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RESEARCH ARTICLE

Continuity and Change of Muscat House - Influencing Factors and Responses

Dr. Soheir Mohamed Hegazy
Department of Architecture and Interior Design, Scientific College of Design, Sultanate of Oman

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Corresponding Author

Dr. Soheir Mohamed Hegazy

Abstract

Oman's architecture and culture are steeped in history through thousands of years; some of the Sultanate's historical heritage are included in UNESCO world heritage sites. In 1970, following a period of decline over the previous century, Oman began to steer on a steadfast track of renaissance and recovery. In spite of unprecedented changes in all aspects of the Omani people's life, the people and their leadership had the ability to adapt to the challenge of a changing world without compromising social values. This research aims to give an answer to the question that was repeated strongly after the post modernism era as to what extent do we allow our heritage to interact with our modern lifestyle and the explosion of the information age? This paper demonstrates one of the successful experiences of achieving such balance between heritage and contemporary. The Omani current architectural style is maintaining the form and design objectives of traditional architecture that responds to the people culture and achieving identity & national pride. Furthermore, the contemporary vernacular Omani architecture does not lose the benefits of modern technology that mainly achieved through the structural systems and materials.

INTRODUCTION

In the last decades of the twentieth century, the shift of intellectual modernity to post modernism, has its importance in developing countries (Lin, 2002). As a consequence of the gradual awareness of the problem of detachment from traditional values, efforts have been made towards keeping continuity of cultural and historical architectural concepts and forms (Sani and Mahasti, 2013). However, the authority of the past cannot be blindly accepted as its relevance to the present must be perceived. Neither the past-tradition and history nor the future-modern technology can provide solutions to problems of the present. Their role lies in the fact that they act as "resources" which broaden our choices. Moreover, a society's past and the way that society conceives its past afford modes of continuity which give the present its authenticity (Al-Hathloul, 1981).

Houses that are used in this paper as a case study have always played an important role in preserving cultural values, providing a sense of belonging, identity and in the issue of self-esteem. In the contemporary architecture of developing countries, these significant considerations are frequently neglected. The advantages of modernization, that goes along with rapid changes and the increasing migration from the villages to the cities accelerates the urgent need for more housing left little chance or time to give adequate care to the issue of ensuring that the new buildings were built in such a way to show aspects or features of the traditional architecture. Accordingly, most of the new buildings, including houses, demonstrate no sense of connection to the country's culture (Sani and Mahasti, 2013).

In spite of the intensive modernization programs of the Sultanate of Oman during the past forty five years after the discovery of large quantities of oil in 1970 (Al zeedi, 2007), Oman, unlike its showy Gulf neighbors is a destination for culture-seekers. Oman is always described as the last bastion of "unspoiled Arabia". A continuous visual link is noticeably repeated across the city (Caldwell, 2012)

The issue of continuity and change approaches of the contemporary architecture was handled from different perspectives in the previous published literatures. For example; some publications examined the scale and significance of different design criteria from both historical and contemporary perspective of contemporary applications. This examinations was applied at the level of regional architecture (Azzam, 2008) or discussed at the level of a country like Duch architecture (Ibelings and Rossem, 2009), Bhutanese architecture (Mishra, 2010) and Indian architecture (Tillotson, 1989). The examination of continuity and change was discussed also at the level of certain types of constructions like the mosque in Delhi (Ali, 2012) or communities such as the Chinese diaspora (Lin, 2002). Moreover, some organizations are concerned about keeping the continuity between traditional and contemporary architecture. For example, Aga khan foundation, Canada awarded such projects every four years from the Islamic world and published them. (Cantacuzino, 1985). Furthermore, some literatures discussed the reasons of discontinuity in the contemporary architecture of some of the developing countries (Al-Hathloul, 1981), (Sani and Mahasti, 2013).

The continuity & change criteria of the Omani architecture was included in the previous editions that discussed its historical development from the past to the present and the affected factors (Hawley, 1995), (Damluji, 1999), (McBrierty and Al-Zubair, 2003) other publications provided more clearer understanding of the current uniform Omani architecture (Al Zeedi, 2007), (Caldwell, 2012).

