</b> like to sit in courtyard as it provides the privacy to women.</li> </ul>	<p>Users prefer a traditional house privacy more than a contemporary house.</p>
<p><b>Security</b></p>	  <p>The north facade is safe, but the east facade is not because the terrace is low and unprotected</p>	  <p>The contemporary housing more safe than traditional housing as users said.</p>	 <p>High wall and Low windows with protection</p>
<p><b>Users opinion</b></p>	<p><b>Users opinion about comparing between contemporary housing and traditional housing</b></p>		
	<p>the contemporary housing was not safe.</p>	<p>Users opinion that, the contemporary housing is safe more then traditional housing.</p>	<p>contemporary housing is safe</p>

**Table 1** Analysis and Result (continued)

Result	According to the users' answer;	According to the users' answer;	According to the users' answer;
	<ul style="list-style-type: none"> <li>▪ The traditional housing has good lighting and heating system.</li> <li>▪ The contemporary housing has good ventilation and cooling.</li> <li>▪ The ventilation is excellent as well as the rooms are cooling all summer time in contemporary housing more than traditional housing. In winter the contemporary housing is very cold.</li> <li>▪ Users prefer contemporary housing to live in more than traditional housing</li> <li>▪ The users do not prefer housing with courtyard, while they prefer house with an outdoor balcony, because the yard brings dust.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The contemporary house has bad ventilation and is considered as dark spaces as users said.</li> <li>▪ Users prefer to live in traditional houses more than contemporary houses</li> <li>▪ The only reason to demolish the traditional building is that; inability of traditional building to vertical expansion.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Traditional housing better than contemporary housing in lighting, ventilation, cooling and heating system.</li> <li>▪ The reason for good indoor environment as user said is that; building materials and courtyard</li> <li>▪ The traditional house is better than the contemporary house in terms of privacy.</li> <li>▪ There are no disadvantages of the traditional house except the inability of the house to add new floors.</li> <li>▪ Users prefer to live in traditional housing with courtyard. Users understand the important role of courtyard after they moved to contemporary housing</li> </ul>

#### 4. MAJOR FINDINGS AND RESULTS

The findings are divided into two; i) the findings gathered from questionnaire and ii) the findings gathered from case study as presented in the following;

**4.1. Major findings in Questionnaire** This study highlighted the problems associated with contemporary and traditional Libyan houses in hot humid regions. In this case, the environmental problems have been identified in relation to four important elements: natural ventilation, cooling, heating and lighting. Moreover, the social problems were also addressed in two parts of privacy and security; finally identify the economic problems of water and electricity shortages. As a result, the questions covered all the previous factors and the finding presented the housing issue that users have faced as;

- i. Most houses are not warm in winter; therefore, people are heating their spaces by means of electrical boilers with an average of 75%in AP, 80% in TH and 75 %in V).

- II. The poor of cooling systems made people depend on electrical energy (90% of users in TH are using air conditioning to cool their spaces, 60% in AP, and 80% in V)
- III. The lack of electricity made users dependent on small generators with an average (40% in TH, 97% in AP, 80% in V).
- IV. The problem of privacy and safety resulted in people creating numerous solutions, such as high walls, covered windows and balconies. All solutions (90% of covered windows in TH, while these solutions have been done with an average of (65% in AP and 55% in V).

As consequence users in contemporary housing are suffering from poor cooling and heating system, therefore they depended on air conditioning which led to high energy consumption. The contemporary house does not provide the required of privacy and safety therefore, users develop solutions to meet their needs of privacy and safety such as, high walls that surrounding their housing, covered balconies and they do not open the windows during the day. Moreover, they need alternative solutions of providing electricity and water especially during a period of civil war.

**4.2. Major findings in case study housing:** In this study, houses were analyzed for people who lived in traditional houses then moved to contemporary houses (*They have the experience of living in two types*). Through analysis the contemporary houses, many important points were concluded in the system of lighting, ventilation, cooling and heating and other factors. The traditional houses were also compared with contemporary houses to identify the reasons for why users choose their answers, thus results summed up as the follows;

- I. Contemporary housing has poor design in creating a suitable environment in terms of natural lighting, ventilation, cooling and heating system. Users answered depending on the comparison with their traditional houses, except one house (case study housing one which provided good ventilation and cooling in the summer as mentioned before.
- II. Therefore, users rely on air conditioning to provide cooling (except one house) and electric heater to provide heating, which means consumes energy to provide comfort to users.
- III. The lighting is acceptable for the users of contemporary houses, but they claimed that it is less than the lighting level in the traditional house.
- IV. They need to solve the problem of privacy rather than provide safety for the contemporary house.

As a result of case studies, environmental problems exist with poor design of lighting, ventilation, cooling and heating system. On the other hand, there are problems as the social issue related to providing privacy and safety system. Finally with issue of lack of water and electricity, users need solutions for solving these problems and reduce their suffering.

The identification of environmental, social and economic issues comprehensively helps to develop effective solutions in future studies, as well as for the designers to reduce these problems in their future design if they consider. It is obvious that the right solution depends

on the right diagnosis of the problem. For future work, the authors will develop a guideline which includes sustainable solutions to the environmental, social and economic problems of the contemporary houses in the hot humid climate.



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**Eman Atti Sasi** graduated from University of Omar Mukhtar, Derna, city, Libya in 1997. She worked as teacher in High Institute in Engineering Department between 1999-2002. She was an Assistant Professor at the University of Omar Mukhtar in 2002. Completed her MsC in Istanbul Cultural University between 2003-2007 in Istanbul, then worked as a Lecturer in the Department of Architectural Design and Urban Design between 2007 -2013. She has 3 books published, (all books relate to university lectures that benefit the student in landscape architecture, urban design and Summary of Master's Thesis) The second edition will be republished next summer. Now she is PhD student at ÇANKAYA University from 2014.

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Her scholarly interests cover sustainable architecture, ecological design theories, performance evaluation and building simulation. She has a substantial track record in improving the energy performance of buildings, and deep knowledge of performance assessment strategies that may be used in the building process. Her research has been focused on performance evaluation techniques (particularly building performance simulations), improvement of performance evaluation during design process, and exploring integration possibilities of performance simulation tools into design process. Regarding the pursuit of improved energy performance, she has published a range of papers published on the subject of the robustness of low-energy design, and the prospects for improving the process by implementing sensitivity analysis. She participated in several national and international research projects as a “senior expert” in the related field.

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**A Research on Selecting the Green Building Certification System Suitable for Turkey<sup>1</sup>**

Fatma S.Said\* and Timucin Harputlugil\*\*

**Abstract**

Since the sustainable development is considered one of the most significant global concerns, its goals are legislated by several countries to guarantee the project compliance. Therefore, the important issue of development is to ensure the project compliance with the sustainability requirements. With this paper, a research is conducted for selecting a green building certification system for Turkey. Moreover a methodology is presented based on the strategy to find the most important standards and criteria which must be considered in the development of a green building certification system in Turkey. The Analytic Hierarchy Process (AHP) technique has been adopted by determining criteria and sub-criteria from the literature. Furthermore, interviews and surveys have been implemented with experts whom are from different backgrounds, i) academicians, ii) professional consultants and iii) decision makers for the government. By the use of criteria and sub-criteria which are considered significant in line with the green building and sustainability studies, the questionnaire has been developed based on AHP is completed by the experts and analysed with a software. Depending on the outcomes of the research; any of the existing certification systems do not fit perfectly for Turkey, therefore, it is concluded that a new national certification system should be developed. Moreover, based on survey results, economy (cost) and effectiveness are considered the most significant standards for the green building certification system in Turkey. Whereas, assessment success, registration and certification costs, adaptability and reliability are the most significant sub-criteria.

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**Türkiye İçin Uygun Yeşil Bina Sertifika Sisteminin Seçilmesi Üzerine Bir Araştırma<sup>1</sup>**

Fatma S.Said\* and Timuçin Harputlugil\*\*

**Öz**

Sürdürülebilir kalkınma en önemli küresel kaygılardan biridir ve hedefleri birçok ülke tarafından projelerde uyumluluğu garanti altına almak için yasal olarak düzenlenmektedir. Bu sebeple kalkınmanın önemli sorunu, projelerin sürdürülebilirlik şartlarına uygun elde edilmesini sağlamaktır. Bu makale Türkiye için uygun yeşil bina sertifika sisteminin seçilmesini araştırmaktadır. Bununla birlikte Türkiye'de yeşil bina sertifikasyon sisteminin geliştirilmesinde göz önünde bulundurulması gereken en önemli standartları ve ölçütleri bulma stratejisine dayalı bir metodoloji sunulmaktadır. Analitik Hiyerarşi Prosesi (AHP) tabanlı yöntem, kaynak taramasına bağlı belirlenen ölçütlerin değerlendirilmesi için önerilmektedir. Değerlendirme için i) akademisyenler, ii) profesyonel danışmanlar ve iii) hükümet için karar vericiler gibi farklı alanlardan gelen uzmanlarla görüşmeler ve anket çalışması yapılmıştır. Yeşil bina ve sürdürülebilirlik çalışmaları doğrultusunda önemli sayılan ölçüt ve alt ölçütler kullanılarak, AHP tabanlı anket çalışması uzmanlar tarafından doldurulmuş, bir yazılım aracılığı ile analiz edilmiştir. Yapılan araştırmaya bağlı olarak mevcut sertifika sistemlerinden herhangi birinin Türkiye için en uygun seçenek olmadığı, bu sebeple ulusal yeni bir sertifika sisteminin geliştirilmesi gerektiği sonucuna varılmıştır. Bununla birlikte Türkiye'deki yeşil bina sertifikalandırma sistemi için ekonomi (maliyet) ve etkinliğin en önemli standartlar olarak kabul gördüğü yapılan anket çalışmalarından çıkarılmıştır. Değerleme başarısı, kayıt ve belgelendirme maliyetleri, uyumluluk ve tutarlılık ise gözetilmesi gereken alt kriterler olarak tespit edilmiştir.

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Bu makale Fatma S. Said'in 2017 tarihli, Çankaya Üniversitesi'nde, Yrd. Doç. Dr. Timuçin Harputlugil danışmanlığındaki yüksek lisans tezinden üretilmiştir.

## 1. INTRODUCTION

The price of energy has increased as a result of the reduction of fossil fuels supply all around the world. In response, countries around the world have started sustainable strategies through the creation of policy instruments. Almost all the sectors including business, manufacturing, construction, transportation have included sustainable strategies into their existing business plans to insure environmental safety (Kibert, 2016). According to researchers and scientists, one of the ways to reduce the harm to the environment is to make buildings more sustainable and more energy effective. When it comes to the design stage, the architect designs the building through advanced tools which predicts, calculates and estimates the environmental performance characteristics of a building (Morledge & Jackson, 2001). The environmental assessment tools for buildings have been developed to provide an objective evaluation of indoor environmental quality, resource use, and ecological loadings, etc. (Cole, 2005). These tools present various methods to define criteria of green buildings. They connect large number of environmental issues and combine them into overall judgments. Those issues addressed by the tools may influence environmental policies, designs and building practices. The methodologies of assessment play several roles; they facilitate understanding the effect of buildings on natural systems, marketing green buildings, as well as addressing sustainability (Cole, 2005). They also help politicians and decision makers in environmental management, primarily in architectural projects (Gluch & Stenberg, 2006). Accordingly, construction sector becomes the potential contributor to the achievement of sustainable development at a great level.

Thus, the assessment tools for green buildings are important subjects in the field of construction. For that reason, it is necessary to investigate the green certification systems acknowledged world-wide such as: Leadership in Energy and Environmental Design' (LEED), 'Building Research Establishment's Environmental Assessment Method' (BREEAM), 'Comprehensive Assessment System for Built Environment Efficiency'(CASBEE), 'High Quality of Environment'(HQE), 'Deutsche Gesellschaft für Nachhaltiges Bauen'(DGNB) and Turkish system Çevre Dostu Yeşil Binalar Derneği, House Certificate (ÇEDBİK-Konut Sertifikası) to understand the content and the context.

Thus, the purpose of this paper is to determine the most important criteria and sub-criteria that influence the choice of a green building certification system for Turkey and to investigate the most compatible certification system based on these criteria.

## **2. LITERATURE REVIEW**

### **2.1 Sustainability**

The concept of sustainability could be defined by several ways; the most common definition was by the World Commission of Environment and Development (WCED) in 1987; "sustainability is addressing the needs of the present without undermining the needs of the future" (Brundtland, 1987). Defined sustainability as "addressing the needs of the present without undermining the needs of the future" (Chichilnisky, 2011). Sustainability has its roots since the period of recognizing the impacts of global warming. Since 1960s, the concept of sustainability has emerged in response of the concerns associated with the environmental degradation and the resource utilization (Becker, 2012). It was acknowledged that the impacts of these aspects would result in limiting the daily life activities as the global ecosphere would have finite productivity along with affecting the geological availability of fossil fuels and minerals as well. The most significant contribution in this area is regarded as the book "Limits to Growth" that was published in 1972 (Bartlett, 2012). The book presented the computer simulations of the economic changes across the globe in two timeframes. Initially the situational analysis of the global economy was carried out for 1900-1970, incorporating the elements of population, natural resources, agricultural production, industrial production, and pollution (Bartlett, 2012).

### **2.2 Sustainable Development.**

In the field of real estate, sustainability has been considerably implemented. Based on the possible impact of different factors, the importance of employing sustainability as a prime priority has been recognized by developers, owners, investors, and the public sector. The sustainability is considered as a continuous process of sustainable development to achieve a stable state among the environmental, economic and social aspects, as can be seen in Figure 1.

According to the Balaras et al. (2005), accepting the structural demands of buildings; it was noted that the effects on design, construction and management of these built environments could also be affected to a considerable extent.

The CO<sub>2</sub> emission, energy and raw material consumption, water usage, and solid wastes have negative impacts on the climate change. In this context, the OECD report of 2011 stated that the construction sector contributes significantly to the sustainable development (Balaras et al., 2005). Therefore, it is known as the keystone of sustainability. Moreover, not taking sufficient actions would cost more than the cost of taking actions (Fankhauser, 2013). Sustainable development was defined by Hopwood, et al, as; "The concept of sustainable development is an attempt to combine growing concerns about a range of environmental issues with socio-

economic issues” (Hopwood, Mellor & O'Brien, 2005). However, this concept cannot be generalized as it involves responsibility towards securing the future of current generation. Therefore, the approach of sustainable development is based on the collaborative impacts of ecology and economic development (Chichilnisky, 2011).



**Figure 1** Elements that form sustainable development (Younan, 2011)

### 2.3 Green Buildings and Sustainability

The green buildings concept is not a recent concept, and the techniques related to this concept have developed with time (Emmitt & Gorse, 2010). A Green Building is designed to be more efficient than the traditional building, regarding the building construction, use of construction materials, functionality of building system, performance, energy and water efficiency, indoor quality; which involves air quality, thermal comfort, lighting, site disturbance, waste management, air emissions, water management, and adaptability in terms of change in user needs and options for occupants transportation (Paumgarten, 2003). The use of Green Building principles gives a possibility to decrease environmental damage (Eno, 2005).

