Comparing the Sustainable Reuse of Historical Buildings

Silvia Mazzetto

Prince Sultan University, College of Architecture and Design, Saudi Arabia

Abstract

The oil industry in Saudi Arabia and the wider Middle East has generated rapid urban growth and sparked a lively debate over the direction that such growth should take. While the construction of contemporary cities using innovative materials and technologies has been pursued, the need to preserve and maintain the nation's identity, rehabilitate national heritage, and establish new relationships with the local history and culture has also been recognised. This paper examines recently completed adaptive reuse projects and argues for the need to increasingly value local traditions and architecture. Based on data collected using mixed methods, and employing terms derived from reuse proposals, our analysis addresses each project's environmental, socio-economic, and socio-cultural aspects. Sustainability was identified as one of projects' common concerns. Broadly considered in terms of unity and harmony, the sustainability of the projects was further analysed in terms of the materials used, respect for the ecosystem, social aspects, and the required investments and costs related to the scale of interventions (urban-architectural). By presenting this assessment of the projects' innovative practices and overall sustainability, this study aims to promote new solutions for the restoration of architectural heritage in Saudi Arabia and the wider Middle East.

Introduction

The Arabian Peninsula is particularly inhospitable due to its environmental conditions. The relatively recent discovery of oil, however, has enhanced the economy and transformed local traditions; local settlements have grown from small tribal agglomerations into more advanced regional and international economic centres. This development has brought with it a range of common challenges for the cities of the region, one of which is the pressure that urban transformation places on historic city centres. Issues relating to the restoration and reuse of historic buildings have thus become a central focus for local decision-makers.

Oil production began in 1938 following the first discovery of oil fields in the Eastern province of Saudi Arabia and Bahrain (Salama, 2012). The discovery immediately generated a boom, transforming the Gulf and the traditional economy of the regions of the Middle East. Cooperation between the Gulf countries and Emirates began in 1981 with the founding of the Gulf Cooperation Council (GCC), which was established to defend local common interests (Salama, 2012).

In the 1970s, oil production and its export produced an industrial revolution that radically altered the structure and urban fabric of the regions of the Middle East. Rapid growth in the 1950's had involved mainly six cities whose populations grew and infrastructures developed: Kuwait City in the northern Gulf became a significant centre for more than two million inhabitants; Dubai and Abu Dhabi, on the southern side of the Gulf, became cosmopolitan, international and regional hubs in the United Arab Emirates; while in Oman, in the south-eastern area, Muscat developed enormously in and around what is known as the "capital area". Such growth has generated intense competition between these Middle Eastern cities which are facing the challenges related to their development.

Since the 1950's, and in the old city centres in particular, the construction of modern buildings using cement-and-steel has impacted traditional development and its forms (Asfour, 2007). In response, many recent projects have attempted to promote the integration of traditional architecture into contemporary designs to preserve the roots of regional architecture. Similarly, numerous historic buildings have also been restored and reused by adapting their traditional functions to contemporary needs. Not surprisingly, then, in the last decade, safeguarding heritage and reusing historical forms has become a topic of renewed interest in the literature. One widely held view is that heritage protection and reuse are as an effective means of reaffirming cultural values and preventing the deterioration of heritage sites. Accordingly, much of the literature focuses on rediscovering and then promoting local traditions, so that they may be passed down to future generations.

Historical monuments and heritage buildings are necessary for understanding the past and preserving the knowledge of ancient times; they are the remaining testimonies of centuries past (Feilden, 2015). Indeed, each architectural period holds its own significance with specific implications for the creation of space, the building of forms, and the realization of beauty. National heritage embodies the culture and civilization of Arabian cities, displaying the creativity and perfection achieved by local artists who often sought to express their distinctive local identity. Further, given that architectural heritage exists as part of complex processes, it reflects the society in which it was produced. The city – including all its buildings and monuments – is therefore an indispensable resource for the understanding and preservation of local culture (Kropf, 1996).