This paper will go in more detail by recognizing the achievement of Oman to maintain the continuity of traditional architecture without losing the benefits of modern technology. A summary on the people and built environment in Oman until 1970 will be presented. Then, fundamental influential changes of Oman during the last forty years will be elucidated. The articles of Building Regulations for Muscat relating to both continuity and change criteria are demonstrated. A comparison between a contemporary and traditional Muscat house will be conducted. Finally, future foresight will be deduced.

The methodology of this paper depended on the careful reading and analysis of the previous related literatures and the 'Building regulations of Muscat', two interviews with high ranked employees of Muscat Municipality and a comparative case study.

1. A Brief History of Oman, People and Built Environment Until 1970

The Sultanate of Oman is the third largest country in the Arabian Peninsula, in terms of surface area 309,500 Km2, with a current population of 2.694 million, according to 2010 census. It lies at the crossroads of three continents and four seas and boasts of a rich seafaring tradition. Oman maintained its independence throughout its long history except for comparatively brief periods of occupation by the Persians and the Portuguese. To understand modern Oman and the path it should follow in the future, one must first understand its past as foresight which is invariably twinned with hindsight. Oman's past reveals the significance of its abundant natural resources and its geographical location. Oman's early inhabitants showed remarkable ingenuity, initiative flair, and spirit of adventure (McBrierty, 2003). Socio economic life centered on settled tribal communities engaged in a combination of fishing, trade, agriculture, and grazing. Documents revealed the extent to which Oman's early inhabitants exploited their natural resources as far back to the fourth century BC, principally frankincense and copper, to develop markets as far afield as Mesopotamia, Syria, Egypt, Greece, Rome , South-East Asia, and East Africa (Damluji, 1999). For generations, the Omani people built their own settlements, villages and houses using their hands and local materials. Traditional architecture in Oman had three main categories; defensive, religious and domestic. Architecture seems an innate activity and one of that is distinctly communal in nature (Al Zubair, 2013).

Throughout its history, Oman experienced periods of high economic achievement and prosperity interspersed with periods of relative calmness. In 630 AD, Oman was one of the first countries to adopt Islam. By the middle of the nineteenth century Oman had become a significant regional power with possessions in Asia and Africa. This Omani economic success was followed by a century of decline (McBrierty 2003). On the other hand, Omani architecture is

a series of complementary elements which have combined through the ages to create a coherent and harmonious built environment.

Until 1970, Muscat and the rest of Oman were separate entities. Architecturally, Muscat and the rest of the towns of the sultanate shared the characteristics of the urban settlements of Arabia and North Africa: walls surrounding cities, and an architectural fabric constructed of local materials restricted to a maximum of three stories in height. The architecture of Oman has been influenced over time, by its natural environment. The urban setting is not far removed from the natural landscape.

Oman's vernacular architecture had a wonderfully sensitive appreciation of the materials and colors of the natural physical environment. The scale of vernacular architecture in Oman is always human as the master craftsmen and builders used parts of their body as units of measurement during the building process. Local materials – stone, mud, brick, wood, lime, and mud plaster were used. The Omani vernacular architecture is distinguished by the contrast of expressive details and decoration against the massive solidity of the rendered walls. These details can be seen in a wide variety of window niches (drāyisha),wooden window screens (mashrabiyyah) and carved wooden door (Fig. 1, 2) (Damluji, 1999).

2. Fundamental Socio – Economic Factors Influencing Changes in Oman at the Later part of the 20th Century.

Oman is a nation in transition. A mere four decades ago, the country was a closed and listless society, basically isolated from the outside world. In 1970, Sultan Qaboos Bin Said took control of the sultanate of Muscat and Oman. Qaboos's liberal approach and personal open – mindedness are evident in all what he did. The country suffered in all aspects. Politically, the more prosperous coastal region–Muscat and Mutrah and the rest of Oman were two separate entities. Historical tensions surfaced from time to time between the two entities. The new sultan promptly and innovatively announced his faith and vision of the future by calling his country "The Sultanate of Oman" (McBrierty, 2003). The country was severely affected by the "brain drain", as many young men had been deprived of the limited education possibilities offered in only three schools in the country. Lacking the services and infrastructure of a modern state was tremendous. The challenge was to turn Oman into a modern state using the gradually increasing oil revenue. Within the guidelines of a series of five year plans, modern Oman has grown into its present state (Hawley, 1995). Tremendous progress has been achieved in all aspects of the Omani people's life during the previous forty years according to the following statistics:

Table 1
A comparison between services and infrastructure in Oman since 1970 to 2009
(compiled by the author)[1]

Point of Comparison	1970	2009
Number of schools	**3 schools**	**1040 schools**
Number of students	**6,941 students**	**531,393 students**
Infant mortality	**10%**	**1%**
Life expectancy rates	**49 years**	**72 years**
Number of hospitals	**2 hospitals**	**58 hospital**
Number of hospital beds	**12 beds**	**5,439 beds**
Doctors	**13 doctors**	**5,194 doctors**
Dentists	**0**	**557 dentists**
Paved roads	**10 k.m.**	**6000 k.m.**
Unpaved roads	**1,700 k.m.**	**24,000 k.m.**
Number of civil airports	**1 civil airport**	**6 civil airports**
Number of telephone lines	**500 lines (fixed)**	**420000 lines (both fixed and mobile)**

In 1986, Oman had the first university – Sultan Qaboos University, originally seen as "an Oxford in Oman" (Hawley, 1996). Culturally, in 1972, no one in Oman could play a note on any orchestral instrument. Now Oman has the royal Omani symphony orchestra.
Today, Oman is recognized as one of the most impressive examples of socio – economic recovery in modern times. Oman was ranked first in the world in 1997 Human Development Report of The United Nations Development Program. In 2010, Oman recorded the fastest progress rate in the non – income section of the Human Development index of the 2010 United Nations Human Development Report(UNDP, 2010). Oman's socio – economic success reflected an ability to adapt to the challenges of the changing world and respond to the modern realities of life.
In spite of the marvelous fast progress and changes in all aspects of Omani life, the development and extension of the built environment was handled from a completely different point of view. This will be discussed in the following point.

3. The Governmental Attitude towards Modern Changes in Built Environment

While Oman is continuing to meet the challenges of the current global knowledge economy and civilization, Oman does not compromise cherished traditions and social values. It has been recognized that Oman's deep rooted history is a source of national pride, not obstruction to progress.

In 1970, with the beginning of the modern era in Oman, extensive program of infrastructural renewal and urban development were conducted. Muscat, the capital –as I will concentrate on Muscat House in this paper- was naturally a focus. Two architect consultants, British and Iraqi, John R. Harris and Makiya Firms were each commissioned to prepare a planning proposal for the development and extension of Muscat and neighboring Mutrah. The reports released within three years (1970, 1973 respectively). The two reports had similar fundamental aims: to define the status and role of the old city of Muscat in the context of national politics and economics; to preserve the walls and traditional buildings in the new districts; and to propose plans for the expanding metropolitan region. Makiya defined Muscat as a cul-de-sac city, an enclave of historic buildings that should be kept untouched. Their reports emphasized the tremendous national value of Muscat's heritage, which they recommended should be enriched by maintenance and renovation. Integration between the old town's fabric and any modernizing scheme should be taken to consideration.

In 1973, the Egyptian architect Hassan Fathy, one of the pioneers of sustainable architecture, worked on integrating new architectural design with the vernacular architecture of the prominent cities in the Sultanate. Upon the suggestion of Hassan Fathy, a team from the Architectural Association School of Architecture carried out a field research in 1973. The study took three years. The majority of Oman's towns and villages and their building methods had remained unaltered for centuries. The material which they gathered provided an invaluable reference point.
The 1980s saw a rapid construction movement that the preservation of Oman's architectural heritage was threatened. The Ministry of Land Affairs (subsequently The Ministry of Housing)- based on the aforesaid studies- issued guidelines requiring new buildings to comply with "Islamic Forms". These guidelines were modified in 1987, an "Elevational Guidelines" was produced by the Diwan of the Royal Court. The objective of this document, commonly referred to as the pink file by architects practicing in Muscat, was to ensure the high quality of architectural design, in the modern and unique Arab/Omani and Islamic architectural style (Damaliji, 1999).

The aforementioned manual "Elevational Guidelines "established a vocabulary of design for the exterior elevation to establish the origins of cultural values. The accompanying illustrations were restrictive. Sets of drawings specified the form and style of boundary walls and gates, main entry doors and windows giving option for arched or flat inlets, railing and motifs. The manual succeeded in controlling the chaotic development that occurred in a very rapidly developing city. Critiques concerning the shortcoming of its creative standards inspired the next edition of "Building Regulations for Muscat" in 1992 to allow for architectural consultants' creative designs with the frame of the local, Arabic and Islamic architecture, subject to the approval of Muscat Municipality. A discussion concerning the reasons of choosing Islamic Architecture as a style will be clarified in the following point.