With respect to the environment, green buildings offer enhanced and protected ecosystem and biodiversity. Water and air quality are improved along with reduced waste streams (Kuhlman & Farrington, 2010). As a result, natural resources are conserved and restored. While considering the economic benefits, green buildings result in reduced operating costs, along with improving occupant productivity (Reed et al., 2009).



## 2.4 The Need of Green Buildings in Turkey

The green buildings were welcomed worldwide. According to the research conducted by Manioglu and Yilmaz (2006), Turkey employs this green strategy and acknowledges its historical presence and architectural importance. 'The House of Mardin' contains one of the first green building projects in Turkey, which is more energy-efficient compared to traditional houses. It also reflects the concept of modern construction in terms of area selection, orientation, distance and the form of the building. The Turkish Green Building Association was founded for the impacts of green strategy and sustainability principles. Training programs have been implemented with pilot projects in order to encourage green buildings and raise awareness (Manioğlu & Yilmaz, 2006).

Turkey has used the innovations of modern technologies to make important changes related to the future impacts of globalization; where several actions have been taken to employ the energy resources to achieve economic improvements through modern solutions adaptation. According to the USGBC yearly report, Turkey is ranked ninth in the application of green building tools (USGBC Report, n.d.).

## 3. COMPARISON OF GREEN BUILDING CERTIFICATION SYSTEMS

There are various green building certification systems developed worldwide since the last quarter of 20th century. The chosen certification systems or assessment tools are capable of meeting the requirements of sustainability efficiently, in a way that facilitates the spread of 'Green Buildings' all over Turkey. In this section, a comprehensive comparison will be made between the key characteristics of these assessment tools. Furthermore, certain features such as the international recognition, notion of seniority, and other features make some tools desirable over the others (Bowd, McKay & Shaw, 2015) (Hamedani & Huber, 2012). Diverse tools have been examined and further explored with taking in consideration the effects of their particular countries. Thus, the chosen assessment tools take into consideration the economic, social, cultural and environmental aspects. In this paper a detailed comparison for LEED, BREEAM, HQE, CASBEE, DGNB and ÇEDBİK is presented (Table 1, Table 2). Distinctions between tools and the characteristics that distinguish each evaluation certification system as well as their strengths and weaknesses are discussed. Thus, different tools have different criteria describing the concept and extent of green for a building, as numerous environmental concerns are brought under consideration to yield proficient and efficient solutions. It is noted that the effectiveness of assessment tools is governed from multiple aspects and also these tools provide necessary understanding of the effects of building approaches on the natural environment, based on the concept of sustainability (Nguyen & Altan, 2011) (Wangel et al., 2106).

**Table 1:** The certification systems comparison (Giama, & Papadopoulos, 2012; ÇEDBIK, 2016; Mattoni, et al, 2018; Said, 2017)

Environmental aspects	BREEAM	LEED	HQE	DGNB	CASBEE	ÇEDBIK
Management	✓	✓	Not as a separate aspect, but included in the assessment targets	✓	✓	✓
Energy efficiency	✓	✓	✓	✓	✓	✓
Transport	✓	Included in the environmental aspect 'sustainable sites'	Not as a separate aspect, but included in the assessment targets	Included in the environmental aspect 'sustainable sites and functional quality'	✓	-
Sustainable	✓	✓	✓	✓	✓	-
Indoor environmental quality	✓	✓	✓	Not as a separate aspect, but included in the aspect 'sustainable sites and functional quality'	✓	✓
Water efficiency	✓	✓	✓	✓	✓	✓
Materials	✓	✓	✓	✓	✓	✓
Socio-economic aspects	-	-	✓	✓	✓	✓
Innovation	✓	✓	-	-	-	✓
Environmental impacts	Not as a separate aspect, but included in the assessment criteria (pollution, land use and ecology)	✓	✓	Included in the environmental aspect 'ecological quality'	✓	-

**Table 2** A Broad comparison of the certification system (Yusoff & Wen, 2014; Giama, & Papadopoulos, 2012; Said, 2017; Bernardi et al., 2017; Beardsley et al., 2017; Zhivov, 2018; DGNB System, 2017)

Criteria	BREEM	LEED	HQE	DGNB	CASBEE	ÇEDBIK
Country	UK	USA	France	Germany	Japan	Turkey
Certification Body, year	BRE 1990	USGBC 1998	HQE Association 1994	DGNB auditors 2007	JSBC 2001	TGBA 2007
Main type of examined buildings	New/existing Renewed Commercial Retail Education Homes Hospitals	New/existing Renewed Commercial Retail Education Homes Hospitals	New/existing Offices Logistics, Hospitals Education Hospitality Buildings Commercial	New/existing Offices, Retail Shopping Buildings Laboratories Schools, Industrial Homes Mixed Use, Hospitals	New/Existing Renewed Urban development Cities Residential Property appraisal	Residential
Certification	Pass. Good. Very Excellent Outstanding	Certified. Silver. Gold. Platinum	Good (1 to 4 stars). Very good (5-8 stars). Excellent (9-11 stars). Exceptional (12 stars and higher)	Bronze (35%) Silver (50%) Gold (at least 65%)	S, A, B+, B and C.	Approved, Very Good, Excellent
Building Phases	Design Maintenance Construction Operation Renewal	Design Maintenance Construction Operation Renewal	Design Maintenance Construction Operation Renewal	Maintenance Construction De-construction Operation Renewal	Design Operation De-construction Construction	Design, construction maintenance and operation
Assessment types	Design & procurement Operation & Management Post-construction	Construction review Design Review Combined design & construction review	Construction review Design Review Combined design & construction review	Maintenance Construction De-construction Operation Renewal	Planning Pre-design design Renewal	Construction review Design Review Combined design & construction review

Table 2 (continued)

Criteria	BREAM	LEED	HQE	DGNB	CASBEE	ÇEDBİK
Categories	Health & Comfort - 15% Management- 12% Transportation 9% Energy- 15% Water- 7% Materials-13.5% Pollution-10% Land Use & Ecology-10% Resources Waste- 8.5% Additional credit for innovation -10%	Energy Atmosphere: 35 pts Materials Resources: 14 pts Indoor environmental quality: 15 pts Innovation & Design Process: 6 pts Regional credits: 4 pts	Eco-construction Health Well-being Management	Economical quality: 22.5% Sociocultural quality: 22.5% Process quality: 10% Separately: Site use	Environmental, Quality (Q). Environmental Load (L). Indoor Environment Quality of Service, Outdoor Environment., BEE (Building Environmental Efficiency) = Q/L. Energy, Resources and Materials, Off- site Environment	Integrated Green Project Management, Land use, Water use, Energy use, Health and comfort, Material usage, Living in the residence, Operation and maintenance, Innovation
International Versions and National Adaptations	International Versions USA, Netherlands Norway, Spain, Sweden, Germany, Austria, Switzerland	International versions: LEED Canada LEED India	International versions: Non-residential building in operation 2015 infrastructures 2015, Habitat and environment Non-residential building under construction 2015 Residential building under construction 2015 Management system for urban planning projects 2016	International version Core 14 National adaptation: Austria, Bulgaria China, Denmark Germany Switzerland Thailand	N/A	N/A

Table 2 shows the different green building certification systems compared in this research in terms of their establishing country, system establishment date and certification body. Furthermore, the table shows the different types of buildings covered under each system. The assessment scale domains are also shown, which varies in its inclusions and complexity. Further information is shown such as the certification types, building phases covered under each system, and the assessment strategy types.

Based on a comparison between the included alternatives in this research, there are general comparison points between the certification systems as the following (Said, 2017; Bernardi et al., 2017; Zhivov, 2018; European Union knowledge Network, 2017; Erten, Henderson, & Kobas, 2009; CASBEE, 2017.; Illankoon et al., 2017). The whole rating systems which are used in order to evaluate the environmental effect of buildings are appropriate for both the new and existing building except ÇEDBİK which certifies only new buildings for houses.

1. The most considered main criteria cover solid waste management, material, energy performance and water.
2. Regarding the categories assessed by the schemes, energy performance, solid waste management, material, and water are the most considered categories from a quantitative perspective; the categories that are considered less are resistance against natural disasters, earthquake prevention, and olfactory comfort.
3. CASBEE is the most technical system, and heavily based on criteria specific to Japan's urban context; CASBEE is the certification that expire on five year cycles, with an option to renew.
4. Some of the green building certification systems offer over-scale-points for innovation such as BREEAM and LEED.
5. BREEAM provides online resources for assessment. However, the agents are more used in the design process.
6. DGNB gives importance weight on the management of technical features.
7. BREEAM and ÇEDBİK have some prerequisites, so that some criteria are mandatory for certification.
8. CASBEE rating tool does not allocate points to each credit criteria however, each credit point is evaluated based on a scale ranging from level 1 to level 5.

In summary, it must be mentioned that these schemes are basically accepted and commonly used in the building sector. The desirable features of these schemes in the future can be explained as follow:

- Completeness which refers to the analysis in a suitable method the whole factors which characterize the building and its life cycle.
- They can be represented in clear method the system of weighting and supporting the counting system with complete evidence.

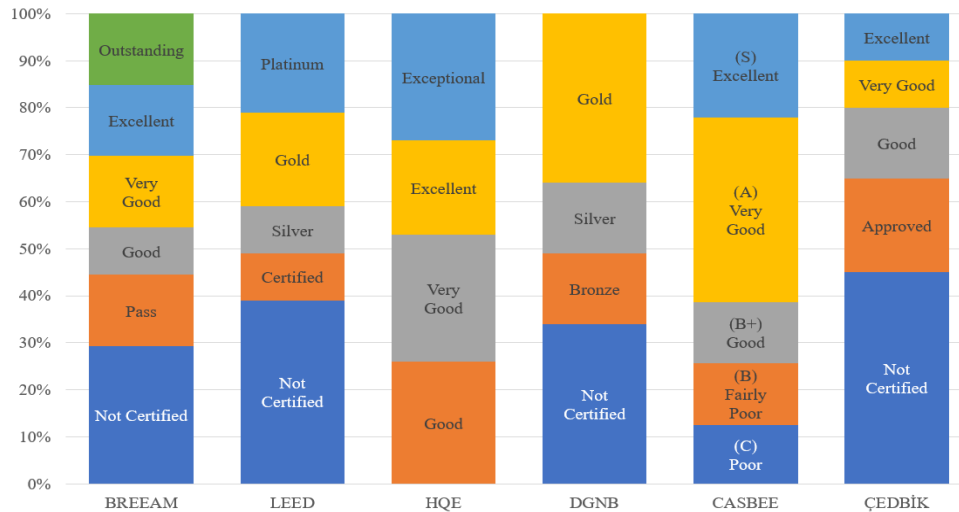


Furthermore, certification systems such as DGNB has several advantages with an early stage assessment that helps the project to stay on track within the required completion time. DGNB is considered one of the mature systems that covers not only the environmental aspects of the projects, but also the economic, social, cultural, and functional aspects (Miranda, 2013).

As for the Energy category, are one of the most important topics in all of the certification system; provides aspects related to the heating and cooling loads control, energy monitoring, storage systems and renewable energy production however, the approach may vary from one system to another (Banani, Vahdati & Elmualim, 2011) (Mattoni, et al, 2018). LEED v4, which is the latest version released in 2013, seems to address new sectors unlike previous versions, has increased technical requisites, shows improvements in environmental issues such as climate change and supports optimization in energy and water consumption (Uğur & Leblebici, 2017). BREEAM the most recent version was developed in 2016 and covers the entire life cycle of buildings, starting from the design stage, to in-use retrofitting (Mattoni, et al, 2018).

Another factor that is different between the different certification systems is the ease of international adaption. Certification system such as DGNB are highly flexible for international use from climatic, regulatory, and cultural perspectives, where its indicators are balanced to reflect the importance of all the input factors (Reith & Orova, 2015). BREEAM is considered one of the international standards which can be adopted, operated and applied by a set of the international professionals. The operation of BREEAM by the clients work on decreasing the environmental impacts of the buildings. BREEAM has been applied in more than 77 countries in order to certify more than 563,616 building evaluations over the life cycle of building (BREEAM, n.d.).

There are other certification systems which have their own unique way of assessment, such as CASBEE, which was developed from scratch without depending on any other certification systems. The weighing system used in CASBEE is relatively different from other systems, which forces the designers and implementors to account for all the green building requirements in its manual (Fauzi & Malek, 2013). The LEED standard is one of the most prevalent international building certification standards, with 80,000 registered projects across 162 countries (Shutter & Tufts, 2016) (Zhivov, 2018). A major conceptual difference between LEED and BREEAM is that LEED uses a single uniform rating system independent of location whereas BREEAM is tailored to specific countries depending on climate, local standards and codes, and culture (Zhivov, 2018). Some certification systems require a third party that reviews the compliance of the project against the set criteria and issues a report to the certifying body for review and issuance (Hamedani & Huber, 2012).



**Figure 2:** Comparison between green building certification systems according to scoring (Said, 2017 ).

Figure 2 shows the weights comparison between the different green building certification systems and the certification scoring scale, respectively. It is shown through the graph that the scoring system, the certifications start with a buffer where projects that do not achieve the minimum points are not certified or labelled as poor ranging between 12% to 45% depending on the system. The scoring scale divisions also vary between the different systems. While DGNB and HQE has three certification scoring categories, BREEAM has five scoring categories as the largest division among the compared systems. Each of LEED, CASBEE and ÇEDBİK have four scoring categories.

#### 4. MATERIAL AND METHOD

In order to choose the best strategy and approach for a green building certification system for Turkey based on the best most important criteria and sub-criteria, the Analytic Hierarchy Process (AHP) technique has been adopted. As a type of multi-criteria decision-making (MCDM) methodology, the AHP method is chosen for this research as it can be used for individual and group participants, which makes the interpretation of the results possible in both cases. Moreover AHP provides consistent data from surveys of a limited groups of expertise participants.

The AHP method uses a hierarchical structure in building the case and depends on comparing each criterion with its counterpart individually on a scale that decides the importance of each criterion in comparison with another criterion. The AHP method breaks the complex decision-making problem into simpler decisions to be taken on a criterion per criterion basis. Therefore, this method is used for complex decision making, where several criteria contribute into the final decision.

One of the most important advantages of using the AHP methodology is its flexibility, ease of use and adaptability to different problem types. The AHP method has simple steps that builds the comparison case, which develops into matrices for the different criteria. In developing the criteria, the types of criteria used can be tangible and intangible, which makes its use more possible for more problems in comparison with other MCDM methods that have constraints on the types of criteria. One of the most important advantages of the AHP method is having the consistency measurement, which ensures that the results from different participants are consistent with each other, as well as using linear mathematical model for ease of interpretation. Furthermore, using the AHP method in order to differentiate between the different criteria and sub-criteria according to their priority and importance to Turkey through the incorporation of the opinion of different specialist, ensures that all the factors are taken into consideration for the certification system development process. The method itself is considered reliable for this type of research and provides consistent results. Therefore the flow of the research can be summarized as:

1. A literature review, where the basic criteria of the certification systems are out together as shown in Table 1, 2.
2. Questionnaire is conducted with nine experts from Turkey, distributed equally into three categories professionals from Government Decision Makers (experts from the related ministries), Consultants from sustainability companies in Turkey, and Academicians in Turkish Universities as shown in Table 3. For the objectivity of the research names of participants are assigned to letters randomly. These three sectors are expected to represent different opinions reflecting ideas of sustainability. It also gives for this study strength to deal with the construction policies of Turkey. The aim is to obtain a field feedback on the tools and their practical advantages and disadvantages.