The current 'modern' approach to restoration and reuse of heritage buildings (Carbonara, 2012; Brandi, 2005) aims to preserve local traditions and the values they embody, by extending a building's life as both a monument with historical value and as an object of culture which embodies the aesthetics and meaning of its setting (Mazzetto, 2006; Jokilehto, 1999;Guerrato et al., 1998; ICOMOS, 2008). These assumptions are reflected in a common approach to the

preservation of heritage buildings that aims to ensure people respect authenticity and appreciate the value of maintaining local history (Marconi, 1999). This approach often draws people's attention to the fact that heritage restoration and reuse projects attempt to combat the ravages of time, limiting a structure's material decay, which preserves its value for future use (Racheli, 2007).The long term value of restoration is thus accentuated and serves to reinforce the importance of authenticity and local history.

This study examines several ongoing or recently completed adaptive reuse projects in the wider Middle East. Its primary goal is to demonstrate how the rehabilitation of historic architecture and the awareness of the local heritage values can enhance the promotion of local and national identity. Through an assessment of the principles adopted for each project's adaptive reuse interventions, our study will identify the economic, environmental, and social benefits of such projects. Specifically, from an economic perspective, heritage reuse can reduce the cost of materials involved in new construction, while water and energy consumption can be lowered. In terms of the environment, heritage reuse reduces both carbon emissions and other forms of pollution. Culturally, the preservation and integration of heritage into new developments allows local culture to retain its presence in the urban landscape, affirming its value and enabling the community to recognize local traditions embodied in the built environment.

Overall, this study argues that the adaptive reuse of heritage has permitted the preservation of local traditions (including their historical materials and techniques), and that such an approach results in a synergy between the modern city, traditional life, and the environment.

Methodology

For the past 30 years, the United Nations Educational, Scientific, and Cultural Organization (UNESCO-ICOMOS, 2010) has been promoting the principles of 'safeguarding heritage', 'sustainability', and 'enhancement of cultural identity' (Miccoli et. al., 2014). In that time, disagreements relating to the protection and safeguarding of heritage buildings have arisen due to conflicting approaches to achieving sustainability, economic growth, and social and cultural goals. These problems often relate to the laws protecting heritage buildings. In some cases, for example, the reuse of historic buildings for new purposes is not legal or its reuse requires alterations that would be incompatible with the specific - often sustainable - elements used in its protection. Such issues have led to much controversy.

The definition of heritage reuse is currently widely debated. Whereas sustainability refers to the ability to meet local needs and requirements by adapting to the environment and using readily available resources. Heritage reuse principally aims to extend the life cycle of a historic building in such a way that it leads to socio-cultural and economic development (UNESCO, 2002), whilst respecting the environment and its biodiversity (Landorf, 2009). The dissonance between the demands of sustainability on one hand, and the limits of adaptive heritage reuse on the other, becomes manifest when the goals are pursued at different levels of governance. UNESCO's designated heritage buildings are protected nationally, for instance, but this may conflict with the host country's sustainable development policies. Moreover, legislation at municipal, federal, and state levels often overlap or conflict; creating legal ambiguity and confusion. On one level, laws may promote sustainability, whilst on another, they may hinder the restoration and reuse of a country's heritage. Effectively, specific heritage projects are caught in the conflicting claims of different levels of governance acting in the pursuit of their respective sustainability and heritage goals.

To effectively assess the relative impact of adaptive heritage reuse projects operating in this context, our study selected prominent examples from the literature. The following projects were chosen on the basis that they are distinctive and interesting examples of best practice from throughout the regions of the Middle East:

(i) Al Jahili Fort and Al Bastakiya Quarter in the United Arab Emirates

(ii) Al Zubarak Fort, Old Amiri Palace, Al Wakrah Souq, Souq Waqif and the Heritage House complex in Qatar

(iii) Old Sana'a district in Yemen.

The above projects were either under construction or had been recently completed, and were assessed according to their scale as either architectural projects or urban developments.