Continuity Criteria of Muscat House

From the 7th century till present, Islam is the official religion of the country. According to 2014 census, the population is 3.92 million, of those 2.15 million are Omanis (worldpopulationreview.com/countries/oman-population), and 75% of the citizens are Muslims and speak Arabic language. (www.wikipedia.org) The religion of

Islam permeates into every aspect of people's life, leaving nothing untouched by the sacred. This means that there is no difference between the sacred and the profane in the everyday life of the Muslim.
Islamic architecture, which has thrived for centuries, over a vast area and was – and is still – always of its time, answering the physical, social and cultural identity of the location and constantly provide contemporary expressions of the timeless principles. Neither the Qur'an-the holy book of Islam nor the Sharia- Islamic jurisprudence -which regulates the daily life of a Muslim formed the framework of an artistic expression. However, the Qur'an and the Sharia, laid down limits and guidelines to regulate each aspect of the Muslims' life. These common regulations give Muslims deep intellectual vision that is the basis of Islamic Art and artistic creation. This will be obvious through the careful use of traditional forms with their inner symbolic language (Azzam, 2008). Therefore, the continuity criteria of Muscat house are:

The Local, Arabic, and Islamic Architectural Design of Facades
The Ministry of Regional Municipalities, Environment and Water Resources released the first building regulations in 1981.Throughout the following years those regulations have been evaluated, re-revised, and modified in 1992 and under revision in 2011. In both editions, the content of the following article was not changed. According to the "Building Regulations for Muscat", chapter II, which was entitled : Architectural and Technical Conditions of Buildings, point 2, article no. 33, stated that: "The architectural design of facades/elevations of residential and residential/commercial buildings shall be according to the Local, Arabic, or Islamic style as in the models prepared by concerned department or the conceptual design submitted by the consultant and approved by the concerned department"(p. 23). (Fig. 3)

Using local Arabic and Islamic Architectural Vocabulary
In many cases, the "Building Regulations for Muscat" considered using screens as a must. Such cases are represented for example in point 5, in the aforementioned article 33 which states "Projecting or visible air conditioners on facades/elevations of buildings should be covered with a screen as per article 32 item" (p.23). Another example which reveals a great concern for aesthetical aspects of the environment is article 32, in the same aforesaid chapter II, which states "Balconies in residential buildings overlooking the street and used for washing lines should be screened" (p. 22) The last example is represented in article 22, the same chapter II which states "Staircase room, water tank, and air conditioning equipment etc. on the roof of the buildings may exceed the maximum height of the building and should be screened according to the Municipality's design or any other approved design" (p.17).

One of the most distinguished Islamic vocabulary is chosen for those screens, which is geometry, biomorphic form or "Arabesque". The Muslim architect is inspired by the multiplicity of forms, patterns, and rhymes he sees around him in nature and distils them to their fundamental essence: the undulating rhymes of the "Arabesque" are not recognizable plants observed in nature but are symbolic representations of nature's essential being. Thus the architect/artist/craftsman work never stands separately from God's creation but is always a part of it (Azzam, 2008). Article 32, chapter II specifies these screens as: "Perforated wood may be used for screening provided that the openings are not more than 1.5cmx1.5cm. Also perforated concrete depth 10cm maximum and openings not more than 7cmx7cm may be used. The relevant sketches shall be submitted to the concerned department."(p. 22) (Fig. 4)

Providing Privacy, One of the Islamic Teachings
Islam respected the privacy of the family and daily life inside the house. Many teachings urged Muslims not to violate this privacy. Some articles of "Building Regulations for Muscat" respond to this important ancient and current social tradition of the Omani society. Points of article 15 titled "Windows and Doors" of chapter II states that: "In order to maintain privacy in residential buildings where window openings of bedrooms are opposite to the windows of a neighboring building, with a maximum distance of 10m in between, a screen, should be provided on the windows opening on both buildings to conceal or diminish the chance to see from outside" (p. 15). Article no. 30 and 31 of the same chapter prevents the owners of industrial plots to build bachelors accommodation for staff or technicians with residential units for family accommodation.