Although six certification systems are reviewed, the five certification systems are put through comparison from the experts' perspective in Turkey. ÇEDBİK-House Certification is not included in comparison matrixes since its limited use (due to building typology and phases) and lack of implemented assessment data. An AHP approach is adapted in order to assign a certain scoring for each criterion according to its importance for the country. The AHP method is chosen amongst the MCDM methods since it can be easily used for individual and group decision making processes by creating hierarchical structure and pairwise comparison matrices. Moreover, AHP is known for its flexibility, ease of use, adaptability and ability to analyse with limited number of decision makers. The AHP makes consistency checks, as it uses a pair wise comparison of tangible and intangible criteria and provides consistent results for every decision-making process (Harputlugil et al.,2014). Table 4 below illustrates the chosen main criteria and the sub-criteria that will be used in the assessment. The criteria and their sub-criteria were chosen based literature review.



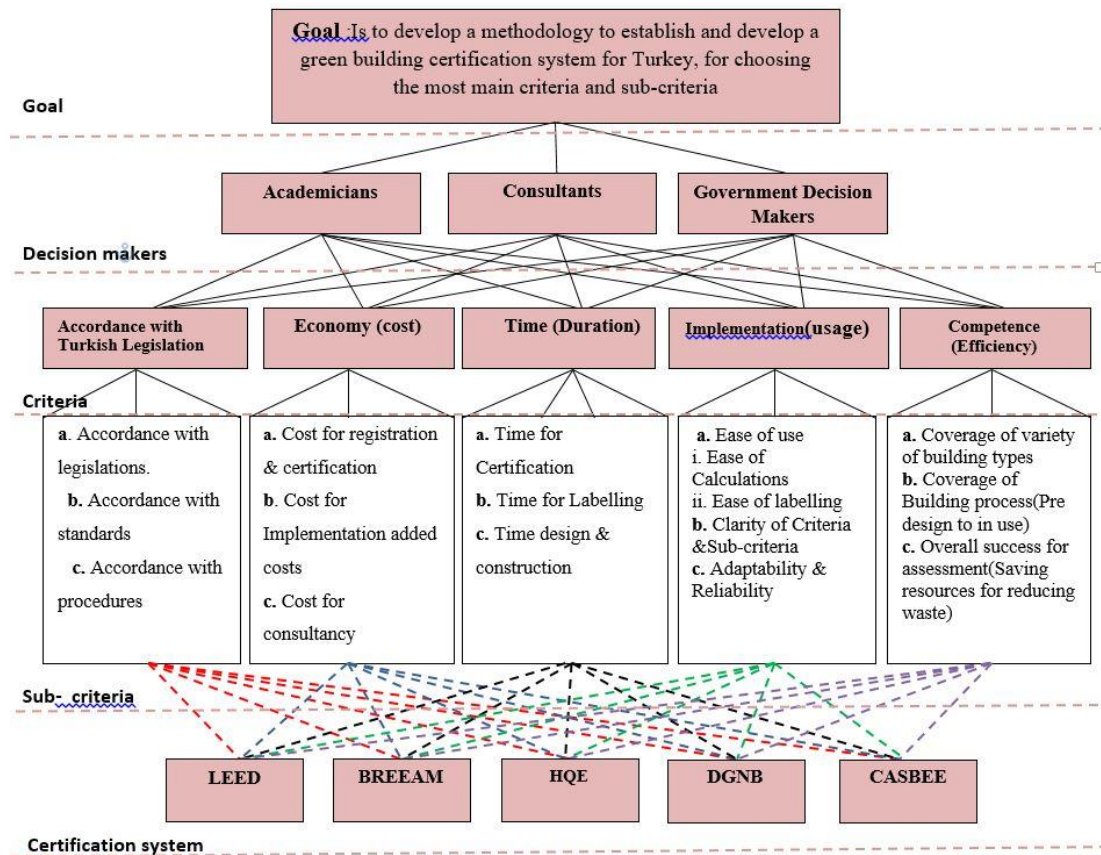
**Table 3.** Experts participating in the study

Names	Expert Background
A	Government Decision Makers
B	
C	
D	Consultants
E	
F	
G	Academicians
H	
I	

**Table 4.** Selected Criteria and sub-criteria for AHP analysis

Criteria	Sub-Criteria	Reference
Efficiency	Coverage of variety of building types	(Driedger, 2009; Portalatin et al., 2010; Kleist, Dorft, 2010;Markelj et al,2014;BREEAM, 2011)
	Coverage of Building process (Pre-design to in use)	
	Overall success for assessment (success for reducing wastes& increasing energy efficiency)	
Economy	Cost for registration & certification	(Driedger, 2009; Nicolow, 2008; Ding, 2008; Birgisdottir& Hansen, 2011)
	Cost for Implementation added costs	
	Cost for consultancy	
Usage	Ease of use i. Ease of Calculations ii. Ease of labelling	(Driedger, 2009; Portalatin et al., 2010; Wang, Fowler & Sullivan, 2012)
	Adaptability & Reliability	
	Clarity of Criteria &Sub-criteria	
Time	Certification time	(Markelj et al.,2014)
	Labelling time	
	Effects on design & construction	
Accordance with Turkish Legislation	Accordance with Turkish Legislation	(Markelj et al.,2014; Seinre, Kurnitski & Voll, 2014)
	Accordance with legislations	
	Accordance with procedures	

Methodology allows a panoramic assessment of the Green Building certification systems from a theoretical, practical and analytical perspectives, which provides the comprehensive judgement aimed by the study (Figure 3).



**Figure 3:** Analytic Hierarchy Process Method (AHP)

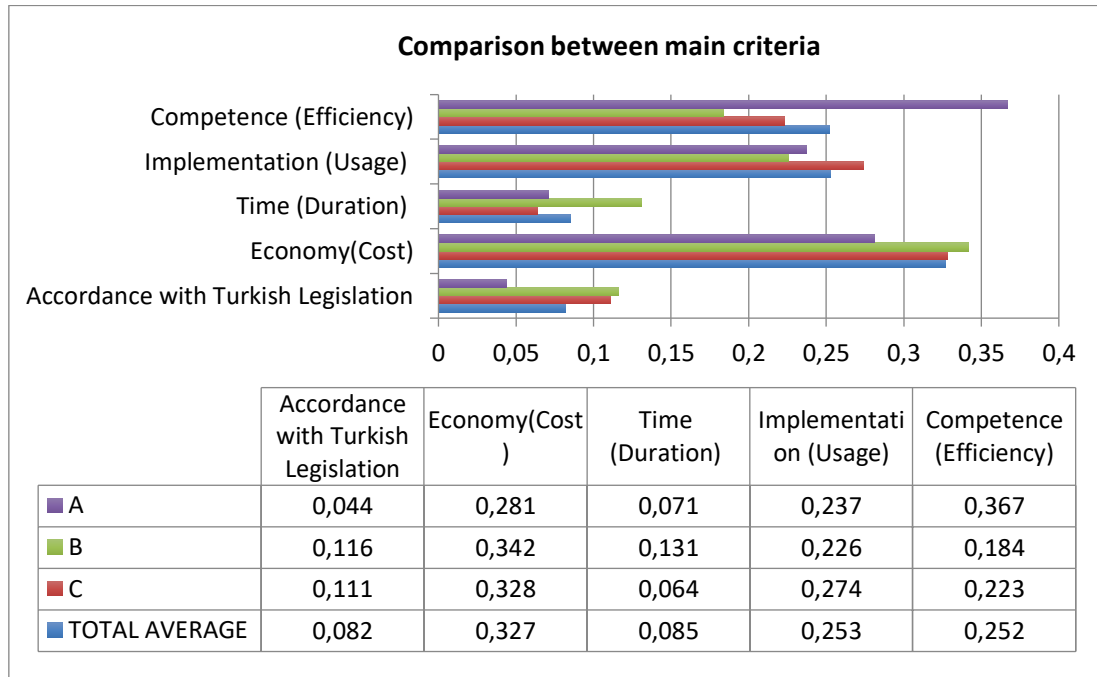
## 5. DISCUSSION

Based on the surveys analysed by the software (Expert choice 11.5 academic version); according to the main criteria pairwise comparison by the study groups, the most important and influential criteria in choosing the best fit green building certification system are as the following:

### 5.1. Assessment of Government Decision Makers.

As shown in Figure 4 the main criterion is most important for each variable, and these standards are competence (efficiency), implementation (usage), time (duration), economy (cost) and according to with Turkey legislation. As in Figure 4 shows that the main criterion is most important for each variable. The names are assigned to numbers for objectivity and

privacy reasons as shown in Figure 4,5,6 the Government Decision Makers are assigned to letters for (A, B and C) and Consultants for (D, E and F) and Academicians for (G, H and I).



**Figure 4.** Comparison between main criteria

According to criteria comparison shown in Figure 4, Specialist A classified efficiency as the most important criteria with 36.7%, followed by Economy (28.1%), implementation (23.7%), time (7.1%), and finally accordance with Turkish legislations (4.4%). Moreover, Specialist B classified the economy factor as the most important criteria with 34.2 %, followed by implementation (22.6%), efficiency (18.4%), time (13.1%), and accordance with Turkish legislations (11.6%). Specialist, given the identification code C classified economy as the most important criteria with 32.8%, while implementation (27.4%), efficiency (22.3%), accordance with Turkish legislations (11.1%), and time (6.4%) have followed respectively.

## 5.2. Assessment of Consultants

The consultants have also provided their assessment for the criteria and sub-criteria that were compiled for the research. In comparing the main criteria, Figure 5, specialist F gave the highest importance for efficiency with 32.4%, followed by time (25%), implementation (20.2%), economy (13.5%) and accordance with Turkish legislations (8.9%). Moreover, specialist E assigned the highest importance for the time criterion with 41.4%, followed by efficiency (27.4%), economy (13.5%), implementation (13.2%), and accordance with Turkish legislation (4.5%). The last consultant specialist, assigned to code D, assessed the economy

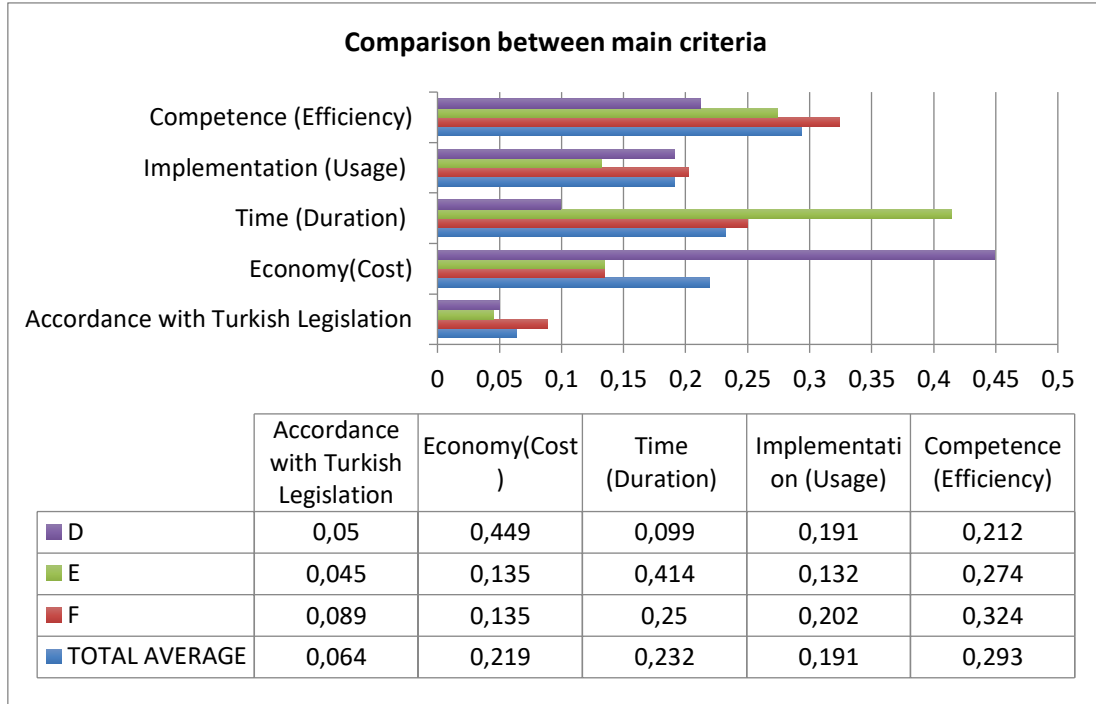
criterion to the highest importance with 44.9%, which is followed by efficiency (21.2%), implementation (19.1%), time (9.9%), and accordance with Turkish legislations (5%). The average score for the main criteria was compiled as the following:

1. First rank: efficiency (29.3%)
2. Second rank: time (23.2%)
3. Third rank: economy (21.9%)
4. Fourth rank: implementation (19.1%)
5. Fifth rank: accordance with Turkish legislations (6.4%)

### **5.3. Assessment by Academicians**

The third evaluation group is formed by academicians who have extensive experience in the sustainability and green building assessment studies in Turkey. The first assessment is made for the main criteria of the study, as shown in Figure 6. Specialist I indicated that economy is the most important criteria with 37.9%, followed by efficiency (32.2%), implementation (20%), time (6.3%) and accordance with Turkish legislations (3.5%). Specialist H indicated that accordance with Turkish regulations is the most important main criterion with 36.9%, followed by efficiency (22.3%), implementation (18.2%), economy (14.3%), and time (8.3%). Moreover, specialist G have stated that the economy is the most important factor with 31.7%, closely followed by implementation (28.1%), then efficiency (23.1%), time (13.4%), and accordance with Turkish legislations (3.8%). Thus, the overall assessment for academics of the main criteria is as the following:

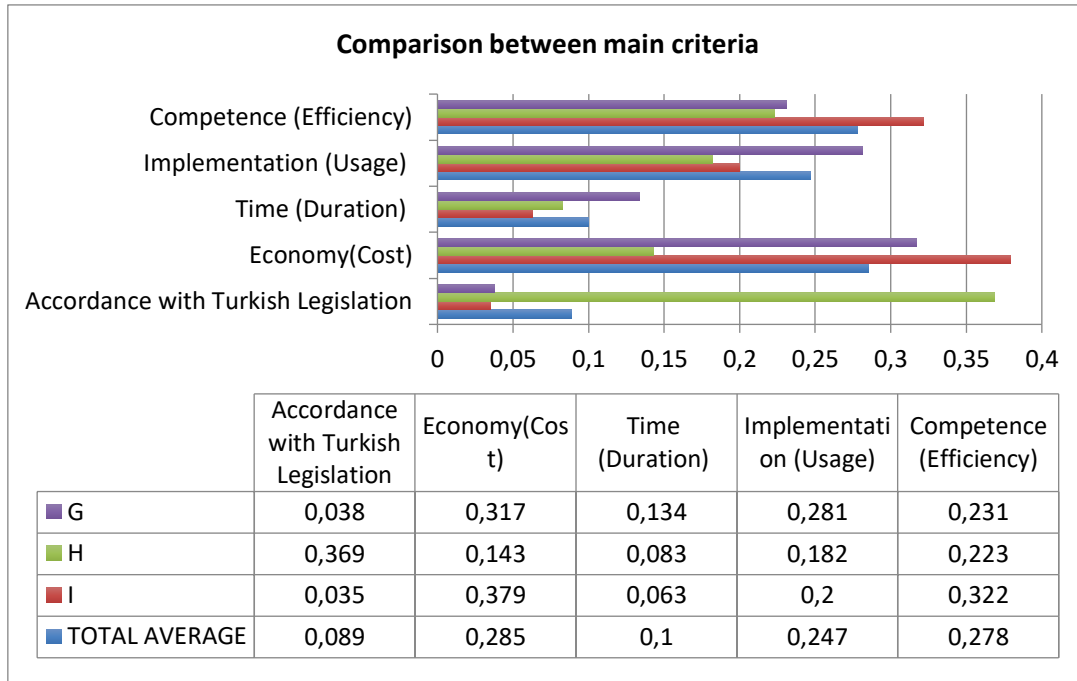
- First rank: economy (28.5%)
- Second rank: efficiency (27.8%)
- Third rank: implementation (24.7%)
- Forth rank: time (10%)
- Fifth rank: accordance with Turkish legislations (8.9%)