Primary data collection used a mixed method approach. The qualitative approach included interviews, discourse analysis, and recording of oral histories. The data were collected through semi-structured interviews conducted in English that lasted from ten minutes to half an hour. Interviews were partially recorded and transcribed in preparation for analysis. Data was collected to address how each adaptive heritage reuse project promoted local values and national identity in their respective settings, and how they produced environmental, economic, and social benefits. The specific categories for this analysis adapted those typically used for architectural restoration projects and urban regeneration projects. In terms of the quantitative dimension of the study, a small area survey was conducted, involving various stakeholders ranging from local people, tourists, governmental officers, clients, and professionals such as architects and heritage experts.

The primary data for both dimensions of the study is presented schematically in Table 1. It should be noted, however, that although field observations were recorded at selected sites in Arab countries, not all sites in the study could be visited. For this reason, the sets of on-site photographs, sketches, and drawings were used to contextualize our analyses and interpretation of the findings from the primary methods of collection, but not included in the primary sets of data themselves.

These primary sets of data (Table 1) were compared in terms of sustainability. That is, the environmental, socio-economic, and socio-cultural principles of each project were identified using the terms present in the literature and the categories used by the respective projects in their proposals. The secondary analysis, comparing the restoration projects in terms of sustainability, is presented on a schematic matrix (Table 2) that includes a brief legend and annotated description of the scores.

Diagrams illustrating comparisons and emerging results were used to identify recurring, similar, and different results, while remaining open to alternative interpretations of the findings. Additional values determined from the survey and those related to the different dimensions of sustainability are also provided (Table 2). Finally, the transversal comparison of the selected projects identified several approaches to integrating technological needs into the sustainable adaptive reuse of historic buildings. Three areas of comparison were used for assessing adaptive reuse interventions: socio-cultural, socio-economic, and environmental.

Heritage Reuse Intervention Criteria

The reuse of heritage buildings and the preservation of original structures usually provides a range of social, economic, and cultural values, as well as resource enhancement. Many of these values, together with the projects' overall sustainability, have recently been promoted by the UN General Assembly as a means of enhancing the value of heritage restoration; which is usually linked with a country's development (UN General Assembly, 2015). However, it should be noted that the reuse of historic buildings is not only involved in the preservation of old materials and neglected structures, but also takes into consideration the spread of local history and culture, including the preservation of knowledge and traditions for their transfer to future generations.

Accordingly, there has been growing interest in the rediscovery of the traditional construction techniques adopted by ancient civilizations, as it is increasingly recognized that they represent an extraordinary collection of technological, cultural, and environmentally friendly methods that have often been ignored by the instigators of modern development. While it must be admitted that in the past, a lack of national built heritage protection laws contributed to the loss of many historic structures - the contemporary towers in many city centers of the regions of the Middle East were only possible following the widespread demolition of historic buildings, - it can now be acknowledged that local governments have recently started imposing rigid restrictions on development to avoid the further demolition of old buildings and to safeguard many run-down urban areas abandoned since the oil boom.

These measures, taken as part of urban renewal schemes, promote the restoration and reuse of historic buildings with a view to enhancing tourism and developing the entertainment industry. They often tap into local cultures and a sense of national identity. The study thus involved three specific categories of historic building reuse which are particularly significant for the rediscovery of the local identity and culture:

(i) Reuse interventions involving defensive structures to enhance the value of local history

(ii) Restoration of residential buildings and historical quarters to promote local culture

(iii) Redevelopment interventions involving urban areas to promote tourism (Mazzetto and Petruccioli, 2018; Mazzetto, 2018 a; Mazzetto, 2018 b).

The comparison between these adaptive reuse interventions enabled our research to identify similar strategies and approaches in similar environmental contexts, within recurring social or cultural interactions, and in relation to the preservation of local culture (Price et al., 1996), as well as in terms of the functional, social, and environmental adequacy of the projects.

