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PATHOLOGIES AND INTERVENTIONS FOR DEFENSIVE STRUCTURES: THE SAFEGUARD OF ARCHITECTURAL HERITAGE

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Affecting the direction of the rapid urbanization due to the oil discovery and exportation, in the Gulf Regions, there is a perpetual dispute, between the construction of a new, modern identity and the advocacy of traditional architecture as a possible way to establish new relations with the local history and culture. In the struggle for the definition of a new architectural identity in the emerging Arab cities, this paper focuses on the action needed to preserve architectural heritage, with the aim of analyzing and comparing some significant examples of pathologies that affected the existing defensive structure in Qatar and the restoration works that were recently completed. The analysis of data and results made it possible to compare the different pathologies and the conducted interventions with the aim of defining an approach that is consistent and add value to the Arab culture in matters of conservation and re-use.

Keywords: Reuse, Deterioration, Conservation, Restoration, Historical heritage.

1 INTRODUCTION

The amount of conservation and restoration projects recently ultimate in Qatar show the growing interest in the local architectural heritage and construction traditions, as a way of enhancing the knowledge of the memory. There is a need to discover and improve appreciation of the local techniques and materials to preserve.

This paper presents some conservation projects recently completed for historical defensive structures in Qatar, analyzing the collected data and comparing the results to offer an overview of the current status of their conservation, the reasons of their deterioration before restoration; the methods and the constructions materials adopted for the intervention; and the diverse proposals for reusing the restored buildings. The research intends to compare and classify the various interventions to apply similar materials and techniques to other restoration projects in future.

2 LITERATURE REVIEW

The recent growth of many Gulf States due to the discovery and export of oil (1960-1970), has produced massive investments but have also produced a negative impact on the safeguard of the architectural heritage. This rapid urban development has altered the old face of the historical monuments of Doha, in particular of traditional defensive buildings (forts, towers, defensive residential complex) that are currently abandoned and have lost their original function, not being anymore used for defensive purposes. Due to the deleterious status of abandonment, the defensive structures are gravely damaged, and close to the final collapse, the original materials have been stolen in the last decades, causing the total loss of their original identity.

Additionally, the local administrations of the Gulf Regions (Carter 2012) have given little attention to the fast demolition of historical defensive buildings, mainly due to the absence of any laws on the heritage safeguarding until 1980. Since then the interest in conservation has reawakened with the launch of many restoration projects such as urban regenerations (Souk Waqif 2004-2008) and architectural refurbishments (Heritage Houses in Msheireb Downtown Doha 2008-2017) in Qatar, re-using the neglected buildings and urban area as new entertainment places (Mazzetto and Petruccioli 2017) (Salama and Wiedman 2013, Jaidah and Bourennane 2009). The increasing interest for the conservation of the heritage has also led to passion in cataloguing the existing remains of the historic defensive buildings, which are currently in very poor conditions of preservation such as archaeological findings, fortifications, towers, defensive residential buildings, the remains of shipwrecks, and wells (Bianchi and Tonner 2013, Brandi 2005, Mazzetto 2006, Carbonara 2012, Feilden 2003, Muñoz Viñas 2004, Jokilehto 1999). The aim is to promote and enhance the Qatari architectural heritage, to safeguard and transfer them over to future generations.

3 RESTORATION PROJECTS OF DEFENSIVE STRUCTURES

The Qatari fortified structures were usually located close to the ancient towns and villages. In fact, in the past, the main reason for building fortified structures, such as forts or watchtowers, was to protect the groundwater wells of the villages because of their importance for the survival of the local population. They were also built to protect the people from incursions and attacks.

3.1 The Al Zubarah Fort

The Al Zubarah Fort is located on the north of Qatar, and it was built in 1938 as a defensive military structure, acting initially as a coastguard station. It is part of a complicated defensive system composed of towers for surveillance situated throughout the territory, along the main roads to defend the inhabited centers.

The squared plan of The Al Zubarah Fort (Figure 1) is regular, composed of three cylindrical and one squared towers at the corners with high defensive walls constructed with local stones. The tops of the towers have machicolations, and soldiers used the inner rooms.