**Figure 5:** Comparison between main criteria

According to the main criteria pairwise comparison by the study groups, the most important and influential criteria in choosing the best fit green building certification system are as the following:

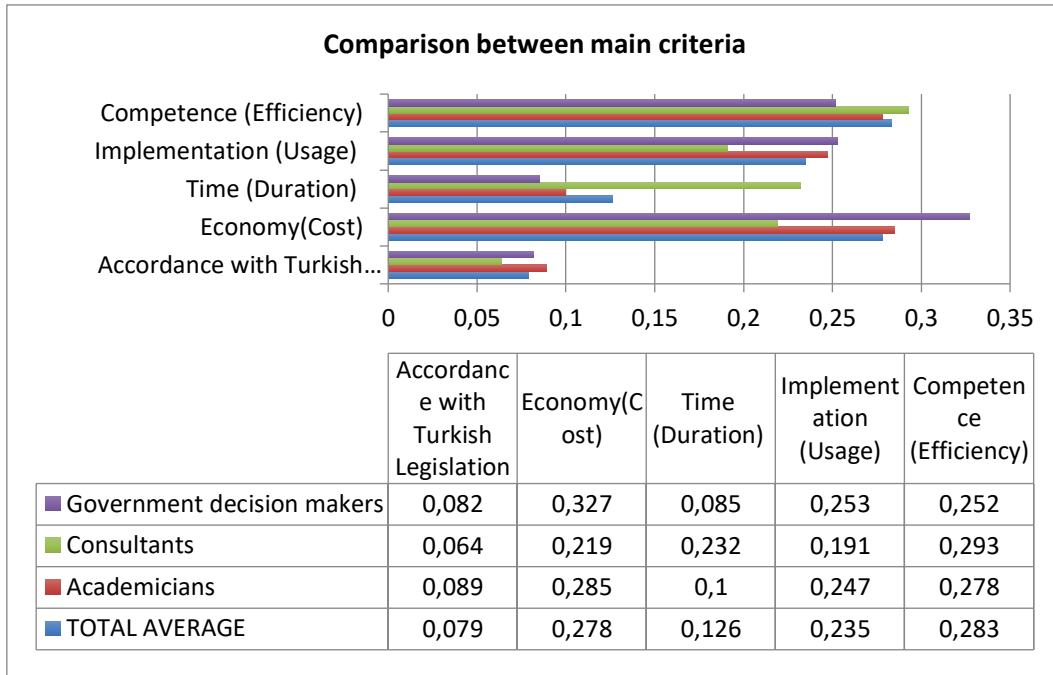
1. The government decision makers from the ministry of environment and urbanization have indicated that the economy main criterion is the most influential factor with 32.7%, which indicates the impact of this factor on achieving sustainable development.
2. The consultants have indicated that the efficiency factor is the most influential main criterion with 29.3%.
3. The academicians have indicated that the economy factor is the most influential main criterion with 28.5%.



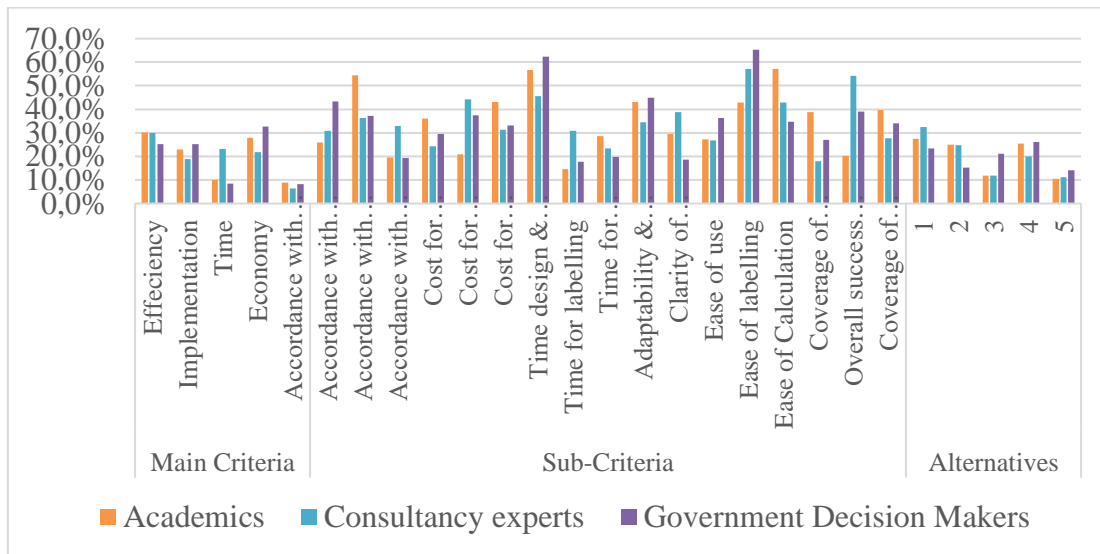
**Figure 6.** Comparison between main criteria

Therefore, the overall assessment of the study groups results shows that efficiency is the most influential main criterion in choosing the best fit green building certification system for Turkey with 28.3%, followed by economy (27.8%), implementation (23.5%), time (12.6%), and accordance with Turkish legislations (7.9%). The overall results of the main criteria are shown in Figure 7 and Figure 8 below show the overall results of the study of criteria, sub-criteria and alternatives with respect to each study group.

In figure 8, five chosen Green Building Certification Systems (LEED, BREEAM, CASBEE, HQE, DGNB) listed as the alternatives are assigned to numbers 1,2,3,4 and 5 randomly. The certification systems are listed numerically instead of their names since the aim of the research is not to promote any of these systems nor highlight one of them. Based on the outcomes of survey results, none of the systems is considered fully convenient for use in Turkey. It is important to understand that there is no specific international certification system that perfectly fits to Turkey. Therefore, as an outcome of this research; it is required to develop a unique certification system for Turkey dependent on the criteria that are concluded in this study.



**Figure 7.** Overall comparison for government decision makers, consultants, and academicians for main criteria



Furthermore, using the AHP method in order to differentiate between the different criteria and sub-criteria according to their priority and importance to Turkey through the incorporation of the opinion of different specialist, ensures that all the factors are taken into

consideration for the certification system development process. The method itself is considered reliable for this type of research and provides consistent results.

## 6. CONCLUSION

This paper reviews methodology based on the strategy to find the most important standards and sub-criteria which must be considered in the development of a green building certification system in Turkey. These standards are increasingly being developed in some countries as a result of increased awareness of environmental, economic and social issues. It is evident in the construction and development industries that sustainable development is one of the hot topics within the sector due to awakened awareness towards energy consumption and the ecological impacts that the development have imposed. As voluntary standards, there are a number of environmental accreditations for buildings around the world. The most popular accreditations are BREEAM (Building Research Establishment Environmental Assessment Method), LEED (Leadership in Energy and Environmental Design), HQE (High quality of environment), CASBEE (Comprehensive Assessment System for Built Environment Efficiency) and DGNB (German Sustainable Building Council). These tools were chosen based on their popularity, magnitude of use, the sustainability development in the tools developing countries and also in order to understand the nature of certification systems.

Moreover, this the study adopts the Analytic Hierarchy Process (AHP) method by identifying the criteria and sub-criteria from the literature, as well as interviewing experts from different background; academicians, consultants and government decision makers. Using criteria and sub-criteria that are considered important according to the green building and sustainability studies, the questionnaire developed by the AHP software (Expert choice 11.5 academic version) is filled by the experts.

Based on the outcomes of the research; it is important to understand that there is no specific international certification system that perfectly fits to Turkey. It is believed that Turkey should develop its own certification system. The new certification system should be structured to meet with the needs of Turkey. The new system should cover certification for all building phases with different building typologies. Flexibility and adaptability should be an important concern. Thus, this paper works also on providing important data to create a new certification system for Turkey through understanding the most important criteria and sub-criteria that shall be considered in the development process.

Since the numbers of the experts are limited in the research, there is no possibility of an assessment depending solely on the results of this study. However, the overall assessment of the limited study groups results shows that economy (cost) and efficiency are considered the most important criteria for the green building certification system in Turkey, while overall



assessment success, registration and certification costs, adaptability and reliability are the most important sub-criteria.

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**Authenticity and Sustainability**

Rui Duarte\*

**Abstract**

To think authenticity, the cultural identity and social economic and environmental sustainability is to reflect on the values and actions that must be developed to strengthen the identity of the regions. They are inseparable components with an impact on the organization of the territory and architecture that affect everyday life and the means and modes of production. To avoid the destruction of secular structures of territorial organization, it is necessary to have a critical awareness of the heritage, to question the cultural values and the symbolic contents that define the ways of being of the populations. Action strategies have been creating tourism networks, rebuilding constructions. We only see effects of a formal contaminated recovery process. Intervention methodologies have to create dynamics that make regions attractive to live, providing quality of life and meaning to the collective future. As case study on rehabilitation in vernacular architecture, we present Outeiro da Vinha, Portugal.

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## Introduction

After the process of dissociation that dominated the scientific thought of the twentieth century; after the pragmatism, and the subsystem thinking that has pulverized key concepts and destroyed the unity of things and of architecture; after the process of disassembling and reassembling that the structuralists used to make the meaning emerge, we are confronted again with the need to synthesize following an inverse process: to integrate systems, to create communities, to articulate theory with practice, and to foresee the thought of complexity.

“Newton’s triumph was not an explanation of anything, but a new way of defining and analysing changes in motion. He gave definitive form to the concepts of force, mass and acceleration, and he asserted with vaulting confidence that the same principle governed the falling apple and the heavenly bodies.” (Woodcock, Davis, 1982, p. 10)

Having surpassed the ideological stage of the Reason-Nature quarrel, the next phase focused on the Knowledge (which involves ignorance) – Nature relation, which allowed us to recover ancestral principles of good practices that can be combined with new technologies.

The architecture issues have to be placed beyond the formal manifestations focusing on the relations’ systems. These, in turn, should not only structurally combine space, time, places, programs, ideas and tectonics. In addition to these essential cultural references, the current stage of questioning in architecture requires a deep reflection on the inextricable connection among the concepts of authenticity, sustainability and energy.

This conjugation calls for an investigation into energy responses involving traditional materials and the investigation of solutions that counteract the persistent crisis of environmental values that we are debating today involving the problem of water, fire, air and occupation/exploitation of the soil.

Thus, innovation in environmental protection stems from the combination of models with different implications for natural systems. Like Newton's physics, Einstein's relativity or quantum mechanics of Neils Bohr, although they are different principles, they express the unity of Nature.

Along with logical thinking, analogies (thought by images) must refer to ancestral good practices coupled with principles to be explored conceptually in a process of synthesis that integrates architecture, place and landscape.

The various presented examples of reference must be read beyond the formal aspects, referring to their time and place, explaining principles that take into account the protection, the environment and the life of the populations.

In order not to lose the identity of local people and regions, we must articulate today the messages of the Charters of Heritage and Sustainability with an effective and adequate energy response.

Taking into account these assumptions, the case study articulates knowledge and principles of intervention referenced in several International Charters as well as current vernacular construction practices, while focusing on maintaining the places' identity. It also takes into account the importance of passive energy in a traditional environment.

In addition, the exploitation of vineyards cultivated on terraces is an integral part of the region's economy and it manifests man's action in the construction of the humanized landscape. Here the reflection equates the impact of tourism and globalization on places. In an era of profound economic, social and environmental changes, it is necessary to consider intervention models that fit each case to maintain its identity.

### **Towards authenticity**

The organization of the territory corresponds to traditional structures that are manifested in the change of the soil sedimented over time. However, the profound changes introduced in the economic system require adequate policies and action, a structure of regional polarities and the dynamization of kernel to attract new inhabitants.

The paradigm changes throughout History correspond to the changing of the means and modes of production, of soil occupation and to different ways of thinking that alter the sense of value, justice, norm, ethics and authenticity. (Duarte and Pinheiro, 2017, p. 15)

The authenticity has to have in mind historical, aesthetical and materials aspects, along with the relations with the surrounding space.

The insertion of architecture in a site defining a place reflects the adequate response to the environmental conditions and derives from the *Genius Loci*, an anthropological and cultural dimension. This aspect also involves as well the *zeitgeist* (spirit of the time) and the use of protection techniques and instruments against different types of adversity: atmospheric agents, cataclysms and defense from enemy attacks.

We face the construction of symbolic territories where the protection/security binomial has always been equated as dimensions of architecture, urbanism, in the relations with the place and with the territory.

We refer the human stabilizing systems that throughout history have always taken into account qualitative determinants: adequate location, soil stability, flood zone prevention, land slope, solar orientation, wind regime and relation with the place. In this field, its various valences are equated: limits, paths, center, sacralization and spatial and environmental qualities.

This type of relation is an ancestral concern present in all types of cultures and has been legislated since the Charter of Venice, 1964. In order to preserve cultural values in contemporary times, a set of increasingly specific charters and international documents on the cultural conditions of the territory, sites and historical and cultural heritage have been produced.

“The Nara Document on Authenticity is conceived in the spirit of the Charter of Venice, 1964, and builds on it and extends it in response to the expanding scope of cultural heritage concerns and interests in our contemporary world.” (The Nara Document on Authenticity, 1994)

The negative impact that the Industrial Revolution has had on the environment, on air quality, on water and soil contamination results from, among other aspects, the use of fossil energy, the mechanization of industrial production and the use of chemical products in large quantities in the agriculture. The massive production of waste and plastics breaks down ancestral balances and profoundly affects the health and quality of the environment: in the air, on land and at sea around the world.

Globalization, characterized by the dominance of the three FFFs (finance, fuel, food), introduces profound changes in the social system resulting in economic crises, the race to energy sources and food mass production. New demands on profitability involve the means

and modes of production and the impact of this macro context of production rupture has direct or indirect repercussions on the regions and on all scales of intervention in the territory.

It is essential to oppose territorial strategies, to create models of cultural intervention economically attractive capable of promoting the regions and managing their natural resources and environmental impacts, given the new dynamics and adversity contexts, the polarity of large cities in the attraction of population in a chaotic way.