Sustainability Comparison Criteria

The selected cases of adaptive reuse interventions in the regions of the wider Middle East were divided according to three main criteria:

A) Socio-cultural

1. To enhance the social inclusion
2. To promote cultural diversity
3. To discover personal and community belonging
4. To enhance social attachment
5. To improve appreciation of cultural values
6. To improve the quality of labours' working conditions

B) Socio-economic

7. To improve the highest social values
8. To enhance economic growth
9. To support the local economy

C) Environmental

10. To respect the environmental context
11. For the benefit of natural and climatic resources
12. To reduce pollution and materials' waste
13. To minimize the climatic changes
14. To reduce the natural hazard effects

The study also assessed three typologies of adaptive reuse interventions, revealing the different aspects of sustainability requalification:

i) Adaptive reuse on an architectural scale of historic defensive buildings to enhance and protect the local building traditions

ii) Adaptive reuse on an urban scale of historic residential quarters located in the urban city centres to strengthen the local culture

iii) Adaptive reuse on an urban scale of commercial areas such as ancient *souqs* (markets) to enhance the national identity and local tourism.

The following sections of this paper discuss the findings of our comparative analysis.

Adaptive Reuse on an Architectural Scale: The Rediscovery of the Defensive Structures

In recent decades, the governmental institutions responsible for safeguarding the heritage in the regions of the wider Middle East tended to favor (and have financed) the completion of many adaptive reuse projects on an architectural scale to save many historic buildings that were severely damaged after

Fig. 1: Al Zubarah fort after the completed works and the structure reuse as a museum of the fort (Source: Mazzetto).

many years of abandonment. Among these, our study compares the adaptive reuse interventions of two ancient historical defensive structures: the Al Zubarah Fort located in Qatar (Fig. 1) and Al Jahili Fort located in Al Ain, in the United Arab Emirates.

The primary function of this kind of heritage structure was to defend the land from foreign invasions and to protect the rare wells of drinking water in the desert. Around the beginning of the nineteenth century, Al Zubarah was a fortified commercial city located in the northern side of Qatar. Abandoned in the late 20th century, there are still visible ruins of the ancient urban fabric: courtyard houses, mosques, streets, fishermen's huts, and the palace with the double defensive walls, essential evidence of a vibrant society in the Middle East.

Al Zubarah Fort is located close to archeological remains. A typical Arab fort built to protect the land from foreign invasion (Walmsley et al. 2009),it is squared with four defensive towers on the corners, made with local limestone blocks. The fort was entirely restored in 2015 by the Qatar Museums Authority (QMA); all the historical materials were strengthened and reinstated in their original locations. Today, the fort is part of Qatar's national tourist heritage sites and is used as a museum that exhibits the archeological finds from the Al Zubarah site. It also presents examples of the local traditions of housing culture, and the drinking water supply techniques adopted in the past.
Importantly, the adaptive reuse intervention has enhanced the socio-cultural value of the site and the rediscovery of Qatari defensive traditions, whilst strengthening the socio-economic aspects of the area. The touristic function is an example of how the site has been adapted over the centuries in response to an environment dominated by extreme climatic conditions and shifting political fortunes.

Similarly, Al Jahili Fort in Al Ain in the United Arab Emirates (Fig. 2) isa traditional fort constructed in the 19th century (1891) by Sheikh Zayed. First used to defend the palm groves, it was subsequently converted into a private residence. In 2007, the fort was entirely strengthened and restored by the Abu Dhabi Tourism and Culture Authority (Abu Dhabi Department of Culture and Tourism, 2017), and is now an exhibition centre for Sir Wilfred Thesiger's collection of explorative works.

The round defensive towers at the corners of the squared fort were strengthened to ensure the fort's overall structural integrity. The defensive walls are constructed of local materials such as coral and limestone, masonry blocks, and mud. The adaptive reuse intervention has resulted in a restored fort that is currently in good condition and attracts many visitors who are encouraged to explore the landscaped gardens and the exhibition centre.

