

Investigating Visualization Principles for Heritage Rehabilitation

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Abstract

Many countries of the world suffered the problem of historical neighborhoods within their urban entity, through various treatments and phases. Regardless of numerous treatments, the city in general is described as an organic entity that has past, present, and future. This past with its birth, originality, and transformation had to have relied on material and spiritual assets that surrounded it, and the urban texture that lived and continued in the peripheries of the cities during the past era is only cultural humanitarian production that interacted and was environmentally consistent and covered the human needs that were related to time and place. In this article, three international experiences were chosen from countries that are different in their geographic location and cultural heritage, and have analyzed their experiences to conserve the historical identity of cities, as follows: The first experience which is handled by the research is the experience of France in the renovation, conservation, and improvements of heritage sites. Any type of dealing on whatever level with historical areas (whether subject to maintenance, improvement or renewal) were subject and belonged to a general plan that was set based on a comprehensive view of the city as a whole, taking into account all elements that affect the problem, including economic, social, cultural and political matters. It is known that France holds advanced philosophical and theoretical heritage in the field of urban planning based on situations of the senior architects and theorists of planning in the past century. The second experience studied in this article takes place in the Kingdom of Saudi Arabia and presents astounding results in the field. It was renewed and was conserved by autonomous efforts by the rehabilitation of many historical cities and restoration of their vitality and spirituality to become attractive to tourism, heritage value, and investment. North America included the United State of America and Canada.

1. Introduction

In many cities, historical areas are present and guarantee the conservation of indispensable and diverse memories. Countries often dealt with architectural heritage, historical buildings, and even historical cities in three ways [1, 2]: 1) Approach that calls for conservation and revival of old neighborhoods without any change, including attempts to re-plan several historical Swiss cities such as Zurich, Lusern and Geneva. The key feature of this approach of dealing with the cultural and urban heritage of cities is enthusiasm to conserve the original appearance and form of the building or even residential neighborhoods, allowing only very limited change or renewal; 2) Approach of integration and interaction between the past and the new. The key advantages of this approach are the high flexibility and tolerance or maintenance of factors and elements in heritage areas, which are later used in technological and social development. This approach can be seen in heritage or monumental areas and historical buildings in many historical English cities such as London and Oxford, and 3) Conventional romantic approaches focus on the appearance of buildings or urban areas. Attention is paid here to the external appearance primarily without attention to the importance of compliance for the essential internal structure of buildings. Exteriors are romantically treated in a way that largely conserves their original appearance. The interior of

buildings may however be changed in terms of functional and spatial organization and accordance with the requirements of the modern era.

This paper studies three different cases around the world in terms of their methodologies and styles by using visualization analysis.

Cultural heritage and economic development

Cultural heritage has recently garnered attention due to its influence on economic development [3–5]. Tangible cultural heritage sites and monuments can add to a country's touristic attractions and thus, boost investment and growth of the tourism sector. Intangible heritage such as cultural craftwork, festivals, and traditions can also create additional revenue and employment opportunities. Studies have been done, on both local and international levels, to understand the influence of cultural heritage on other areas of society and the consequent creation of novel products and services [6, 7]. In terms of the economy, certain observations can be noted. Expert knowledge, that is, adequately trained staff in heritage management and conservation, is needed to better understand the contribution of tangible and intangible cultural heritage to the economy. Hired staff must have the right knowledge and skill in the domain of heritage. The trade of arts and crafts fabricated by the local community should also be considered as valuable and promoted. This should not be dependent on whether local arts and crafts add to economic development. An evaluation of the effects of cultural heritage on the local economy should also be assessed regularly. The benefactors should be identified in terms of their sex and social status. The drawbacks of cultural heritage in the housing sector, for example, should also be analyzed.

Cultural heritage is dynamic and for its advancement, economic approaches should be applied. Innovative components should be included in cultural heritage since intangible cultural heritage develops just as the local community develops. For the aforementioned step to yield economic benefits, cultural heritage and tourism should be both "inclusive and sustainable" [8–10]. It is necessary that "sustainable tourism development" consider the effect of touristic visits on the conservation of heritage buildings. A portion of the revenue from the touristic use of heritage buildings should also be employed in other areas of cultural development that are less funded. Local communities should be involved in setting up policies to this effect.