Respecting the Surrounding Natural Environments
The true Muslim sees himself as the custodian of nature; man is God's vice – regent on earth. And if he leaves a stamp on his physical space then it should be done with humility. The Muslim architect acknowledges by his Islam his submission to the divine will that God is the supreme architect. Thus the relationship between the architect and his surrounding space is one that is based on respect not arrogance (Azzam, 2008). Traditional Omani architecture

has a wonderfully sensitive appreciation of the natural environment with restricted height of a maximum of three stories (Fig. 5) and light colors. Unprecedented in the Gulf region, the current building regulations in Oman is keen to continue keeping the same sensitivity with the surrounding environment. All residential areas have a maximum height of three stories, a maximum height of commercial and commercial/residential buildings is 40 meters. The colors to be used for exterior walls: white, light buff and silver grey (Damluji, 1999). Article 123 chapter II entitled "Inspection and supervision of buildings in "Building Regulations for Muscat", states that:" No building shall be painted from outside in colors other than the ones approved in the permit. Any person who wants to change the colors or repaint the building from the outside must abide by the colors approved by the Municipality"(p. 46)

Changing Criteria of Muscat House

Keeping continuity between traditional architecture in Oman and contemporary vernacular architecture was not an obstacle to get benefits of modern technology. According to his majesty, Sultan Qaboos; "*The emphasis on originality and individuated "turf" not to mention our innate human curiosity and our cultural commitment to the idea of progress*" (Hancock,2010).

Modern Techniques of Thermal Insulation

Muscat has severe climatic conditions, only two seasons, Summer and Fall. Summer is hot and humid (31– 48 degree centigrade) and extends from April to December. Building regulations for Muscat obligate people to use some modern techniques and materials to reduce the transmission of heat and solar radiation to save energy of air conditioning. This attitude is responding to the current calls for green architecture. Point B, article 15 entitled "Windows and Doors" in chapter II states "Glass (laminated or solar control or reflective) shall be used in all windows (Bedrooms, Living rooms, and Offices) of multi-floor buildings with more than four floors and public buildings" (p.15). Furthermore, point 2–B entitled "Building Materials", article 14, chapter II states: "Heat insulation materials shall be used for roofs and external walls according to the following formula"[2] (P.14).

New Construction Systems

According to Eng. Khaled El – Hashmi[3], director of building permits in Muscat Municipalities, new construction systems were studied by an English consultant, Bill Freshment. Two new construction systems were approved in 2012. Senior Eng. Yahya El– Ghadani, structural section, Muscat Municipality[4] said that the two new structure systems are:

- **EVG, 3-D Building Panel System**

It consists of welded mesh, Polystyrene foam as core, and galvanized wire, Additional field shotcrete applied from both sides (fig. 6) this system meets the requirements of American building and used in more than 20 countries all over the world. (EVG, 3D Building Panel System)

- **Rapidwall**

It is the name of a new building panel product, made essentially of gypsum plaster, reinforced with glass fibers. This product was originally developed and used since 1990 in Australia. It is used also in India and China. The material is eco-friendly and resistant to water and fire (fig. 7) (Aravinda, 2003).

4. A Comparison Between a Contemporary and a Historical Muscat Houses- A Case Study

Both traditional and contemporary Muscat houses maintain the same design objectives. Changeable technique is employed due to changing technology. Through the following comparison (table 2) this fact is going to be revealed. Continuity and change design criteria also can be detected. From the above table, in spite of 200 years of difference between the two buildings, they continue to share common design objectives. Change techniques, materials and technology are employed.

5. Future Foresight of Muscat House

In 2010, the author distributed a questionnaire to measure the level of satisfaction of contemporary vernacular architecture style between the Omani people[5]. 77.4% of the respondents were satisfied with contemporary vernacular architecture (Chart 1).

Omani traditional architecture emerges from a particular community and environment and should be seen as one of place and not one of time. The designs are timeless, and are still used. The use of traditional forms is an inherent

symbolic language. Using modern materials and technique can be adopted in contemporary Omani traditional architecture.