Fig. 2: The main entrance of Al Jahili Fort located in the United Arab Emirates, in Al Ain.
Source : https://www.marcopolo.tv/al-ain-alla-scoperta-di-abu-dhabi.

Residential Buildings: Enhancement of Local Culture

The recent interest in the rehabilitation and reuse of architectural heritage has also involved many examples of the residential heritage buildings. The old Amiri Palace in Qatarwas constructed under Ottoman authority by Sheikh Abdullah bin Jassim Al Thani. Itis mainly constituted by the three courtyard houses of the Sheikh and his sons, Hamad and Ali (Wright, 1975). It also includes a vast *majlis* (living room) that still dominates the compound. In 1923, the building was abandoned, and by the 1960s the complex was in disrepair. It was partially restored with the reconstruction of some buildings in the 1970s. That is, in 1972 Sheikh Khalifa Al Thani decided to establish for Qatar a new national museum in the Old Palace complex. It was restored with the addition of few new buildings by Msheireb Property, a subsidiary of the government's Qatar Foundation. The wall structures are made of coralline settlement and are set in mud mortar, they are then plastered with mud to protect the buildings from the sea air. During the 1970s restoration project, the basic structures for the new additions were added with concrete slabs and beams.

Currently, the residential quarter rooms are being reused as museums, exhibition spaces, and cultural centres to exhibit local memories and traditions. The project's aim was the full rehabilitation and restoration of the historic residential buildings, bringing cultural values to life while emphasizing the local, sustainable credentials.

Another complex restoration project was completed at the end of the 1980s in Yemen (Fig. 3). The Old Sana'a, the residential settlement, was consolidated and reconstructed using a historical typological approach under the direction of the General Organization for the Preservation of Historic Cities of Yemen (GOPHCY). The architecture of houses located in the old city center ("Conservation of Old Sana'a, Yemen", 1995) reflects the Ottoman style that dates to the beginning of the 16th century. The external walls are thick to allow protection from attacks and enemies and simultaneously provide comfortable residential spaces for the inhabitants inside the city walls. The defensive structures were built using local materials combined layers of mud, bricks, and stone blocks. The reconstruction works took into consideration the use of the same traditional materials respecting the history of the place and reaching a comparable level of integration between the old

Fig. 3: The Old Sana'a residential settlement in Yemen. Source : www.akdn.org/architecture/project/conservation-old-sanaa

The old buildings and structures provide an authentic impression of the traditional residential structures (Bulosan, 2016), together with the recently completed (2015) restoration projects of the Heritage House Quarter in Doha, which was supervised by Msheireb Properties. The "Heritage Houses" quarter was constructed in the early twentieth century and is composed of four Qatari houses: Company House, Bin Jelmood House, Mohammed Bin Jassim House, and Radwani House, where we can find the traditional method for the construction of residential buildings following the local typology of the country.

and the new houses by recognizing the traditional Islamic settlement characteristics of the early years of Islam. The complex is currently used as a residential area with palaces and historic buildings reused as museums and exhibition places (Lewcock,1996).

The Al Bastakiya Quarter in Dubai (Fig. 4) (Salama and Wiedman, 2013) is another interesting restoration project completed in the United Arab Emirates in 2003 under the supervision of the Dubai Municipality. The residential area, built in the late 19th century by Persian merchants,

Fig. 4: Bastakiya Quarter, United Arab Emirates, Dubai Source:www.flickr.com/photos/bhaktiamsterdam/2192557163.

Fig. 5: Al Wakrah fishermen village restored in 2015 and currently used as the new Souq
Source: Mazzetto

was recently classified as of having heritage value and completely restored after many years of abandonment. As the structures of the houses before the restoration presented severe traces of deterioration, an extensive large-scale consolidation of the structural materials was applied to avoid any structural collapse. Consequently, the intervention partially transformed the original urban fabric of the place. The wooden floors, staircases, and windows were replaced entirely using similar materials, respecting the local style. After the intervention, the Al Bastakiya quarter is in a good state of conservation and is used as a cultural museum open to the public and tourists' visits.