Figure 1. Al Zubarah Fort, the restoration works recently completed (Source: Author).

The restoration works were completed in 2015 by the Qatari governmental institutions and included the reconstruction of the roofs, which consist of wooden poles protected by bitumen and

a layer of sun-dried bricks. The plasters of the ceiling on the rooms, deteriorated because of erosion and the critical weather conditions, were also restored. The defensive perimeter walls, built from coral stone and limestone were restored by complex structural interventions to solve the damages caused by the weight over the foundations. The internal partitions were consolidated, by using cement mixture to enhance the structural stability. Many missing elements were refurbished including portions of the wooden gargoyles.

In the courtyard is located an ancient well, initially used for the drinking water supply, that was restored during the last intervention.

The fort is currently reused as a museum, where it exhibits the recently discovered archaeological findings from the Al Zubarah site. The place is including a new visitor route for visitors to discover the history of the fort and its well.

3.2 The Barzan Towers

The Barzan Towers are located along the Doha Expressway and were constructed at the beginning of the 20th century to protect the ancient wells. The towers were part of the southern side of the Doha's defensive historical system, against the Ottoman army.

Figure 2. The Barzan Towers in Doha. The restoration works recently completed (Source: Author).

In 1910 the private owner of the towers carried out some reconstruction and restoration works, later on, in 2003, the towers were consolidated, and then in 2015, the last restoration works were completed by the Qatari local governmental institutions. The two towers have a simple rectangular plan; the defensive perimeter walls were built with coral and limestone masonry blocks bonded with mud. The corner towers were originally constructed using traditional materials such as coral and limestone blocks, mud gypsum and plasters, decorated with wooden rainwater gargoyles (“marazim”) and wooden lintels (“danchal”) usually protected with a bituminous layer (“basgijl”)

The completed restoration works included a structural consolidation of the towers’ foundation, which had failed because of the weight. The structural stability of one tower was strengthened at the corner by increasing the wall thickness. The deteriorated plasters were reinstated; the external and internal architectural elements; doors and windows, the stairs, and internal walls were all refurbished, and the building services were fully upgraded (Figure 2).

The defensive function of the towers was transformed into a museum that is open to visitors although there isn’t yet a thematic visitor route or any specific service for tourists.

3.3 The Al Thagab and Al Rakayat Forts

The Al Thagab and Al Rakayat Forts are located in the northern side of Qatar. They are typical desert forts constructed in the 19th century to defend from incursions the wells that have been in use from 1911 onwards.

Al Thagab and Al Rakayat are both rectangular in plan. The central courtyards were used by the people to store goods in case of attacks, and in both the forts there are the traditional deep wells located in the corner of the perimeter defensive walls.

The analysis of the two forts is similar since they both were structurally consolidated and reconstructed at the end of the 1990s under the direction of the local governmental institutions. The methods for construction of the walls were, in both the cases, done by layers of coral stones and limestone blocks bonded with mud mortar and gypsum plaster, reaching a great thickness to provide both protection and thermal insulation.

Nowadays still the perimeter walls of both the forts consist of alternated layers of coral rock and limestone bocks, having both regular and irregular shapes. Wooden beams construct the structures of the roofs, currently in a good state of conservation in Al Taghab fort (Figure 3) while in Al Rakayat fort they are damaged by deep cracks which generated the failure of extended portions of the ceiling as a consequence of the building's abandonment in the last decades.

Figure 3. Al Thagab Fort, the external walls are constructed with layers of alternated coral rock and limestone blocks having a regular shape (Source: Author).

In Al Thagab fort, during the last restoration works, the upper level of the external wall was reconstructed using regular blocks of limestone, which are easy to identify if compared with the original lower part, more irregular and fragmented. In both the forts the interventions included newly reconstructions of the perimeter walls due to their structural instability, such walls were left visible in al Taghab fort while being covered with the final plaster in Al Rekyak fort. The cracks still distinguishable in the external walls are probably the result of structural settlement as a consequence of the consolidation and reconstruction works. In both the forts the oldest, an original layer of the wall is located at the bottom of the structures and it is composed of alternated coral rock and limestone fragments consolidated with composite mixed mortar mixture. This layer was consolidated during the last intervention using mud and cement mortar.