Economic development can also lead to negative impacts on cultural heritage, including the demolition of heritage buildings or monuments. An assessment of the impact of projects on cultural heritage should be performed. Specifications involving the use of local building materials and construction designs should be promoted for new building projects and renovation of existing buildings.

2. Research Background

Historical buildings in certain countries such as France, Italy, Saudi Arabia, the United States of America, and Canada are compared to understand how historical areas, including heritage buildings, are treated in various parts of the world. A comprehensive analytical approach is used in terms of maintenance,

renovation, conservation, and improvement plans. A brief discussion is provided on the general principles of heritage conservation applied to the cases in different countries. Finally, this paper introduces new strategies to maintain, sustain, and improve historical areas in the Arab world.

3. Research Methodology

In this research, the methodology divided into three modules which are shown in Fig. 1. The modules are (1) data collection, (2) case study analysis, and (3) deriving conclusions and recommendations.

In the data collection compartment, this research work relied on the collection of data through interviews with officials, representatives, and scholars. Additionally, data was collected via visiting heritage sites in the studied locations and recording what was observed by the visiting authors.

In the second compartment, case study analysis, three main case studies were selected, and they are (1) Europe, (2) Asia, and (3) North America. In Europe, the main cities that were studied and visited were Rome and Paris. That is mainly due to their fame and abundance of heritage sites. Two main concepts were studied in those two cities: (1) the general principles for heritage site management, and (2) the approaches for maintenance and development of the sites. In Asia, the area of historic Jeddah was selected for the study. The interaction of the historic neighborhood with the modernized city was examined in addition to the two main concepts that were previously identified in the European case study. Finally, the third case study that takes place in North America specifies the cities of Montreal and Quebec City. In addition to the two initial principles, the conservation approaches in those two cities were examined as well.

The third compartment aims to draw conclusions and recommendations for the betterment of heritage sites' management in the Arabic region. Specifically, on the levels of restoration and preservation. The article ends with identifying future venues for contribution and improvement.

3.1 European approach in dealing with historical buildings: The cases of France and Italy

In the 19th century, Haussman [11] introduced conventional romantic approaches to dealing with heritage and urban structures in ancient French cities. He prepared urban designs of Paris, which comprised of wide open and straight streets that were surrounded by different building heights and patterns. The designs also considered natural, social, and functional needs.

It is noteworthy here that historical centers, which are the nuclei of many old French cities, are affected by urban growth and development. These historical centers often take central positions in the cities and their design can be summarized, concerning French cities, in two main approaches [12]: 1) peripheral approach where historical centers expand radially and enclose the center of the city. The historical centers are linked by radial roads from the center, and 2) growth around industrial areas in cities which are often near to movement arteries of all types.

In the beginning, neighborhoods were divided into several sectors based on the population of inhabitants in each sector. Lowerclass inhabitants occupied sectors on the exterior periphery of the city while the rich, upper-class occupied the center where highpriced properties were present. The center of the city also enveloped important cultural, trading, and administrative areas. Over time, as buildings became more ancient, the center started to lose its prestige and aesthetics. Accordingly, the transition of the population started to follow a reverse fashion. The rich started to move to external areas around the cities while central areas (particularly residential areas) were left to serve as shelters for the poor and working class.

Many years later, Le Corbusier strongly suggested the design of an integrated city (City of Happiness). His goal was to allow the spread of daily life and social activities in the city. The existence of wide streets and open areas was for people to feel happy [13].

3.1.1 Maintenance and development of French historical areas and buildings

France has a set of laws that protect historical areas and buildings and these laws also paid considerable attention to reconnecting the population to urban heritage. So, competent authorities worked on finding balanced solutions that consider and agree with the heritage values of conservation and development. These solutions also endeavored to meet the requirements of the population since there had been significant emigration from historical areas of the cities to the peripheries. Emigration was mainly due to deteriorating buildings and living conditions.