The two examples of adaptive reuse of historical centres reveal how heritage preservation helps to enhance the traditional

Fig. 6: Souq Waqif restored in 2006, today one of the most pleasant social places in Doha
Source: Mazzetto

culture embodied in their settings. After the interventions, both the sites are reused as cultural centres, which has improved the value of local tradition by enhancing the transmission of cultural traditions linked to the performance of residential spaces and their functions. One of the most important approaches adopted for the restoration interventions was to emphasize and improve the transmission of socio-cultural elements. Although such aspects are not normally taken into consideration, they remain crucial to achieving the right level of heritage revitalization. Indeed, the city centre's new function has highlighted the capability of the old buildings to be adapted to the population's needs, and thanks to the recognition of social cohesion in the territory, it has become an example of social values strengthening.

Commercial Reuse of Old Spaces on an Urban Scale: Enhancement of Local Tradition And Tourism

In the category of the completed urban rehabilitation projects, two interventions located in Qatar were analyzed: the Al Wakrah fishermen village (Fig. 5) that was transformed and reused as a new *souq* and the restoration of Souq Waqif in Doha.

Name	Date / Place	Institution	Original use	Project categories	Project description	Type of materials used	Adaptive Reuse	Comparison principles
Al Jahili Fort	2007 Al-Ain UAE	Abu Dhabi Tourism & Culture Authority	Defensive structure	Architectural restoration	Restoration, consolidation	Natural materials and cement mortar	Fort Museum	Socio-cultural Environmental
Al Zubarah Fort	2014 Doha Qatar	Qatar Museum Authority	Defensive structure	Architectural restoration	Restoration	Natural materials, limestone rocks, gypsum mortar, wooden poles	Fort and Cultural Museum	Socio-cultural and socio-economic
Old Amiri Palace	1981 Doha Qatar	Msheireb Property	Residential Palace	Architectural restoration	Restoration, Structural consolidation	Natural materials and cement mortar	Museum of the palace	Socio-cultural
Heritage Houses	2015 Doha Qatar	Msheireb Property	Residential quarter	Architectural restoration,	Restoration, Structural consolidation	Natural materials, limestone rocks, gypsum mortar, wooden pole	Museums of the culture	Socio-cultural
Old Sana'a	1995 Yemen	General Organization for the Preservation of Historic Cities of Yemen	Residential Settlement	Urban regeneration	Restoration, consolidation	Natural materials, cement mortar.	Residential, museums, exhibitions	Socio-cultural socio-economic environmental
Al Bastakiya Quarter	2003 Dubai UAE	Dubai Municipality	Residential Quarte	Architectural restoration	Restoration, consolidation	Natural materials, mud, cement mortar.	Religious and Cultural Center	Socio-cultural and socio-economic
Al Wakrah Souq	2015 Doha Qatar	Private Engineering Office PEO	Fishermen Village	Urban regeneration	Restoration, typological reconstruction	Natural materials, cement mortar, concrete blocks, and reinforced concrete	Commercial - Entertainment	Socio-cultural socio-economic environmental
Souq Waqif	2006 Doha Qatar	Private Engineering Office PEO	Old Souq	Urban regeneration	Conservation and restoration, typological reconstruction	Natural materials, cement mortar, concrete blocks, and reinforced concrete	Commercial - Entertainment	Socio-cultural socio-economic environmental

Table 1: Schematic Comparison of the Adaptive Reuse Projects

Al Wakrah's intervention was completed in 2015 under the supervision of the Private Engineering Office (PEO). The project has enhanced the link between the integration of contemporary architecture with traditional structures. The urban regeneration of the old fishermen village near the old Al Wakrah Port has permitted the reuse of the old areas as the new *souq*. Many new buildings were reconstructed using a typological approach. Other old and run down structures have been integrated with the new ones through a meaningful functional adaptation, which has enhanced the promotion of old and new commercial activities, as well as restaurants and cafeterias in front of the sea. The location has preserved its original identity as a social and commercial area, including many traditional activities that recall the local culture. The social values connected with the environmental values of the area are still clearly perceptible, and there is a strong sense of appreciation and transmission of the local commercial culture.