This requires research, appropriate action policies, and the organization of territorial structures that energize regional polarities, which create grounded anchored centers in forms of identity capable of fixing inhabitants.

The question that arises relatively to the cultural, economic, formal and functional regions is that they are not coincidental among each other. In geographic terms, the characterization comes from the limits given by the orography, the climate, the rivers and the vegetation cover. Thus, it is necessary to equate the structure and the attractiveness of the regions and the relations between them, contrasting environmental values and quality of life, reinforcing the cultural systems of production. The sense of belonging is essential, being in some way contrary to the fragmented system of life of the great urban centers.

Territorial matrices must translate a natural balance and should correspond to a genuine mode of cultural intervention that guarantees the attractiveness and sustainability of the regions. However, the management of goods and flows, accessibility and policies must be taken into account, as they can alter the relation systems and even cause serious problems for the environment and human health.

By taking advantage of the environmental and economic resources of the regions, it is essential to reconcile the global with the local, to defend the diversity, to adapt the place, to insert in the landscape, to consider the fabric in order to guarantee the quality of the environment, the products and of the populations' life. (The Burra Charter, 1999)

International Charters and Recommendations on authenticity - Machu Picchu (1977), Nara (1994), Burra (1999) - reinforce the importance of cultural places, heritage sites and locations. International environmental and patrimonial protection standards have progressively diversified their scope and increasingly specify their objectives. In the case of

popular architecture, the incidence is expressed in *The Charter on the Built Vernacular Heritage* (1999), ratified by ICOMOS 12th General Assembly, in Mexico, October 1999.

“Vernacular building is the traditional and natural way by which communities house themselves. It is a continuing process including necessary changes and continuous adaptation as a response to social and environmental constraints. The survival of this tradition is threatened worldwide by the forces of economic, cultural and architectural homogenization. How these forces can be met is a fundamental problem that must be addressed by communities and also by governments, planners, architects, conservationists and by a multidisciplinary group of specialists.” (The Burra Charter, 1999)

This set of concerns on quality should be framed by the different impacts of sustainability - social, economic and environmental - that should also involve the cultural and political aspects.

However, these five essential aspects of characterizing the issue require leadership in order to implement the process. This is the case of the Paris Agreement on Climate Change, 2015.

We move in complex systems that need to maintain the balance that, although unstable, is essential to produce with quality, taking into consideration that we should not desacralize Nature.

When reflecting on intervention models from the local qualities (landscape, economic, cultural), the greatest of luxuries should be preserved, whenever possible: time, silence and place.

Today, in the information era, many of the cutting-edge activities do not involve an affectation of the soil so one has to be aware of the impact of this strand on the meaning and development of the places.

### **The qualities of the place**

“The place is the most unstable of the spatial portions, for lived intensely by each person in constant processes of re-signification; Thus, it is necessary to take into account the complexity of contemporary culture to discuss it, without nostalgia for a lost place, resisting as far as possible from

neologisms that serve only to label a crisis, and not tools for reflection. This is a problem seen in Mark Augé's no-place concept." (Duarte, 2002, p. 99)

The quality of the narrative is essential to intervene conceptually in all places and scales. Think of the Zen side of the Japanese landscape, the reconciliation between tradition and modernity. Memories are an immaterial heritage, which exist beyond stones, they preside over the ruins and records of time in the territory, in places, they cross the collective symbolic that stems from cultural identity.

The secular importance of stones in the construction of houses, walls that delimit properties, or terraces all over the world bear witness to the passing of the centuries. There are regions impregnated with History with palimpsests of times and civilizations, are testimonies of imaginary wars.

The materials, the technics of building and the organization of human settlements are part of the cultural identity of people everywhere, which is always unique and unrepeatable. Therefore, it is necessary to reconcile contemporary economic dynamics with the higher significance of places that should not be held hostage to the false sense of progress arising from Industrial Civilization.

The Charter of Machu Picchu, 1977, is an update of the 1933 Athens Charter and emphasizes the cultural contribution of other civilizations. Involving the meaning of places and sites "*represents all that is not encompassed by universal illuministic mentality and cannot be classified by logic alone.*" (The Charter of Machu Picchu, 1977)

The desacralization of Nature - a result of the prevalence of Ratio against Nature - has led to pollution, to the destruction of environmental values. Thus, it is essential to equate its profound impact that corresponds to predatory businesses of the environment.

The harmful aspects of the productive system resulting from the Industrial Civilization can be characterized by the impact of the effects of the produced actions:

*“Design a system of production that  
. Puts billions of pounds of toxic material into the air, water, and soil every year  
. Produces some materials so dangerous they will require constant vigilance by future generations*

- . *Results in gigantic amounts of waste*
- . *Puts valuable materials in holes all over the planet, where they can never be retrieved*
- . *Requires thousands of complex regulations – not to keep people and natural systems safe, but rather to keep them from being poisoned too quickly*
- . *Measures productivity by how few people is working*
- . *Creates prosperity by digging up or cutting down natural resources and then burying or burning them.*
- . *Erodes the diversity of species and cultural practices.” (Braungart and McDonoug, 2009, p. 18)*

### **Relation to the place in adverse contexts**

However, we can identify humanized landscapes that express a deep symbiosis with agriculture, having this productive system remained with the same characteristics for centuries.

This is the case of the Porto wine terraces, the Alto Douro Wine Region in the schist zone in northern Portugal. The characteristics of schist, the organization of the territory terraces for 2000 years, its mesological characteristics (the influence of the environment on the individual) and the climatic peculiarities of the region unique in the world have created unique conditions for the planting of vines, being a successful economy.

This was the first demarcated wine region in the world (1756), considered World Heritage since 2001 (Figures 1 and 2).

"Terraces, which separate the slopes and retain arable land, constitute a defined mark of all the relieve landscapes from the Northwest and Beira. These admirable constructions, that boldly climb like mountains up to 700 or 800 meters high, require a painful and vigilant effort: (...) The diffusion of the corn crop was undoubtedly the reason for the dissemination of the terraces, after being applied to rainfed crops that expanded in more recent times: Douro vineyards, the olive groves of the Beira mountains." (Ribeiro, 1967, p. 76)





**Figure 1 and Figure 2** Douro vineyards terraces. Photography: Maria Rebelo

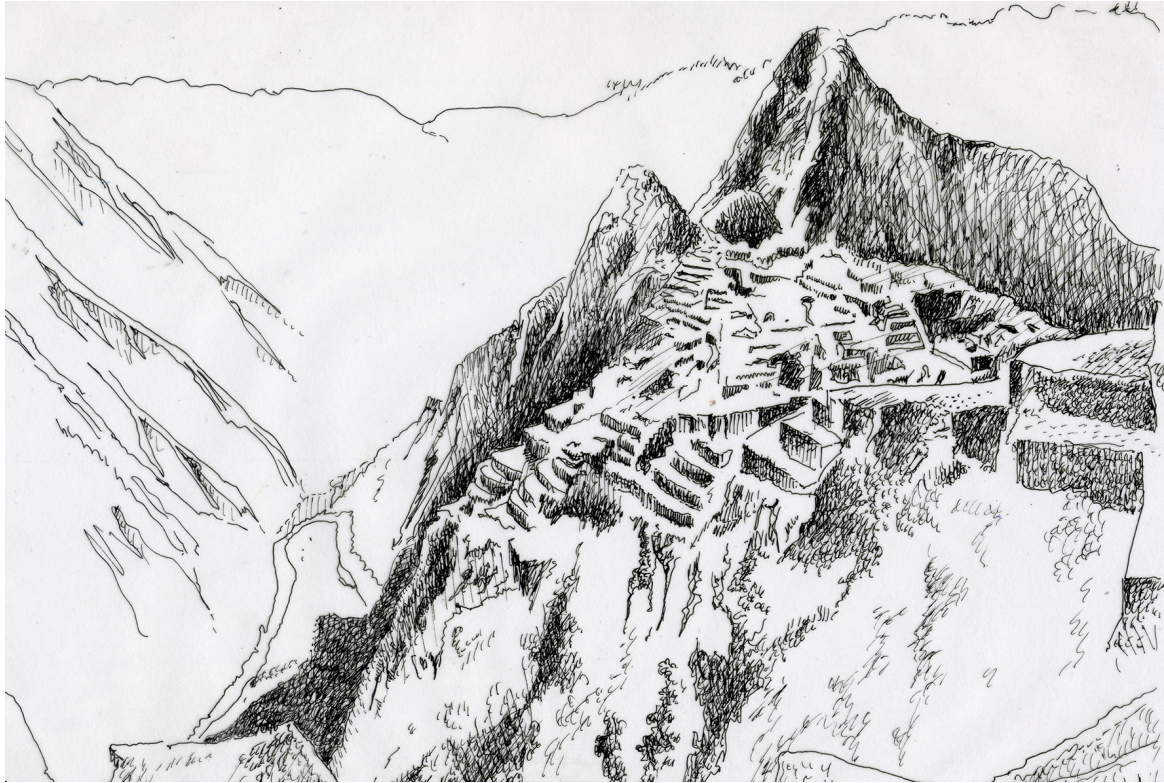
The human action in the creation of the humanized terraced landscape is a cross-cultural principle. For example, in China, terraced rice cultivation is done in *Yuanyang* County, in *Yunnan* Province (Figure 3).

The ancient Inca civilization in South America used the same principles in agriculture in *Machu Picchu*, before a landscape reached to high altitude (Figure 4).



**Figure 3** Terraced rice cultivation in *Yuanyang*, *Yunnan* County. Author's drawing.





**Figure 4** Agricultural terraces in *Machu Picchu*. Author's drawing.

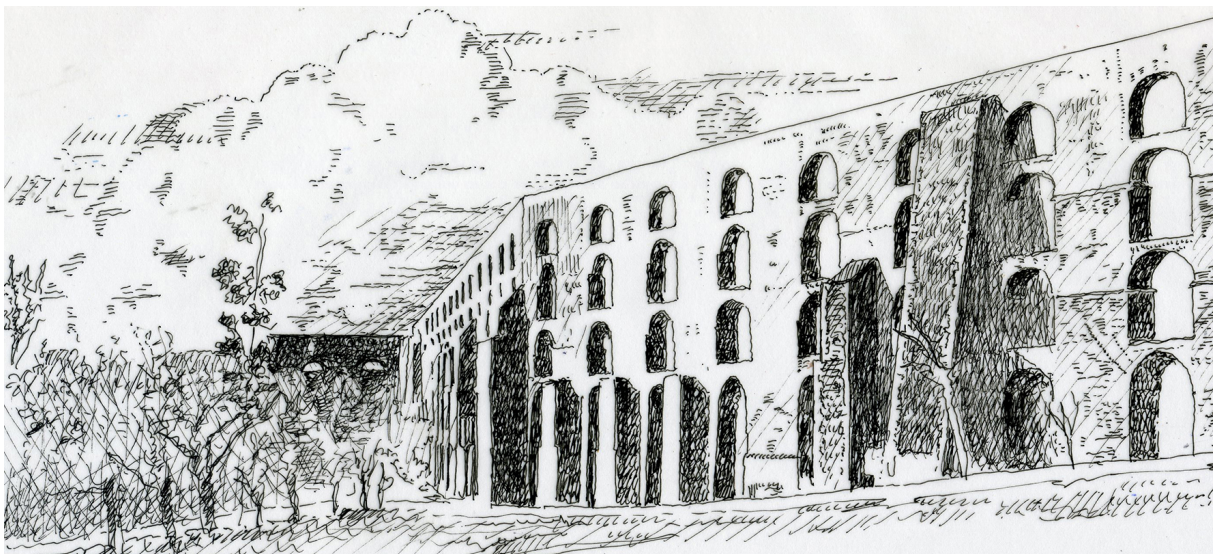


**Figure 5** Protection of the vine foot with volcanic stone in Lanzarote, Canary Islands. Author's drawing.



These are adverse conditions of a difficult work that must be done in order to extract food from the land or to stimulate the economy. Difficulties create a stronger collective spirit that energizes the actions of societies. The collective transcends the individual and this differs within the collective.

In Lanzarote, in the Canaries, a volcanic island where three days a year rain is considered a good agricultural year, the creation of semicircular walls of volcanic stone to protect each foot of *Malvasia* vine from the winds that blow from the Sahara Desert, is a cultural landmark emblematic of the landscape. The deposition of volcanic ash, about 0.15 m high, captures the humidity of the night to water the plants (Figure 5).



**Figure 6** *Elvas'* Aqueduct, Portugal. Author's drawing.

There are also infrastructures that are macrostructures with great impact on the landscape as the case of aqueducts. The Romans were masters of making aqueducts to carry water to distant regions. These aspects reflect an adequate architecture of the landscape (Figure 6).

The great civilizations of antiquity had already taken care of the basic needs of the people, of the territory organization, and their solutions' effectiveness still works today.

The approximately 40,000 *Qanat* in Iran, underground tunnels to irrigate desertified areas, were considered, in 2017, World Heritage Site by UNESCO.

The great civilizations never gave up using art and technique and, when in the face of adversity, they innovated with strategy and vision. Their performance served to solve the problems.

From the earliest times, there have been adequate irrigation solutions to the inhospitable regions of the Middle East. Claude Cahen discovered a manuscript of an anonymous author of the XI century, entitled *Kitâb al-Hâwî li-l'a'mâl al-sultâniyya wa-rusûm al-bisâb al-dîwâniyya* (Compendium of State Works and Rules of Public Calculation). (El Faïz, 2018)

This work allowed us to know how these societies were organized to carry out works for the transportation and distribution of water. He referred to the complexity of the process involving a specialized administration and hundreds or thousands of technicians. The anonymous author of this treaty would probably belong to the generation of Arab empirical hydraulic engineers. They were strongly aware of the need for a link between theory and practice to develop hydrological knowledge.

The fieldwork, allied to science, involved wise men and mathematicians and was developed for several years guaranteeing experience to the learner. By associating theoretical and practical knowledge, it gave the hydraulic engineer the leading role in the personnel who

"performs the tasks without understanding the origin of the phenomena, nor their causes, nor how to behave or be able to distinguish truth from error. A man like this ... acts like an animal that has no consciousness of the nature of the tasks it performs and in any case fails to create, from its activity, new branches of knowledge useful to the community." (El Faïz, 2018, p. 97)

The creation of infrastructures (road network, water, sewage, electricity) and effective security systems, especially related to the forest, articulate the traditional occupation and the current affectation of the soil. In emergency cases, systems of access to water must be guaranteed with effectiveness and quantity.

The use of cisterns and wells, water towers, dams, rivers and streams are complementary factors to be included in a territorial matrix as a form of protection and defense in case of fire or development of the ludic aspect.

Adversity is the enemy against which we must protect ourselves, avoiding risks arising from the casuistry of interventions; today there is a radicalization of the atmospheric conditions that have repercussions all over the world.

This new "normality" has to be assumed from the beginning as a given, being possible as an analogy to redefine the concept of wall. Its functional stages were essential in terms of defense strategically taking advantage of the enemy's location and attack potential. At that time, it was known who the enemy was and the strategies had this in mind. Now it is necessary to include the climatic radicalizations in the system.