Competent authorities tried to develop plans for the renewal of old neighborhoods (to serve the poor) and the protection of cities. This approach failed and work was stopped because of the huge costs and limited financial returns [14, 15]. With the intervention of capitalists in those areas, many buildings were removed and high and modern towers were built. The towers were not related to the old and they dispersed the historical urban structure of the area. The key purpose of the capitalists was to earn a profit under the pretext of repairing the chaos of old areas [16].

In the 1960s, an increase in tourism started to call for a comprehensive revival of the historical area [17]. However, these approaches focused on place and ignored the society in which people live. Priority was on buildings and their appearance without any consideration of the social and demographic backgrounds of the inhabitants. Another problem was that touristic objectives can never be the basis of renewal, maintenance, and sustainability of cities, particularly important cities [18]. Without regard to the social structure of the cities, such touristic objectives will turn the cities, meant for living and accommodation, into museums. In the 1970s, a new law was passed to focus on restoration, maintenance, and improvement of important historical cities by setting deliberate plans for the revival of neighborhoods. These plans retained the demographic structure and historical features and the urban, social and cultural aspects of these neighborhoods.

In general, the appropriate authorities dealt with heritage buildings and French historical areas using the following three methods:

Renovation

was part of the early ideas of renewal of some popular neighborhoods of Paris. The main idea was derived from the reorganization of those neighborhoods to overcome oldness and land abuse. Most of the urban structures were lowrise buildings and many stores and warehouses occupied large areas of lands. A huge advertising campaign currently advocates for the renovation of heritage buildings. The main purpose is to attract and convince investors regarding the feasibility of the renovation process.

Conservation: In Northern France, "Roubia" was chosen as an exemplary model of urban structure. Roubia is an industrial city, 200 meters from the municipality, and with an area of 12,000 m². In this city, there are businesses and crafts on the exterior part of the streets and above them exist housing units. There are large fences and private gardens in the inner parts of the city. An abandoned spinning factory is also present. Instead of demolishing it, a project was established for the: 1) main entrance to the factory where the ground floor was used for trading and craft activities. The first floor served as office spaces and the second floor was converted to housing units. Forty residential units were enclosed as well as a corridor that receives light directly from the ceiling holes. The uppermost floor was used for entertainment and sports activities; 2) central part where upper floors were allocated to supply 30 single residential units. The building landscape had office areas for general activities and facilities were connected with other parts of the district through a covered back corridor; 3) adjacent site which was turned to a public park.

Improvements: A residential building that had been improved was chosen in the first neighborhood of Paris. This building comprises of five floors in an area allocated for pedestrian movement. The purpose of the project was to retain the same residential function of the building and to maximize the benefits of the building. This was done according to the following steps: 1) structural study of the building condition and its ability to bear excess loads resulting from the addition of a mezzanine to the residential unit; 2) courtyard was used for ventilation, natural lighting and connecting to the first floor of the building; and 3) Original architectural character of façades was maintained with some required improvements, maintenance, repair, and cleaning. This improvement operation was limited to conserve one of the oldest buildings that has characteristics and features of the conventional architectural heritage of Paris.

3.1.2 General principles applied and the reasons for success in France

For the case of France, several principles were applied in dealing with heritage buildings. These can be summarized as follows: 1) dissemination of conservation culture that protects historical areas and buildings and draws citizens' attention to urban heritage. Many heritage buildings are located in areas where the lower and middle classes live; 2) supply of financial resources with the planning and executive governmental and non-governmental organizations and reliance of those authorities on flexibility in planning and execution; 3) provision of experience and expertise in setting and forming the standards which led to the identification of heritage neighborhoods of historical architectural value. These neighborhoods require attention and documentation of their activities to enable technical authorities to assume their responsibilities and satisfy the plans, and deriving the rules that shall be adopted in the

development of the design of those areas; 4) hindering capitalists from implementing their high-profit investment projects on conservation lands and areas; and 5) allowing multidisciplinary participation to create successful standards since the project affects the social, cultural and political aspects of the society (Fig. 2).