Another project is the rehabilitation of Souq Waqif in Doha (Fig. 6). The project was completed in July 2006 by PEO and is an excellent example of a contemporary approach integrated with tradition that promotes cultural values. Souq Waqif is an extensive urban development; hosting a wide variety of traditional commercial activities, together with a rich combination of restaurants, and local shops close to the Doha's city center.

The restoration project has been based on a detailed and meticulous study of the history of the original *souq* and its urban fabric, with the intention of restoring the existing historic buildings which remain, despite having been

LEGEND A it refers to the maximum level of the score (8-10 points) B= it refers to the average level of the score (4-7points) C= it refers to the low level of the score (0-4 points)		Urban regeneration			Architectural restoration				
Areas of sustainability	Principles of sustainability	Souq Waqif	Souq Al Wakrah	Old Sana' a	Heritage Houses	Amiri Paalaca	Al Zubarah Fort	Al Bastakiya quarter	Al Jahili Fort
SOCIO-CULTURAL SUSTAINABILITY	1. To enhance the social inclusion	A	A	A	B	B	C	A	A
	2. To promote cultural diversity	A	B	A	A	B	C	A	B
	3. To discover personal and community belonging	A	A	A	A	A	A	B	A
	4. To enhance social attachment	A	A	A	A	A	A	A	A
	5. To improve appreciation of cultural values	B	B	B	A	A	B	A	A
	6. To improve the quality of labours' working conditions	C	C	B	C	C	C	C	C
SOCIO-ECONOMIC SUSTAINABILITY	7. To improve the highest social values	A	A	B	B	A	A	B	B
	8. To enhance economic growth	A	B	A	B	B	C	B	B
	9. To support the local economy	B	B	B	B	A	B	B	B
ENVIRONMENTAL SUSTAINABILITY	10. To respect the environmental context	C	C	C	B	B	A	A	B
	11. For the benefit of natural and climatic resources	B	C	B	B	C	A	C	B
	12. To reduce pollution and materials' waste	C	B	C	B	B	A	C	B
	13. To minimize the climatic changes	B	B	B	B	B	A	B	B
	14. To reduce the natural hazard effects	C	B	B	C	C	A	B	C

Table 2. Schematic Comparison of Areas and Principles of Sustainability Used for Assessing the Restoration Projects. (The legend shows the scores achieved from each project during the assessment phase).

severely damaged after many years of neglect and abandonment. The reconstruction works included the detailed restoration of all of the oldest structures and the recovering of the local building typology following the traditional methodology for construction (Mazzetto and Petruccioli, 2018).

The restored Souq Waqif is currently the most vital commercial area in the city centre. It offers an architectural integrative solution to the competing demands of preserving traditional spaces and contemporary populations. The human scale of the structures and the open spaces provide a comfortable and pleasing atmosphere, which attracts locals and tourists alike in any season. It is therefore a highly frequented and much appreciated destination.

All of the adaptive reuse interventions of commercial *souqs* assessed here highlight the valorization of thesocio-cultural and socio-economic conditionsof these places. Regarding the socio-cultural values, both interventions have strengthened thesense of attachmentto the local traditions of heritage places felt by local inhabitants and visitors alike. This was achieved bycreating new entertainment and commercial areas (*souqs*) and by strengthening the values embodied by local historical forms within re-qualified urban areas. From a socio-economic point of view, both reuse projects have contributed to reestablishing the importance of these urban areas that were once abandoned for many long years (Hakim, 2007).

Comparing Adaptive Reuse Interventions – A New Approach?

Table 1 shows a comparison of the analyzed adaptive reuse interventions and proposes a framework for representing accepted study methods. Evaluations have, in fact, only taken into consideration some typologies of intervention (defensive buildings, residential buildings, commercial space), the scale of the projects (architectural and urban scale), and the comparison between the interventions, that were based on some socio-cultural, socio-economic, environmental and sustainable values.