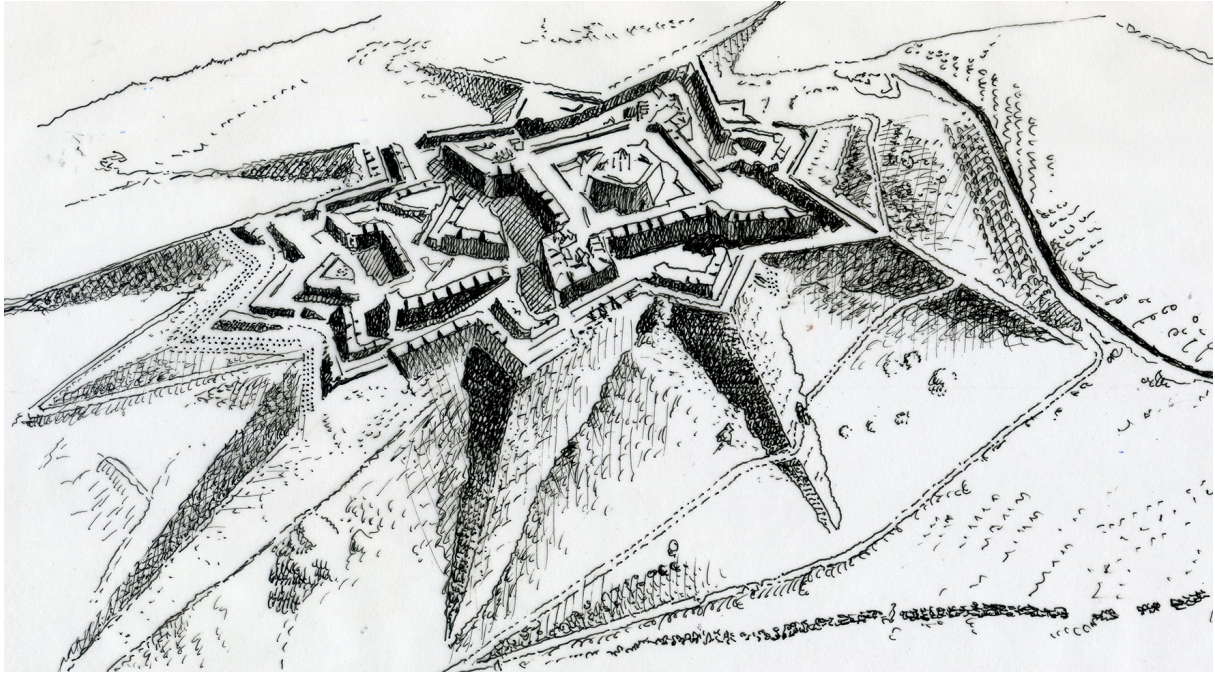
Enemy against which we must protect ourselves are typhoons and strong winds, floods, landslides, avalanches, fires and earthquakes among others.

#### **Fire: a new development deterrent paradigm**

The fires are the great spectrum that hangs in the air as a deterrent factor to inhabit, with no alternatives available. Although the great civilizations of antiquity have already taken care of the basic needs of the population, of the organization of the territory, the effectiveness of the solutions created still works today.

Operationally, we can question the concept of *polis* of the ancient Greeks. *Polis* represented a city model that did not grow. In *polis*, when it reached a certain number of inhabitants, the citizens went to another territory to establish a new colony that rebuilt the initial model. This closed model was translated in the spatial organization of communities that resisted to the enemy through type structures of defense *Vauban* as it is the case of the city of *Elvas* in *Alentejo* (Figure 7) or of *Almeida* in *Beira Alta* (Figure 8), both in Portugal.





**Figure 7** Fort of *Nossa Senhora da Graça* near *Elvas*, a city that grows inside *Vauban* walls.  
Author's drawing.



**Figure 8** *Almeida* inside *Vauban* walls, *Beira Alta*, Portugal. Author's drawing.

For defense reasons, the old villages of the interior were located in higher areas because they were easier to defend, to visually control the landscape and the accesses. The narrow and steep streets, well shaded, respond to the light intensity of the places and allow an adequate response to the climate whilst, at the same time, greater social interaction in the streets and in the patios.

Taking a conceptual analogy from this model, taking advantage of the star-shaped geometry (open/fragmented or closed) we can create sequential zones with rings of protection to the villages with adequate green treatment, avoiding being destroyed by the fires. After identifying the enemy, one must know how to fight with intelligence, strategy, opportunity and culture using appropriate systems of physical and immaterial protection, models of prediction and dissuasion, clarification and organization of populations. But do we actually identify the real enemy? Water is essential to life, but who is familiar with the *Al-Karaji Treaty of Exploration of Groundwater (Kitâb istinbât al-miyyâh al-khafiyya)* (1017)? (El Faiz, 2018, p. 117)

Concerns on this matter of ancient civilizations have lost their breath and the work of Ibn al-Haytam - the most illustrious Muslim physicist and the first man to conceive the Aswan dam nine centuries before it was actually built - was burned in 1193 by *Ibn al-Mâristânyyya* with insults to the philosophers. (El Faiz, 2018, p.114)

Today we are also confronted with obscurantism, with businesses that overlap the collective good, which leads to the destruction of memories and of cultural identity.

In Portugal there is still a lack of solutions and the casuistry manages the process that involves the use of airplanes and helicopters to combat flames, complementing the actions of firefighters, although there are organizational structures in network that allow access to all kinds of information. Economic development funds have action programs, create incentives that must respond to cultural values and make regions attractive to work at. They should not only focus on tourism, in the epidermal sense of the question.

Quality of life and safety, the access to goods and services, to health and education, the possibility of working and inhabit, are determinants that have to be guaranteed as they reflect an option for where to live, encourage or nullify the creation of social life. There is still a lot of work to be done, as there is a lack of basic safety points, of mapping, of knowledge regarding the property structure and affectation of the soil. The territory organization requires data that can be worked with, to cross information on the evolution of



soil affectation over time to identify protected areas, forests (what type of forest), agricultural areas, *non-aedificandi* zones, urban and intended industry areas. This aspect crosses both the inefficacy of response actions to the fires with the regions' de-characterization and the abandonment of places due to lack of incentives. Reflecting on intervention models that take advantage of environmental qualities should be part of trans-disciplinary scientific research that optimizes local development actions. Anticipation strategies are essential to avoid the perverse effects of lack of momentum and knowledge.

### **Territory Organization**

In order to organize the territory, on a first level, it is necessary to exist cultural, technical and environmental information that allows to cross data to obtain readings of the various reality layers, its transformation over time, to identify the invariants and their meaning. These tools are essential for being able to act, define accessibility and control flows.

The collective knowledge grounded throughout generations was essential for popular architecture and for the organization of the territory. Today it is necessary to equate problems at all scales because they are interdependent. Trans-disciplinary dialogue is a cultural issue. The information network has been replacing the individual knowledge, but the system of relations that is equated in architecture, urbanism and territory is incompatible with the coldness of the data. Man is not a dimensional being, but rather a rational, metaphorical and symbolic one.

Moreover, the physical characteristics of the territory (on the surface and in depth), immaterial qualities such as points of view which, in addition to being important in terms of military defense, had already been foreseen in the Zenonian laws of the Romans concerning the overall quality of cities.

“Promulgated during the reign of Emperor Cezar Zeno (474-491), in the context of the Roman Empire of the East, the constitution of Zeno or Zenonian Constitution, resulted from a set of regulations established for the reconstruction of Constantinople after a great fire.

Written in Greek, these laws are later included in the Great Legislative Compilation during the reign of the Emperor Justinian (527-565), which constitute the so-called Corpus Juris Civilis.”<sup>1</sup>

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1 Colloquium “The Lisbon Image: The Tagus and the Zenonian Laws of the Sea”, October 13 and 14, 2016. Organization of the Lisbon City Council and Institute of Art History of the Faculty of Social and Human Sciences of the NOVA University of Lisbon.

The climate and microclimate, the wind regime and sun exposure are all conceptual determinants. It is also essential to consider the smells that exist in the sites (resulting from the places' poetic seasonality, but also from the dumpsters or the paper pulp with the smell of hydrogen sulphide) corresponding to the air contamination and the pollution.

Similarly, we can't ignore the radioactive conditions that may exist in the territory other than Chernobyl. This is the case of radon, a radioactive gas that granite releases and which is the second cause of cancer in Portugal (after tobacco). This important aspect only began to be legislated in 2006 but being little publicized, is unknown to the majority of people and architects.

One equates a set of factors that have profound implications for public health and safety, which should be considered at from the beginning. This issue also involves new materials, as their chemical components are always problematic for health. As a result of air pollution, many allergies are on the rise today. Complex treatment systems for asthmatics are used, but a week over 2000 m is enough for all the mites to die and the problem is solved. Altimetry is an additional condition of natural treatment, which is why the sanatoria were located in the high areas or in areas with special therapeutic qualities.

Also the thermal qualities of the regions constituted one of the intervention strands privileged by the Romans like *Hierapolis* in Turkey. As well *Pamukkale*, Unesco World Heritage since 1988, is a special Turkish geological place with strong identity. Miles and miles of calcium cliffs (travertine terraces) are shaping multi-level pools of thermal water.

## Methods

In modern societies, employability constitutes a dependency system of the worker that today suffers the contingencies vicissitudes of the economic crises with frequent bankruptcies and consequent unemployment. As a counterpoint, the constitution of small production cells can create economic sustainability for families or for small communities. They combine rural practice with a performance of sophisticated types of specialized work for which it is difficult to find new skills, types of remote work made possible by the internet, the computer, e-learning and teleconferences. The existing deterritorialization in this domain can take advantage of time zones and create global connections. Thus, continuous training actions still are one of the power factors nowadays, along with the credit card and the TV, according to *Deleuze*. There are two structures: one creates responsibility and training commitment; the other offers only subsidized facilitation.

Continuing training in terms of regional employability, meets the needs of the qualification and diffusion of regional products. There are niche markets in the global structure that value the quality of what is different. This is what differentiates agricultural products from regional production, which are a counterpoint to mass production as it is the wines' case. However, the cultural question that arises is the media coverage of life, by the effects of the easiness considered as a value that offers itself as an illusion.



**Figure 9** Vernacular architecture in schist, *Lousã*. Author's drawing.

Some business and cultural dynamics can become attractive for the regions' development. As an example, *Lousã* - a municipality in the center of Portugal in the schist zone - is part of the "*schist villages route*" (Figure 9). Its dynamics, supported by the appreciation of architectural complexes and sites, the attraction of entrepreneurs and the creation of jobs in diverse areas, meet the concerns of International Charters in this field.

"Architectural ensembles are groupings of urban or rural buildings, isolated or assembled, which by virtue of their architecture, unity or integration in the landscape, have Exceptional Universal Value from the point of view of history, art or science." (Miranda, 2015, p. 16)

### **Schist Villages**

There are several types of dynamics that have been sedimentary over time, such as the schist villages. They correspond to an action program in network that sets up a homogeneous region with 27 villages distributed in 16 municipalities in central Portugal. All of them have constructive features that involve schist. Mostly ruins, they are nowadays award-winning tourist destinations.

The European application actions were a way to raise development funds that allowed the recovery of homes that are generally intended for rural tourism. Despite their landscape qualities, various kinds of events, group visits and cultural dynamics of rural culture are not enough to create a social dynamic that encourages the permanent habitability of these areas. Schist, rivers, reservoirs, streams, cliffs and valleys, constitute diverse and harmonious sets that allow walking, cycling or swimming.

However, they are seasonal actions that do not have as counterpoint an attractive social aspect that fixes people. In addition, they are included in production systems linked directly or indirectly to tourism.

Although it is a level of intervention that takes advantage of the exceptional landscape features that provide identity to the region, the organization of the territory must take into account the broad set of environmental, social and economic characteristics.

The most rudimentary forms of the economy of the mountain are found in the schist mountain range, having been for this reason belatedly populated. Even today, this factor is a deterrent to the agricultural development of these regions. However, the vineyard introduces the desired quality for development and exploration. The characteristics of the schist lands vary according to the regions and should be studied in depth.

### **Case Study: *Outeiro da Vinha***

Housing is determinant when talking of people's attachment to a place. When it corresponds to a symbolic value of tradition, it activates memories that are even stronger from when they root cultural values with customs and beliefs, with the secular imaginary that is transversal to time and helps to build the place.



In the book "*Inquiry to the Vernacular Architecture in Portugal*", which started being made in 1955, despite being a reference of vernacular architecture, it was detected a reductive presentation that omits the schist architecture in the center zone, except for two photographs that focus on the space adjacent to the project place.

These photographs make it possible to identify a small lane with a tree still in existence, but the confining buildings have already been destroyed and replaced by illegal multi-storey buildings. Also the materials do not come from the region. The examples proliferate all over the hill, demarcating the place.



**Figure 10** Outeiro da Vinha, Portugal. In color: architectural intervention.

Source: Author's Personal Achieve

The house referenced as case study is located in *Outeiro da Vinha, Serra da Estrela, Portugal* - a small housing nucleus that has been getting depopulated and deeply uncharacterized (Figure 10).



**Figure 11 and Figure 12** Outeiro da Vinha, Portugal.

Source: Author's Personal Achieve

The expansion of a schist rural house that did not have the minimum conditions of habitability according to current standards, affirms the patrimonial value of the rural housing that was referenced as a sign of poverty (Figures 11 and 12). The owner of the house, who had already immigrated to Lisbon, requested the intervention of the architects Rui Barreiros Duarte and Ana Paula Pinheiro and distanced herself from the local mentality. She intended to optimize the housing program that had small areas, which were very conditioned, whilst spending little money on the construction (Figure 13).





**Figure 13** Expansion of the house: local materials and technological innovation. Source: Author's Personal Achieve



**Figure 14** Expansion of the house: Mezzanine. Views on the mountain. Source: Author's Personal Achieve

The use of cheaper local materials, allows the house of schist and wood to require practically no maintenance. It is a sign of recovery of cultural identity in an area where acculturation decontextualizes interventions with signs of equivocal status. The intervention reacts against the adulterations that have been done and against a misleading opening of concepts on what is today the vernacular architecture.

In addition, actions of this kind for sustainability and authenticity add value. It is a matter of architecture to know how to take advantage of tradition, to update the constructive systems and to create solutions of balanced performance in face of the new challenges (Figure 14).

The program, which is compatible with the small size of the pre-existing building, responds to the needs of agricultural work and considers the principles of passive sustainability. This is another current stage - in addition to patrimonial incidence -, which must coexist with it, to add value and interest to the built set.