In both the forts, the extensive structural reconstructions have partly altered the original historical configurations. Neither the plans nor the elevations appear to have preserved their original design, and after the reconstruction works carried at the beginning of the 19th century, the layout of the original plan have been modified.

Both the forts are private and although they are open and accessible for visits they do not offer any special touristic tour or particular service for the visitors.

4 RESULTS

Analysis of the completed restoration projects to the Qatari defensive structures show the methods and techniques used during the interventions, permitting a comparison between different approaches more or less preservationist. In fact, all the defensive structures that are currently used as museums were more preserved, with the intention of maintaining the existing materials as found, without alteration to exhibit publically.

Because of the typical use of traditional materials (mud, sundried bricks, coral rock limestone blocks, wooden poles) the analyzed causes of deterioration were always similar and mainly due to the severe weather conditions or the change of use of the buildings, which have caused abandonment and lack of maintenance generating collapses in foundations, capillary rising damp in the masonry, severe deterioration if the plasters.

The different types of restoration works carried out can mainly be divided into two categories, such as an artificial approach for substantial structural interventions and a natural one in case of conservative interventions finalized to more preservationist results.

The different restoration approaches were also due to the various government authorities responsible for the different interventions. It was also found that the methods adopted by each governmental institution have often been isolated, and there is a need to improve the coordination and management of the Qatari heritage safeguard.

5 CONCLUSION

In Doha, a new emergent global city, despite its fast urbanization and modernization, there is a growing need to safeguard the historical heritage.

This need to preserve the cultural traditions of Doha is strongly related to the search for a new architectural identity that could emphasize the value of diversity against the conventionality of the global economic interests.

The research presents some recent restoration projects carried out for the ancient fortified Qatari structures, showing how these adaptive reuse interventions can provide one valid alternative for the growth of the city, respecting and preserving the existing architectural culture and traditions.

However, there is still a lack of open dialogue between the involved institutions and the different administrations. The absence of a general coordinating plan for all the works may be leading to future problems in safeguarding and managing the heritage safeguard.

References

Bianchi, A., and Tonner, T., *Data Standards, Documentation and Responses to Cultural Heritage Management in Qatar*, 18th International Conference on Cultural Heritage and New Technologies CHNT 18, Vienna, 2013.

Brandi, C., *Il Restauro: Teoria e Pratica 1939-1986*, Rome, Editori Riuniti, Italy 2005.

Carbonara, G., An Italian Contribution to Architectural Restoration, *Frontiers of Architectural Research*, 1, 2-9, 2012.

Carter, R., *Sea of Pearls. Seven Thousand Years of the Industry that Shaped the Gulf*. London: Arabian Publishing, 2012.
Feilden, B., *Conservation of Historic Buildings*, United Kingdom: Rutledge. 2003.
Jaidah, I. M., and Bourennane, M., *The History of Qatar Architecture (1800-1950)*, Skira, Italy, 2009.
Jokilehto, J., *A History of Architectural Conservation*, Elsevier: Butterworth-Heinemann, 1999.
Mazzetto S., and Petruccioli A., Methods and Techniques Used in Significant Restoration Projects in Qatar, *Studies in Conservation*, Routledge, 2017.
Mazzetto, S., *Beni Militari Come Attori Protagonisti, in Cavallino–Treporti*, Progetti per un idea di Parco P. Grandinetti, S. Mazzetto, V. Skabar (eds.), Il Poligrafo, Venice, Italy, 50-51, 2006.
Muñoz Viñas, S., *Contemporary Theory of Conservation*, Elsevier Butterworth-Heinemann, 2004.
Salama, A. M., and Wiedman F., *Demystifying Doha: on Architecture and Urbanism in an Emerging City*, Farnham, England: Ashgate, 43-45, 2013.