Analysis of the compared adaptive reuse projects shows that all the projects followed the restoration approach imposed by the government authorities responsible for the interventions. The comparison principles have also considered the scale of the intervention, the environmental aspects, the surroundings, and the context of the historic building, its links with tradition, the transmission of cultural and social values, the new buildings' functions, as well as the results of the reused places. Table 1 summarizes the comparison of the adaptive reuse interventions by showing the differences and similarities between the projects.

Table 2 presents the case study, the status, and the assessment systems adopted for the research, showing the features and performance used for environmental, socio-cultural, and socio-economic sustainability.

Regarding the sustainable approach adopted, the results show that the categories of urban and architectural interventions have mainly addressed the principles of sustainability about the socio-cultural and socio-economic areas. In contrast, archaeological interventions have focused primarily on the principles and areas of environmental sustainability. As part of the socio-cultural principles of sustainability adopted for the assessment, the quality of the labourer's conditions during the interventions reveal the need to improve the general living conditions and safety standards during the restoration projects.

Discussion

The research presented has highlighted the need to preserve local traditions in the wider Middle East. This should be guided by a new approach that highlights our responsibility to restore historic buildings and preserve local culture. This approach is sensitive to the environmental characteristics of the locations and aims at developing sustainability. Nowadays, , there is a clear and deliberate attempt in many regions of the Arab Peninsula to link the cultural aspirations of growing countries with the preservation of their local histories and traditions. This has been illustrated by the cases presented in this study.
While Dubai, Abu Dhabi and Doha are currently the main centres of contemporary post-oil urbanism, other cities in the UAE, Qatar, Oman, Kuwait, and Saudi Arabia have also begun a rapid urban transformation process. Traditionally, historical architecture and heritage are the direct expressions of local ideas and values, embodying the beliefs of Arabian culture. However, due to the rapid spread of modernization, a disconnect in our relationship between the past and the future has generated many doubts concerning the direction of growth being taken by many new cities. In the Arabian Peninsula, architectural restoration and reuse must therefore be further analyzed and developed so that it can contribute to a healthier relationship between tradition and modernity.

Another important principle that should be applied to any intervention is that of sustainability. The sustainable approach to the restoration of ancient buildings has been linked to many cultural, social, environmental, and energy-saving values. Further, one result of the current study, as shown in the schematic diagrams, is that there are many common points shared by the adaptive reuse of local heritage, the restoration and reuse of traditional techniques and natural materials, the enhancement of local values, the synergy with the location and various therapeutic strategies; all of which should be sustainable and compatible with heritage buildings.

Conclusion

This research presents an assessment of significant restoration projects completed in the wider Middle East by considering some fundamental values linked with sustainable heritage reuses. These are: (i) Socio-cultural values that enhance social inclusion, and foster a sense of community belonging and the cultural diversity; (ii) Environmental values that enhance the environment and minimize the negative impacts; and (iii) Socio-economic values that improve the economic future of the country. The cases analysed show that the principles of sustainability are usually addressed through their cultivation of unity and harmony understood in a broad sense; through respect of local sites and their ecosystems; through restoration using old materials; through the enhancement of the social elements of places; through the cultivation of local investment and the reduction of the costs of the reuse interventions.

Our study has aimed to promote strategies, solutions, and examples of good practice. It could also be considered as innovative through our use of a schematic analysis to compare current techniques for restoring national architectural heritage, promoting Arab culture in the field of restoration, whilst respecting the environmental principles of sustainability. By developing such a comparative overview, we hope to facilitate further preservation and reuse of heritage sites throughout the wider Middle East. Indeed, much historical architecture and many of the neglected monuments are waiting to be safeguarded. Our study has aimed to demonstrate that such initiatives are preserving the historical value of places, and contributing to the local identity of the many growing countries in our region.

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