"Passive techniques, such as thermal insulation or use of solar heat, or even metabolic heat, can reduce the building's energy consumption by 70% to 90%. Shading structures can also improve thermal behavior, reducing energy consumption when cooling the building." (Pinheiro, 2017, p. 39)

The Passive Sustainability Principles that were used in the intervention respond to a set of points that must always be equated in architectural interventions and that we hereby enunciate:

*"LEAK-TIGHTNESS: The buildings are designed to avoid thermal losses and damages caused by humidity.*

*INSULATION: The building façade must be properly insulated in order to avoid overheating during the hot season and excessive cooling during the cold season.*

*INEXISTENCE OF THERMAL BRIDGES: improvement of energy efficiency through the elimination of thermal bridges. Thus pleasant temperatures are achieved and moisture damage is eliminated.*

*HEAT RECOVERY: Heat recovery through the efficient use of solar energy and internal heat sources.*

*WINDOWS: The windows should be strategically located and properly insulated in order to use solar energy efficiently and allow ventilation.*



*VENTILATION: Natural ventilation should be favored in order to permanently provide fresh air in abundance and free of dust.*

*SHADING: Various types of strategically located shading structures should be used to reduce energy consumption, such as sun visors, blinds, shutters, light breaks, vegetation." (Pineiro, 2017, p. 39)*

The applicability of these sustainability principles in rehabilitation of vernacular architecture is innovative in terms of climate and energy control, since it is an issue that had never arisen in popular architecture in Portugal as it has such little detail.

Thus, cultural roots must be harmonized with the modern strategies, integrating the realm of authenticity and sustainability into the architecture that must respond to program, place, idea and construction (involving materiality).

Moreover, it is always necessary to consider the symbolic aspect that must guide interventions. This is where individual values, that have a strong impact on the quality of places, are ultimately played.

It is also necessary to equate the execution time, the price and the constructive techniques that are used. Many of the constructive techniques of schist buildings were lost over time, so it was necessary to know beforehand that there were performers capable of performing the work by replacing the traditional stereotomy, which in fact happened.

However, in order to respond to these situations, there are already some alternatives in the market today: modules of stone elements connected by a natural cement in order to overcome the lack of skilled labour. Also the coverings were executed in self-supporting solid wood structure with thermal insulation, properly acoustically insulated and waterproofed, and the final coating was done with flap and straw roofing.

It is an effective alternative to the old wood roofing technique. Besides the wood being dried in a greenhouse and running the risk of wiring, the workforce in the area is practically non-existent making construction almost unfeasible.

The intervention, in addition to taking advantage of the traditional materials of the place, aims to draw attention to vernacular architecture that has been devaluated in detriment of architectural acculturations that exhibit misleading symbols of success and desire. The

memories of old popular architecture belong dominantly to a past of poverty that one wants to forget. Hence the changes that emerge in the landscape reveal non-cultural solutions of bad taste and kitsch.

However, all the international recommendations are in order to avoid style subversions and the application of unrelated materials from the region that disfigure the sites. In addition to the example of individual interventions, the placement of the International Charters produced since the Charter of Venice is essential for preserving the built-in sets of authenticity. It means knowing how to add value to the existing by balancing the new meanings with the materiality and the spirit of the place, extensive to the sustainability domain.

### **Conclusion**

The territory intervention must equate the society change and create sustainable and attractive alternatives to invigorate and fix populations in the abandoned regions of the interior.

The village of *Outeiro da Vinha* is part of the *Serra da Estrela* Natural Park, an area with great tourist potential throughout the year, including the winter when it snows.

Another strong reason to exercise institutional competences that guarantee the objectives - on a patrimonial, authenticity and sustainability level - expressed in the Charters and International Documents in relation to urban agglomerations and architecture.

Cultural identity cannot be replaced by the acculturated individualism expressed in the images of the houses of *Outeiro da Vinha*.

The public socialization space refers to the small square frontier to the chapel in which the tree was placed. The churchyard emptied of symbolism, of people and of the traditional architectural surroundings, was not characterized.

The social imagery has become residual against the prevailing individual imaginaries. However, the patrimonial matrix of the group must be recovered, creating a reality that manifests the balance between tradition and contemporaneity, responding to the new environmental and energy requirements.

In this sense, the establishment of intervention rules should guarantee a pallet of local materials and a set of constructive procedures, in addition to the necessary energy efficiency. Responsible technicians of the competent institutions should ensure the convergence of these matters, supervise the area and follow up on local architectural and urban intervention actions.

The research of the soil qualities and the varieties to be planted by qualified people in the area begins to exist in several wine-growing areas of Portugal, reinforcing the economy of the region.

The same must be guaranteed with the technical and environmental aspects involving architects who are trained in these areas. It is not permissible to have omissions and failures to comply with the rules that are already spread throughout the world.

The cultural and economic matters, coupled with the expectations of the current society, must create conditions so that there is no exclusion of opportunities by reversing the current desertification process of the interior.

The quality of the images must not be epidermal, but should correspond to a real fixation of the populations. This social aspect is articulated with the architectonic thought that specifies, recovers and enlarges the community network and architectural interventions that were omitted from the Inquiry, as opposition to the destruction of the regions' characteristics, the acculturation of personal taste and critical relativity.

It emphasizes the patrimonial place, the tectonics, the constructions' sustainability and quality, definitively distanced from the deficient conditions of livability that generated the symbolic repudiation by the past of poverty. It is necessary to reestablish the pride and values that people formerly had for their village, an identity that was ideologically deactivated. Today we find a revision of concepts, but there is a lack of theory essential to reinforce the cultural community sense and architecture in its time and place.

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### **RUI BARREIROS DUARTE**

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**The Sociocultural Role of Architectural Types: Cultural Sustainability in Architecture and the Possibility of Convention<sup>1</sup>**

Zeynep Çiğdem UYSAL ÜREY\*

**Abstract**

This study looks at the issue of cultural sustainability in architecture from the perspective of architectural types and attempts to question the cognitive viability of using types in the creation of a sustainable cultural milieu. The study conducts a multi-disciplinary and cross-comparative discourse analysis on the subject areas of cultural sustainability, cultural schemas and architectural types, in an attempt to find out the social and cognitive role of architectural types with regard to cultural sustainability. Examining these subject areas comparatively, the study respectively investigates the role of cultural schemas in cultural sustainability, the correlation of architectural types and cultural schemas, and the social and cognitive role of architectural types in the formation of cultural sustainability. Consequently, the study questions if the use of architectural types has a cognitive basis in the creation of a sustainable cultural milieu.

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<sup>1</sup> This paper makes partial use of some of the theoretical discussions about architectural type in the author's PhD Dissertation (Uysal Ürey, Zeynep Çiğdem. (2012). Architectural Type as a Cultural Schema and Its Cognitive Use in Architectural Design: An Analysis of the Aga Khan Award Winning Dwellings in Turkey (1970-2008), Unpublished PhD Dissertation, North Carolina State University, Raleigh. Supervisor: Prof. Kristen Schaffer); and the extended abstract of this paper was presented at the BEYOND ALL LIMITS 2018: International Congress on Sustainability in Architecture, Planning, and Design, on 17-19 October 2018, Ankara, Turkey.

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**Mimari Tiplerin Sosyokültürel Rolü: Kültürel Sürdürülebilirlik ve Geleneğin Sunduğu Olanaklar<sup>2</sup>**

Zeynep Çiğdem UYSAL ÜREY\*

**Öz**

Bu çalışma, mimarlıkta kültürel sürdürülebilirlik konusuna, mimari tipler perspektifinden bakmakta ve sürdürülebilir bir kültürel ortamın yaratılmasında tip kullanımının bilişsel geçerliliğini sorgulamaya çalışmaktadır. Çalışma, kültürel sürdürülebilirlik açısından mimari tiplerin sosyal ve bilişsel rolünü ortaya çıkarmak amacıyla, kültürel sürdürülebilirlik, kültürel şemalar ve mimari tip konularına ilişkin çok disiplinli ve karşılaştırmalı bir söylem analizi yürütmektedir. Bu konuları karşılaştırmalı olarak inceleyen çalışmada, sırasıyla kültürel şemaların kültürel sürdürülebilirlik üzerindeki rolü, mimari tiplerin ve kültürel şemaların ilişkisi ve kültürel sürdürülebilirliğin oluşumunda mimari tiplerin sosyal ve bilişsel rolü incelenmektedir. Sonuç olarak, mimari tiplerin kullanımının sürdürülebilir bir kültürel ortamın yaratılmasında bilişsel bir temele sahip olup olmadığı sorusu cevaplanmaya çalışılmaktadır.

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## Introduction

The cognitive function of cultural knowledge in the interpretation of new information accumulated a considerable research interest. As a formative aspect of this cultural knowledge on the other hand, the cognitive function of architectural types and their role both in the interpretation and production of architectural products, and also in the formation of a sustainable built environment still seems to be an area that needs further attention. This study delves upon the cognitive role of architectural types in the creation of a sustainable built environment and discusses if types have the possibility of sustaining a cultural milieu today.

## Methods

With the aforementioned objective, the study conducts a multi-disciplinary and cross-comparative discourse analysis respectively on the subject areas of culture, cultural sustainability, cultural schemas, the cognitive role of cultural schemas in the interpretation of built environment, architectural types, and the cognitive and sociocultural characteristics of architectural types, in an attempt to examine the cognitive role of architectural types in the creation of a sustainable cultural milieu.

## Findings and Discussion

### a. Culture and Cultural Sustainability

The inclusion of cultural sustainability as the forth pillar of sustainable development is a recent phenomenon with its unique dimensions of importance (Soini and Birkeland, 2014, p. 213). Mentioned previously under the third pillar of social sustainability, the concept of cultural sustainability itself was first brought up in 1995 by the World Commission on Culture and Development (WCCD) and was defined as the “inter and intra generational access to cultural resources” (WCCD, 1995). Although the definition of the concept still remains to be vague, it broadly talks about the preservation of cultural values, ideas, practices, artefacts and heritage (Axelsson et al., 2013). Culture is taken here as an asset in its own right and considered as having a crucial role in keeping the sustainability of a society, in unison with the other three dimensions of sustainable development, which are ecological, economic and social (Soini and Birkeland, 2014, p. 214).

On general terms, culture can be accepted as the “meaning content of human communities, which are expressed through their symbolic patterns, norms and rules” (Hylland-Eriksen, 2001). Being a very multifaceted and complex concept itself, “culture” has seen many shifts of meaning throughout history and has many different definitions that highlight these shifts. Being evidently at the root of cultural sustainability, the term “culture” can still be defined in a more inclusive manner as:



“The system of shared knowledge, ideas, skills, beliefs, customs, behaviors and values, which humans acquire to cope with their world, to transmit from generation to generation by learning and express in the material systems of artifacts and the built environment”. (Lawrence-Zuniga, 1997, p. 49)

In this definition and else, the most important aspect of the term is that it is shared by a society, transferred from generation to generation and loaded with that society's value systems. It becomes through these shared meanings that culture enables people to 'make sense' of things around them; let them communicate and formulate ideas. As Stuart Hall suggests, people are able to communicate the way they do in a society as they share the same "cultural codes". Members of the same culture think and feel about the world and understand it in similar ways on the basis of these shared 'cultural codes', which are the shared sets of concepts, images, and ideas. As Hall describes, this is what determines to 'belong to the same culture' (Hall, 1997, p. 4, 18) and it becomes through those cultural codes that the meaning in society is constructed and sustained (Du Gay and Hall, 1997, p. 13). Accordingly, culture acts as a very crucial element for the sustainability of the very being of the societies it belongs to.

#### **b. Cultural Schemas in Cognition and their Cognitive role in the Interpretation of Built Environment**

Studies on cognitive theory suggest that people carry this load of cultural information and operate on it through their cognition by way of their cultural schemas, which are a subset of their bigger store of cognitive schemas (Johnson, 1987, p. 19) (Oyserman, Sorensen, Reber and Chen, 2009, p. 219). It is an acknowledged theory today that our knowledge is held by our minds by way of our cognitive schemas, which are basically defined as the conceptual structures, which represent our knowledge of objects, situations, events, actions and sequences of action (Wertsch, 1985, p. 154). They are described as the mental frameworks that we use to organize our knowledge, which control the reception, storage, retrieval and production of information (D'Andrade, 1992, p. 28).

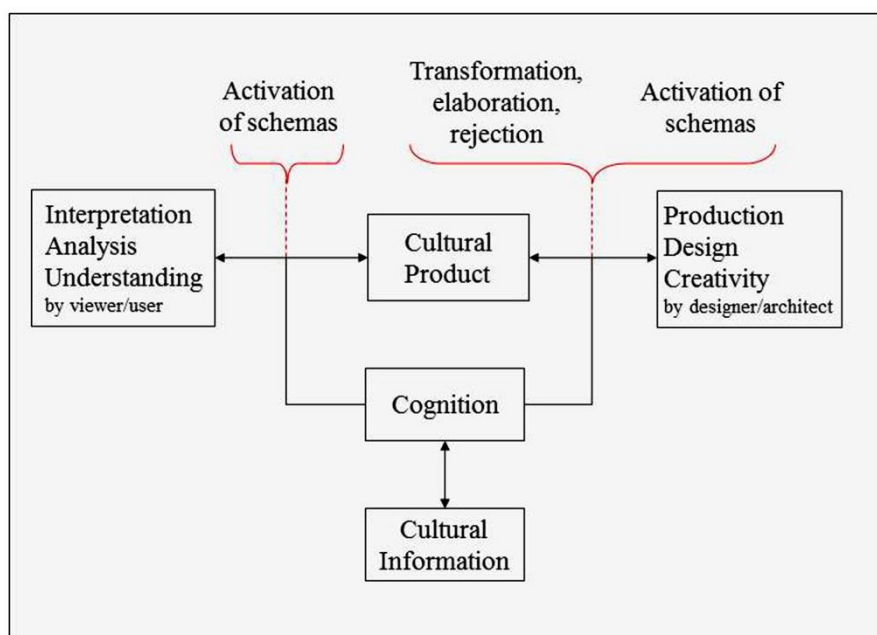
Cultural schemas on the other hand are found to be the subset of cognitive schemas and they are specifically defined as the "patterns of basic schemas that make up the meaning system of a cultural group", which govern how the people in that group experience and interpret their experiences in their daily lives (Nisbett and Norenzayan, 2002, p. 5, 6). They are seen as the "presupposed, taken-for-granted models of the world that are widely shared by the members of a society and that play an enormous role in their understanding of that world and their behaviour in it" (Holland and Quinn, 1987, p. 4). They vary from "highly concrete and specific constructs like spoons and left-turns to high-level schemas for things like love, success, authority, pollution, and the like". (D'Andrade, 1992, p. 34).

The use of our store of cultural schemas is of seminal value for the continuation of our daily lives within a cultural community and to interpret the meanings that are offered to us by that community through different cultural means, such as architecture, behaviours, tools etc. It is generally accepted today that culture exists at the very beginning of most of our cognitive experiences that define both the reception and the production of meaning through systems of representation. For D'Andrade, to have a sufficient understanding of a culture, a person should be acquainted with the most "intersubjectively shared" information of that culture, which are the mostly used and legitimized cultural schemas of that culture. Therefore, it is deemed important to know how to use those schemas for that cultural community. The interpretations that depend on those schemas are not questioned and treated as "obvious facts of the world". An important example given by scholars for a cultural schema is the restaurant script, which defines the overall general behaviour and setting patterns that defines the activity of eating at a restaurant (D'Andrade, 1989, p. 809, 820-825; D'Andrade, 1987, p. 112-113).