Figure 1. The use of carved wooden doors in traditional Omani Architecture(Bayt Shakily), (Damluji,1999)

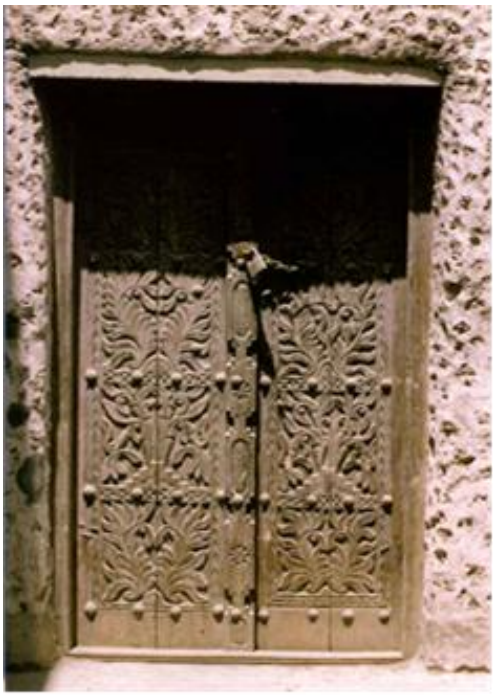


Figure 2. The use of arabesque Screens in traditional Omani Architecture (Jabrrin Palace, Buhla), (Damluji,1999)

Figure 3. Mr. Saed Al hashli Villa-Built in 2013 - Muscat according to the local Arabic and Islamic architecture (pemitted by Kamal Ismail Consultant)

Figure 4. A wooden screen (Mashrabiya) used in contemporary Muscat houses (Permitted by Kamal Ismail Consultant)

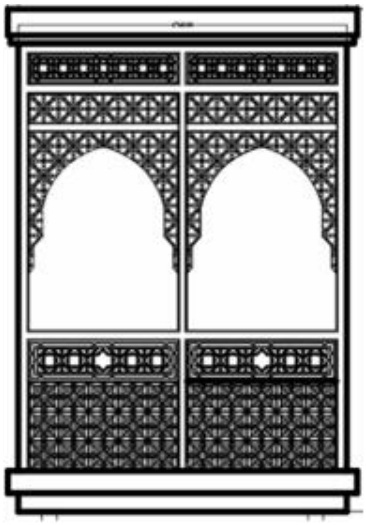


Figure 5. Restricted heights and colors of Omani buildings (Muscat- Al-Alam Palace and surroundings.

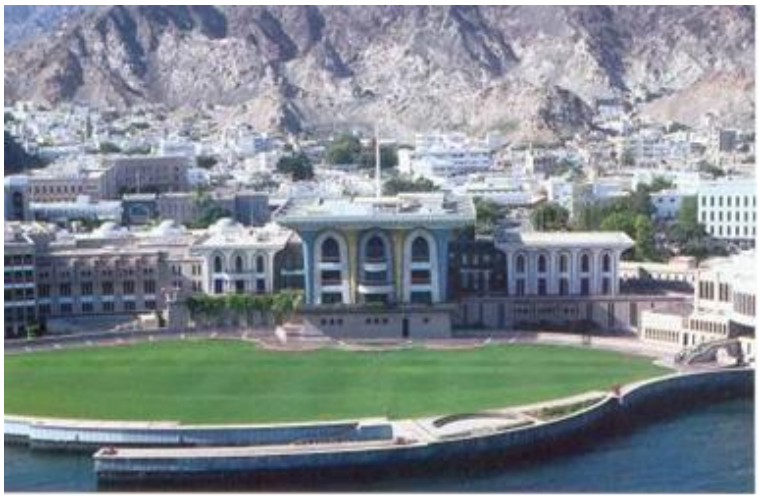


Figure 6 3-D building Panel System, a modern construction system which is approved in 2012 (EVG, 3D Building Panel System)

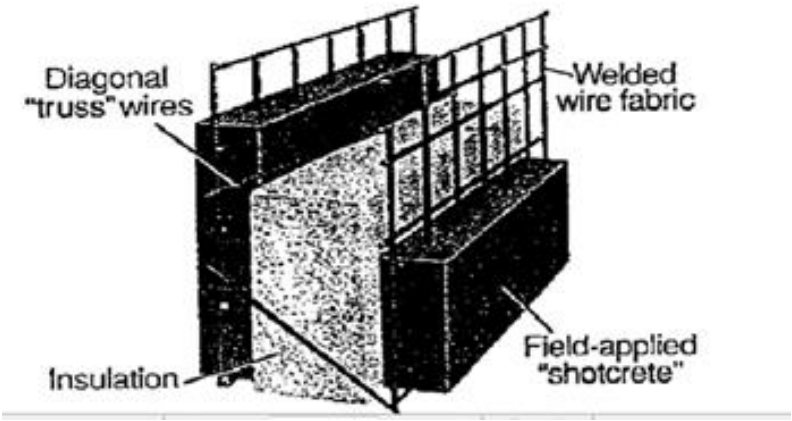


Figure 7. Rapidwall System, A modern construction System which is pending approval, (P.K. Aravindan etal, 2003)