3.2 Saudi Arabian approach in dealing with historical areas

Urban development in Saudi Arabia has left the country with several heritage buildings or areas, which can be categorized as follows:

- a. Small, valuable ancient cities: comprises of ancient cities such as Al Dir'iyah City, the historical area of Jeddah, and Mada'in Saleh.
- b. Modern areas with historical and architecturally valuable areas: These include major cities such as Riyadh in which Murabba Palace is present. Ancient buildings and cities such as Jeddah fall under this category.
- c. Environmentally important cities include many cities in the Mada'in Saleh region. d) Rural entities of high environmental value:
- d. Cultural, historical, and environmentally valuable buildings and areas on the outskirts of cities: In this category exist military architecture, churches, monasteries, monuments, and infrastructures such as parts of old roads and bridges.

Many cities and buildings have features from the old Arabian Peninsula and the western part of medieval Europe. Others have features from urban and rural parts of the Arabian Peninsula. Some examples include Riyadh, Jeddah, and cities in the south of Saudi Arabia. Buildings in the center, west of Saudi Arabia, and some buildings in Jeddah still bear some traits from Islamic architecture. Vernacular architecture is also present and highly rich in detail in the Kingdom of Saudi Arabia.

In the '70s, historical areas in Saudi Arabia were successfully maintained and protected by the newly established administrative and financial systems [19]. The Saudi Commission for Tourism and National Heritage (SCTNH) was in charge of dealing with issues related to historical heritage centers and their protection. Through a planned reorganization program, SCTNH, in 2016, worked to promote trade, tourism, and cultural activities in the Al Dir'iyah area by reconstructing dilapidated buildings [20]. In 1974, the Riyadh Development authority was established for the preservation and protection of historical areas, particularly in Jeddah [21]. SCTNH prepared documents that covered reconstruction design plans, surveys, and historical and architectural studies. The organization also raised funds from twelve different sources and the city of Jeddah was reorganized. Nasseef House was also renovated and some buildings in Ohrid were rebuilt or used for modern activities. Modifications were also made to buildings and palaces in Riyadh and the Islamic pattern was maintained for touristic purposes. For all these projects, the Urban Planning Institute of SCTNH prepared architectural plans and designs of the historical areas.

3.2.1 Neighborhoods in the historical center of Al Dir'iyah City

In the north-central part of the Najd region, Al Dir'iyā is a city with 180,000 people. It was the administrative, cultural, and economic center of the Najd region. Many cultural structures existed (and still exist) and their economy was characterized by rapid growth, as it depended (and still depends) on the industry, cultural centers, traditional markets, trading, and tourism. It was the capital of the First Saudi State.

Murabba Palace in Riyadh represents the main historical and architectural value of the city. It is one of the main architectural monuments of the late Roman era in terms of its exterior framework and features such as doors, towers, and temples. In addition to the palace, there are other historical and architectural monuments such as churches, gothic palaces, buildings from the Renaissance era and Parochial ages, and houses that date back to the era before and during the Romantic age.

Phases of the developmental work for the city of Al Dir'iyā and the historical area of Jeddah can be divided as follows:

- a. Documentation, analysis, and study of the existing cases: This represented the first phase of developmental work in the city. Important procedures were applied in the survey, documentation, and analysis. Analyses that were conducted in the area of the study showed very important results. For example, a comparison of the commercial use of areas with the health and living conditions showed that most ramshackle buildings are located in areas that lack temporary vital jobs. The ground floor of buildings is primarily used for storage purposes while stores and other trading enterprises are located in buildings of higher residential value. Analysis of pedestrian movement reflected a serious problem with the historical center. Pedestrian traffic is concentrated in some streets and since most of the streets are allocated to pedestrian movement only, vehicle entry is denied.
- b. Study of urban development of the area: Restoration of historical centers in the city of Al Dir'iyā and the historical area of Jeddah city can be summarized in three main categories:
 1. Protection of historical sites in huge cities and regional plans.
 2. Protection of historical centers of cities and other areas of environmental importance in the framework of the basic design.
 3. Protection, restoration, and revival of historical sites within the detailed plans and urban and architectural designs.

The protection and revival of cultural and historical heritage in the first and second phases represent an integrated section within the complicated urban planning environment. The third phase (detailed plan and projects for historical sites) provides the core procedures and covers the entire scope, from preliminary study to execution (Fig. 3).