In cognitive literature, culture is altogether accepted as the sum of mental representations (cultural schemas), their public expressions and resultant behaviours in certain contexts, which are always in a continuous interaction with each other (Medin, Unsworth and Hirschfield, 2007, p. 618). As Shore states in line with this, culture could be seen as to have two main dimensions, which are called the "culture in the mind" and "culture in the ground". The first dimension, which is "culture in the mind", describes our aforementioned cultural schemas, which are the "cognitive representations" of the cultural context that we are in. The latter on the other hand, which is "culture in the ground", consists of the external manifestations or artefacts in the environment, such as our architecture, pottery or tools, which are also called as the 'material culture'. They also contain the intangible forms of culture, such as the forms of speech or social interaction styles etc. (Shore, 1996, p. 44, 52). It is proposed that there is a constant interaction between these two dimensions: people form cultural schemas ("culture in the mind") when they experience 'externalized' public cultural artefacts, such as buildings, tools etc. (culture in the ground) and they form new 'externalized' public cultural artefacts (culture in the ground) when they express their own cultural schemas ("culture in the mind"). As Shore describes, these two dimensions of culture therefore has a "twice-born character" that results from the specific internalization and externalization of culture in the mind (Shore, 1996).

The research shows that architecture or built environment exists as an important component of this "culture in the ground", from which members of that society derive cultural meanings to form their cultural schemas. When people would produce back to that very cultural environment from where they have driven their schemas, those very schemas become active again (DiMaggio, 1997, p. 263-287). Therefore, our built environment, as a form of our

material culture, both derives its meaning from the ‘cognitive-cultural system’, which is formed by customs, rituals and alike, and also perpetuates this ‘cognitive-cultural system’ by being its externalization in the environment (Donald, 1998b, p. 181-187). Consequently, as the research on cultural cognition shows, the role of our cultural schemas is indispensable in the understanding, interpretation and production of the architecture and the built environment that we inhabit. We need the necessary cultural schemas to give meaning to our experience with architecture, to read our built environment and behave accordingly. To maintain this meaningful relationship between us and our built environment becomes especially important for the sustainability of our cultural existence and milieu (Fig. 1)



**Figure 1** The use of cultural schemas in the interpretation and production of built environment (Diagram by author).

### c. Architectural Types and Cultural Schemas

As the research on design cognition shows, architectural types could be seen as a part of our store of cultural schemas. As cultural attributes that are used cognitively in the interpretation and production of architectural products, types behave like cultural schemas on the cognitive level assisting both the reception and interpretation of incoming architectural information and also the production of new designs.

The dictionary definition of “type” describes the term as “the general character or structure held in common by a number of people or things, which are considered as a group or class” (“Type”, 2012). The grouping action provided by a quality of abstractness that unites and represents a larger group is what produces the “type” (Tice, 1993, p. 162). In architectural

theory, type is defined both as an abstract conceptual form, and as a cognitive facility, which functions as the context for systemic action based on categorization (Habraken, 1985, p. 40). In the article 'On Typology', Rafael Moneo combines these two traits and defines type as:

“...the concept which describes a group of objects characterized by the same formal structure. It is neither a definite spatial diagram nor the average of a serial list. It is fundamentally based on the possibility of grouping objects by certain inherent structural similarities. It might even be said that type means thinking in groups.” (Moneo, 1978, p. 23)

An important emphasis implied in this definition is the abstract characteristic of type, which is used to act as the structural common denominator of a larger group (Argan, 1996, p. 246). Through this abstractness, it both becomes embedded in the units of the group as a conceptual structure, and it also represents them on this commonality.

As stated by Petruccioli, the birth of the architectural type results from the presence of this commonality that exists between a group of buildings. Type appears in this framework as a result of a process of elimination that leaves only the common elements that belong to this group. For Petruccioli, this process of elimination leaves type only as a schema and makes it a collective product in this sense that is shared both by the architects and the community they serve to.” (Petruccioli, 1998, p. 11).

Emphasizing this abstract schematic quality, Quatremere de Quincy, who is one of the first theoreticians who worked on architectural type, uses even the term 'schema' while explaining the term. Defining type as “the idea of an element which should itself serve as a rule for the model” (Argan, 1996, p. 240), Quatremere states that type is neither a concrete image of something that can be copied or imitated directly, nor it is a definite form, but it is a schema or the outline of a form (Argan, 1996, p. 244). Quatremere refers to type as an ideal schema, which acts as the abstract structure used for spatial articulation (as cited in Argan, 1996, p. 244). For Quatremere, type is set to contain the most ideal form of relationships for the required basic demands in spatial articulation, which are to be used recurrently in different forms and shapes through time. As Argan indicates, architectural type appears in this sense as a 'schema of spatial articulation', which has been shaped as a 'response to a totality of practical and ideological demands' (Argan, 1996, p. 246). It appears as a 'common root form' reduced from complex formal variants.

The comparative survey with cultural schemas demonstrates a correlation that exists between the notions of architectural type and cultural schema. This emphasis on the abstract schematic structure of type that functions as the initial common denominator or the preliminary structure behind spatial articulation gives the first hints of its correlation with the notion of 'schema'. Being a form of 'thinking in groups', type exists as the formal, functional or structural schema, which consists of 'abstract system of relationships'. As mentioned before, it exists

not just as a unique formal spatial diagram, but as an outline that expresses and provides the possibilities of several complex forms of potential results.

The connection between types and schemas are portrayed very explicitly in several definitions of type made by different theoreticians. As stated before, in his definition of type, Quatremere de Quincy refers to type as the 'schema' or the outline of a form ("type is not a definite form but a 'schema' or the outline of a form") and characterizes it as the 'schema of spatial articulation' (Argan, 1996, p. 244, 245). For Quatremere, like a schema, type acts as the abstract structure that is set to contain the most ideal form of relationships for spatial articulation, which are developed for the required basic demands to be used recurrently in different forms and shapes through time.

Likewise Quatremere, Habraken also notes on the schematic quality of type by defining type as an implicit, abstract 'schema', which is possessed conventionally as a shared knowledge. Habraken states that type gives permission to a range of variations for the reason that it is the abstract basic schema behind spatial articulation (Habraken, 1985, p. 25). The adaptability of type therefore appears as a seminal characteristic that results from its schematic quality. On account of this schematic adaptability, Wittkower states that in architectural design, type adapts to the specific spatial and temporal features of different contexts and programs while conserving its significant characteristics. He demonstrates this generic schematic characteristic of typology in analyzing Renaissance architect Palladio's villa designs (Wittkower, 1971).

Therefore, the design theoretical research also shows that, type exists as a general solution schema, which acts as a source of generic knowledge manipulated in design (Oxman, 1990, p. 2-8). As explained before, it contains the body of prior knowledge that allows the designer "to extract 'generic schema' from specific images". It consists of both the finding of the 'generic representational schema' and also the knowledge of the strategies of using this schema (Oxman, 2001, p. 280).

#### **d. Cognitive Role of Architectural Types in the Formation of Cultural Sustainability**

As architectural artefacts are structured by layers of cultural signification and as the architectural forms and their content have a historical representational value, the interest in type in architecture appears as a search for 'meaning', since type establishes continuity with cultural memory in architecture (Argan, 1996, p. 240). As testified by Colquhoun, typology works as a condition of architectural meaning through its ties with culture (Colquhoun, 1996, p. 248).

Studies on the cognitive use of culture suggest that the built environment is both directed by cultural schemas and also signifies the encoding of them, through which the members of one culture translate from it specific formal cues resulting in appropriate behavior (Lawrence-Zuniga, 1997, p. 49). What we can deduce from this research in terms of the interpretation of architectural products then is that architectural artefacts present cognitive tools for the user/viewer, depending on the existing cultural schemas. The 'new' in architecture could only be read by the viewer on these terms in connection to his/her prior cultural knowledge.

As Bonta indicates the interpretation of an architectural work by the viewer/user cannot be isolated neither from the context of ideas within which they were proposed, nor from the position of the interpreters. Interpreting an architectural object thus requires recognizing a set of characteristics, which can also appear in other works of architecture, such as typological features or previously known qualities (Bonta, 1979, p. 24). This feature requires the presence of 'familiarity' that must be observed by the viewer. As stated by Tesar, this familiarity is required for the building to pass the threshold of relevance for the viewer. If its form appears too remote, it would go unnoticed as it would require an unreasonable information processing effort, which is pointlessly effortful for the visual or formal acceptance of architectural works (Tesar, 1991).

Thus, in the perception and interpretation of architectural works, type exists as the initial frame of reference, or the preliminary way to know, which controls the acceptance and initial processing of new visual and spatial information (Tesar, 1991, p. 168). Carrying within itself the function and form as connected to each other, type connects the visual image of the building with its function and this way provides for the user/viewer the message that he/she can use in the perception or the interpretation of the architectural product.

As Tesar states, type acts in this sense as the 'natural context of architectural experience' in the perception of information, where the mind compares and matches the new information into the existing schematic structure of type in order to recognize and understand it with the least information processing effort (Tesar, 1991, p. 166). This way, the new 'strange' information is digested with the help of type into the 'familiar'. As stated by Alan Colquhoun, type becomes in this sense, the context with which the new work is understood (Colquhoun, 1996, p. 248). It stands for the familiar cognitive structure or the 'familiarity' that is used in the reception and perception of problems to arrive into new solutions later through the creative process. Type's familiarity becomes the ground to position oneself before stepping onto a new, unknown ground (Tesar, 1991, p. 168, 174).

Consequently, as cultural schemas help us to communicate over shared images and ideas due to the recall of prior cultural knowledge, types also function over the shared visual and formal

information, which live within the social body as shared knowledge gathered by common experience (Habracken, 1985, p. 25). As Robinson states, the architectural type “links the act of perceiving and categorization with the act of recreating and designing” on the basis of culture (Robinson, 1989, p. 256). Type both carries the seeds of culture within it and also transfers it to continue its existence through time. As indicated by Robinson, the power of type comes directly from its connection with culture:

“Built form as artifact not only expresses the ideas held by a culture but also communicates and perpetuates them. Insofar as there are different kinds of buildings and building types in a culture, architecture can be used to indicate that there are different kinds of places – places for which different kinds of behavior may be expected, behavior settings...The power of the building type as a subject of analysis thus derives from its embeddedness in culture. Unlike the style, which is understood only by the formally educated, building types communicates meaning to all societal members.” (Robinson, 1989, p. 273)

Therefore, identifying the meanings conveyed by architectural types allows the “productive building upon or modifying of existing cultural values by means of architecture” (Robinson, 1989, p. 273). As Tesar states, in this sense types hold the promise to reunite the world of social meaning and the world of architecture in a way that depends on the ‘sharing of images’ (Tesar, 1991, p. 165).

It is acknowledged today that in architecture, this integrity and the concern for communication could be maintained if the design of the buildings can develop in harmony with the existing cultural environment. As Tesar notes, the maintenance of this meaningful communication is very important for architecture, since architecture is an inclusive social and public art, rather than an exclusive fine art with its accompanying freedom to explore and to express the subjective, personal, and private subject matter. On these terms, it has a responsibility to manifest our shared values publicly in material form and to provide us a shared frame of reference to experience our environment (Tesar, 2010). Therefore, as Peter Collins also indicates, an architect’s urge towards self-expression and originality should not override this communication and the sense of duty towards the environment and the past (Collins, 1971, p. 27), and what is more, the search for rationality in buildings and in the physical environment should not destroy the existing cultural continuity in the environment, since, as stated by Assi:

“Rationality does not necessarily demands using a logic dissociated from existing conditions. Change in built form need not take place as dissociated from the existing conditions. It could happen in the nature of the context. Interventions can be knit more successfully knit into the flow of history.” (Assi, 2001, p. 3)



On these terms, architecture possesses both the capacity and the task of providing a meaningful communication in the environment by way of respecting the cultural levels shared by the society. Knitting urban patterns and creating cultural landscapes, it holds the ability of both expressing and reinforcing the values of the society and the layers of cultural ideas. Being a public art in this sense, it carries the responsibility of providing a cultural communication within society and offering a meeting point between the interpretation and the production of the architectural products, by way of the proper use of cultural information.

In the light of the theories examined in the previous sections, it could be argued that in architecture, this connection between the 'interpretation' (perception, understanding or reception), the 'production' (design), and the 'architectural product' could be provided by the cognitive use of cultural schemas, such as architectural types. This intersection of the interpretation and production of architectural products over the shared frames of reference could be provided by the cognitive function of cultural knowledge that is in continuity within the society. Those shared forms provided by culture produce a meeting point for the interpretation and production of architectural works, which results from the familiarity of recognizable forms. The value of this intersection is important leaning on the fact that architecture is a public art that shapes the shared human environment and in fact, it is through this intersection that architecture becomes a public art, which is given the responsibility of forming our built world.

On this basis, the use of types in architectural design could be an effective tool to learn from the architecture of a culture and to form a cultural continuity therein. Types act in this sense as the cognitive tools that can create a richer architectural language by forming a connection with the past or with the existing cultural environment (Assi, 2001, p. 5). As Tesar notes, they offer cultural continuity and sustainability in this sense by keeping the degree of change from getting out of hand (Tesar, 2010). By way of building on the existing types, an architect can respond to his environment with sensitivity and can provide a sense of continuity between the past, present and the future (Assi, 2001, p. 3). As suggested by Assi, this kind of an approach can maintain "a creative process of regeneration of diversity within the context of the communication and unity of the community" (Assi, 2001, p. 5). Therefore, the use of types in design is of seminal value for architecture and is a way to form an "an alternative to the current fascination with novelty as the primary design strategy" (Tice, 1993, p. 162).

## **Conclusion**

The results of the discourse analysis show that architectural types work as the cognitive counterparts of architectural culture and in culturally stable and locally isolated environments their use in architectural design could be an effective cognitive tool to form cultural continuity therein and to keep a sustainable cultural milieu. They exist as nonlinguistic cultural schemas



of a society, by working as the visual image models of a culture (Shore, 1996, p. 56-65). As cultural schemas help us to communicate over shared images and ideas in a society, types enable us in this sense to make sense of the built environment around us based on the shared cultural information that we have. As Tesar notes, types offer cultural sustainability by keeping the degree of change from getting out of hand and hold the promise to reunite the world of social meaning and the world of architecture in a way that depends on the 'sharing of images' (Tesar, 1991, p. 165).

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This work makes partial use of some of the theoretical discussions about architectural type in my PhD Dissertation (Uysal Urey, Zeynep Çiğdem. (2012). *Architectural Type as a Cultural Schema and Its Cognitive Use in Architectural Design: An Analysis of the Aga Khan Award Winning Dwellings in Turkey (1970-2008)*, Unpublished PhD Dissertation, North Carolina State University, Raleigh. Supervisor: Prof. Kristen Schaffer) and on this account I would like to express my sincere gratitude once again to my advisor Prof. Kristen Schaffer and my committee members Prof. Paul Tesar, Prof. Meredith Davis, and Prof. Ronald Endicott.

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### **Biography of the Author**

Zeynep Cigdem Uysal Urey was born in Ankara, Turkey, in 1979. She received her B.Arch. degree in 2001, from the Middle East Technical University (METU), Department of Architecture (Ankara, Turkey). She received her M.Arch degree in 2004, again from the Middle East Technical University (METU), Department of Architecture. She received her PhD degree in 2012 from North Carolina State University, College of Design (Raleigh, USA). In 2012, she joined Cankaya University, Department of Architecture, and in 2013 she became an Assistant Professor at the same institution. Her current research interests include the use of cultural information and cognitive schemas in architectural design.