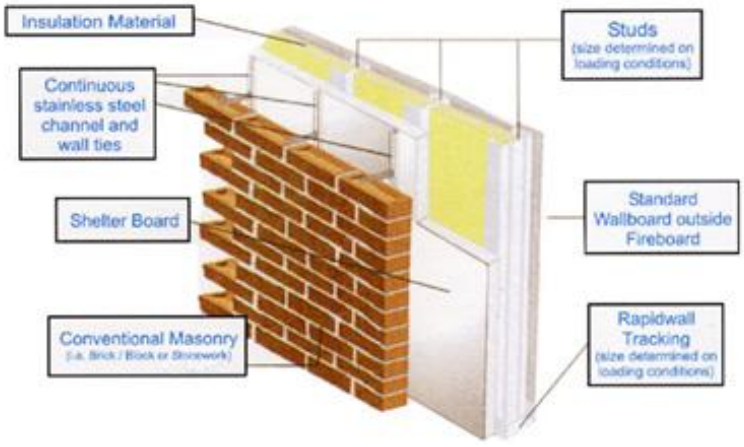
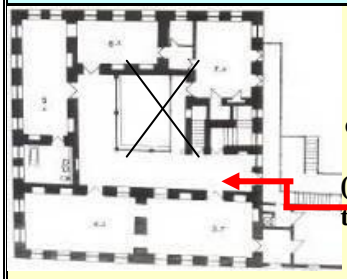
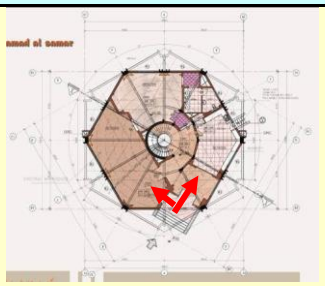


Table 2
A comparison between a Contemporary and historical Muscat House

Ghaliyah bin Salim House (Now Omani – French Museum)	**Saeed bin Sultan El – Samer House**
Date of Establishment: 1820 - 1840	**Date of Establishment: 2000 — upgraded in 2011**
Location:Old Muscat	**Location:Sultan Qaboos city (suburb of Muscat**
Design Objectives	
1- Providing Privicy	
 **Figure 8. First floor- a cetral open-to-skycourtyard (presented in the Museum)**	 **Figure 9. Hexagon plan without central courtyard (pemitted by Kamal Ismail Consultant)**
1-1 looking inward plan 1-1 Small screened windows 1-2 Indirect entrance open to a corridor not to a space	1-1using tinted reflecting glass (enables looking out and enlarging windows without compromising privacy) 1-2 Using high walls around the external garden 1-3Two entrances, one for the family and the other for guests.
2- Respecting the natural surrounding enviornment	
 **Figure 10. Front elevation (Presented in the museum)**	 **Figure 11. 3D model (permitted by Kamal Ismail Consultant))**
2-1 Three story building 2-2 White color	2-1 Three story building 2-2 off-White color

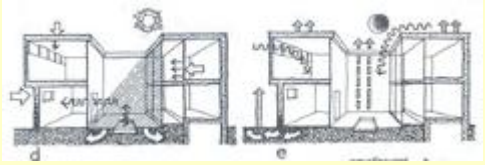
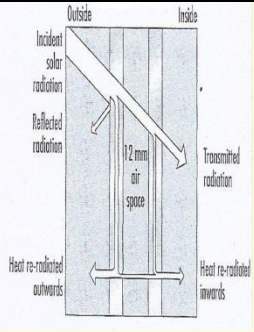
<table>
<tr><th>Ghaliyah bin Salim House
(Now Omani – French Museum)</th><th>Saeed bin Sultan El – Samer
House</th></tr>
<tr><td colspan="2">3- Resisting the severe hot - humid climate</td></tr>
<tr><td> 
Figure 12.
The cooling system of open-to-sky courtyard (Konya, 1980)</td><td> 