3.2.2 Impact of urbanization on Saudi Arabian cities

The largest country in the Gulf region, Saudi Arabia is shaped by Islamic culture, oil exportation, and political rulership that is based on dynasty [22]. The conservative Islamic country is also strongly

influenced by geographical, environmental, and climate issues. Saudi Arabia has a strong focus on family, which also affects the field of architecture and urbanization [23]. Oil discovery in Saudi Arabia has boosted the economy and urbanized local Saudi cities. However, there is a danger to lose the country's historical heritage due to urban development and migration from rural to more urban areas in the country. Many historical buildings are occupied by lower-class inhabitants and no strategy has been developed to preserve or revive these sites. In summary, historical buildings in Saudi cities such as Riyadh and Jeddah are faced with problems related to urbanization, lifestyle changes, local and international migration, and lack preservation plans [24, 25].

Urbanization in Saudi Arabia was mainly propagated by two oil boom periods in 1956 and the early 70 s [26]. More people immigrated to Riyadh and consequently, the population increased to 55 times its previous size (from 100,000 in 1950 to 5,576,621 in 2013). A further increase to 8 million in 2028 is anticipated [27]. Globalization has also played a role in the observed changes in the country. For example, streets are wider for car passage compared to the previous narrower street form. The demographic structure of Saudi cities has also shifted from a mixedbackground population to a denser population of low-income inhabitants in certain unplanned areas. Housing styles have also been influenced in that more duplexes and cement-based apartments for onefamily units have been built to replace large houses for extended families. Mosques no longer served as places to gather and interact but as places to meet only at the appointed prayer times. Gigantic malls replaced the local, traditional shops for trade, food, and entertainment activities.

In light of the aforementioned issues, two cities, Riyadh and Al-Dir'iya will be studied and presented in more detail. Both cities are highly exemplary when speaking of the rehabilitation of historical Saudi Arabian heritage.

3.2.3 Approaches to maintain historical areas in Saudi Arabia

Traditional Arabic countries have unique characteristics that are in line with Islamic principles, environment, and culture. The surge in urbanization has however affected the architecturally unique characteristics of many historical buildings in Arabic countries, specifically Saudi Arabia. In two Saudi Arabian cities, Riyadh and Al-Dir'iya, most of the traditional fabric and architectural buildings have been neglected, destroyed, or demolished due to urbanization. Many people migrated to these modern cities and as a result, factors such as social structure and proximity to the family were greatly affected.

In 1981, the Council of Ministers in Saudi Arabia approved the plan to conserve the remaining heritage and traditional buildings. This encouraged Riyadh to revitalize its core historical areas and buildings, including Qasr Al-Hokm, that reflect the spirit of the old Riyadh [28–30]. Al-Bathaa and Al-Dira areas are the oldest parts of Riyadh and Al-Masmak Fortress lies in its heart as the oldest and most attractive landmark in the city. This fortress was built in the mid-19th century and now serves as a museum and a representation of the history of the country. Another example is the Riyadh Museum of History and Archeology in the west of Saudi Arabia. In Al-Bathaa and Al-Dira, numerous traditional markets and restored buildings such as the Royal Palace, Imam Turki Bin Abdullah Grand Mosque, and the AlMue'qila

building can be found. Less than ten kilometers from the center to the north-west lies Old Al-Dir'iya, a world heritage site. It is located along Wadi Hanifah, which is a region with rich historical events, a unique urban fabric, and architecture style, and nowadays, it serves as an oasis within Ar-Riyadh [21, 23, 27, 28].

Al-Dir'iya, with At-Turaif as its citadel, was the capital of the First Saudi State until Imam Turki bin Abdullah shifted the new headquarters of his Government to Riyadh in 1240 AH/1824 CE [31]. It was founded in the 15th century and was built according to the Najdi architectural style. This style was common in the central regions of the Arabian Peninsula and it consists of adjacent buildings made from brick mud materials, courtyards, narrow streets, palm farms, and gardens. Its political and religious roles increased in the 18th and early 19th centuries and the At-Turaif region became the center of the temporal power of the house of Al-Saud, the current royal family of the Kingdom of Saudi Arabia. At-Turaif still has its unique urban fabric, including the remains of many palaces and buildings. In 2010, it was listed as one of the world heritage sites due to its remarkable representation of a traditional human settlement and the culture of the central region of the Arabian peninsula and the Riyadh area [27].