Figure 13
Using tinted, double and heat reflecting glass to scatter the absorbed heat</td></tr>
<tr><td>3-1 Using white color for the facade.
(the lighter the color of a surface , the lower its temperature will be raised by the absorbtion of solar energy (Konya, 1980))
3-2 The heavy mud brick 80 cm thick wall has a large "time lag" thermal capacity. This will delay the transfer of heat from outside to inside.
3-3 using open-to-sky courtyard as a thermal system.(Fig. 12) is showing how the shaded courtyard provides a source of cool air during the day time. Plants and water inside patio modify the microclimate.</td><td>3-1 Using off-white color for the facade- the same aforementioned effect.
3-2 Using heat insulation in both the walls and the roof.
3-3 Using tinned, double and heat reflecting glass to scatter the absorbed heat, a greater proportion is expelled.(Fig. 13)
3-4 Using airconditioning to provide the human comfoot zone inside the house.</td></tr>
<tr><td colspan="2">4- Using traditional forms</td></tr>
<tr><td>4-1 Arabasque is used in both carved-stucco facade and windows screens.
4-2 Using crenellations at the skyline.
4-3 Carved wooden door.</td><td>4-1 Arabasque is used in both carved-stucco facade and windows railing
4-2 Abstracted crenellations to two successive colors.
4-3 Carved wooden door.</td></tr>
</table>

6. Conclusion

In Sultanate of Oman, in spite of the accelerated changes in all aspects of the Omani people's life during the past 40 years, both the government and people chose to continue their traditional Islamic architecture responding to the modern inevitable required changes. The parameters that define Oman's current development are examined, including a dependence on its diminishing oil reserves, the role of education in economic development, economic diversification and privatization, globalization versus nationalization, and preservation of culture and environmental identity.

This paper went through "Building Regulations for Muscat" as an example to other Omani cities and defined the articles which maintain the continuity between the traditional Islamic Omani architecture and contemporary vernacular architecture. In addition, a presentation of the articles that obligate using some modern materials and techniques to enhance the severe climate environment and save energy responding to the current sustainable architecture attitude. Furthermore, new eco–friendly construction systems are up to be approved.

A questionnaire, distributed by the author in 2010, to a judgmental sample of Omani people for the first time, to the best of the writer's knowledge, revealed that 77.4% of the respondents were satisfied with their contemporary vernacular architecture.

A comparison between two traditional and contemporary Muscat houses with a difference of 200 years between both, demonstrated how similarity of design objectives, form, and respecting the natural surrounding architecture are very obvious. However, changeful techniques, materials and technology are used.

In the future, the author recommends conducting more research in Oman concerning a wide range of using more abstracted forms of Omani traditional architecture, and more tendencies to develop the use of eco–friendly materials, techniques and construction systems to maintain this orderable balance between continuity and change in Omani architecture.

Endnotes

1- These statistics were compiled from:1.1. Ministry of Education, 2006 – 2007 (Educational statistical year book) Sultanate of Oman1.2. Ministry of National Economy, 2010 statistical year book, Sultanate of Oman.1.3. The Royal Hospital, 2011Ministry of Heath Miracle, the Royal Hospital Oman1.4. Blake, Emad, 2010, Oman Achieves Notable Progress in Health and Education sectors, Al Shorfa.com

2- The formula are:

- Roofs:

U (maximum) = 0.1 B.t.u / sq.ft / hr. * F

ie. 0.57 Watts/sq.m.*C

- External Wall:

U (maximum) = 0.13 B.t.u / sq.ft / hr. *F

ie. 0.741 Watts/sq.m.*C

(Note: An astric means degree)

3- An interview was conducted on 18th December, 2010 in Muscat Municipality between the author and Eng. Khaled El—Hashmi, Director of building permits, by the author. Another one was conducted on June 30,2015.

4- An interview was conducted on 24th April, 2011 in Muscat Municipality with senior Eng. Yahya El—Ghadany, Structural Section, by the author.

5- The questionnaire was distributed to a judgmental sample of students and their families in Scientific College of Design. One hundred and twenty questionnaire forms were distributed and eighty four forms were returned.

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