The government enacted several programs to preserve and develop Al-Dir'iya under Al Dir'iya's Comprehensive Development Program. In 1998, a Royal Decree (No. m/528) was issued to approve the development program for Al Dir'iya. Ar-Riyadh Development Authority (ADA) was in charge of executing the program and forming the Supreme Committee of Al Dir'iya Development under the chairmanship of ADA [31]. This project serves as a model when a partnership is adopted, in this case, between SCTH and ADA. Support was also received from organizations such as the International Restoration Group and King Abdul Aziz Dara, which is in charge of documenting the history of the Saudi state [31]. The restoration and rehabilitation program of At-Turaif comprised of:

- a. Cadastral and documentation of archeological and remnants of old buildings and debris removal [31].
- b. Restoration of internal and external elements of all buildings: This included rehabilitation of buildings in the At-Turaif area for use as museums and administrative purposes. Rehabilitation of buildings was also done for use as hotels in the Samhan neighborhood and as shops and restaurants in the Al Bejairi neighborhood. Elements on existing buildings were also preserved to protect them from deterioration and building facades that face streets and pathways were also restored [31]. This phase involved the development of infrastructure, service networks, and main and sub-street networks. New buildings and areas were also added [31].

Also, ADA developed the Al Bujairy Quarter to be an open museum that reflects the traditional life and culture of the Saudi people. The project began in 2015 and one of the main elements is the main plaza that comprises of a range of retail outlets for traditional food and local handcrafts. Within this area is the restored Al Dhuwayhirah Mosque. It is connected to grassed areas with palm trees and a central water feature that reflect the intimate relationship between the mosque and the local community. There is also a garden designed according to the traditional Islamic style. The garden floor is made of grids of squares with channels of water by each edge, where date palms and grass provide shade and comfort for visitors.

Also, the promenade along Wadi Hanifah offers picturesque views across terraces, which were formerly cultivated areas that supplied agricultural produce to the settlements of Al Bujairi and At-Turaif [27].

3.2.4 General principles

Several principles can be highlighted based on the Saudi Arabian experience in dealing with historical areas. These are summarized as follows:

- 1) For preservation and development projects, the involvement of the government was necessary, and it took shape in the form of royal decrees and financial support.
- 2) Committees linked mainly to SCTH were established for each heritage historical site and partnership approach with other governmental, non-governmental, and international agencies should be adopted.
- 3) Cadastral and documentation, including visual and archeological documentation, of all buildings and elements of the heritage historical site were done.
- 4) Restoration and rehabilitation projects were performed for buildings and neighborhoods, including changing the use of these buildings to museums, hotels, restaurants, cafes, and administration offices. Some of these buildings were reused according to their previous function, especially mosques.
- 5) New buildings and areas were added to support administrative, economic, and recreational activities by using materials that revive the old atmosphere and integrating the surrounding nature with the built environment.
- 6) Aim and focus on touristic and cultural aspects such as festivals and cultural events: The problem with the focus on touristic approach is that it ignores the social structure and lets historical places serve as museums or other recreational purposes instead of being cities for living.

For future projects, public awareness can be raised regarding the conservation and revival of historical areas and buildings through seasonal activities and events in historical areas. Agreements can be signed with the Faculties of Architecture and Planning to motivate students and researchers to participate in projects on the preservation and revival of urban heritage. Students and researchers can also take part in the annual Prince Sultan bin Salman Urban Heritage Competition and Awards. International trips, workshops, and summer schools can also be organized in this domain.

Plan source:

Al Bujairi Heart of the Call_p88

Picture source:

<https://asg-architects.com/portfolio/ada-atturaif-living-museum/>

3.2.5 Historic Jeddah

Jeddah city is located on the eastern shore of the Red Sea. The history of this city back to very ancient times. It became a more important city in the beginnings of the Islamic era. It was the gateway for Muslim pilgrims to Mecca who arrived by sea. since the 7th century AH when the 3rd Caliph Othman ibn Affan made it the official port of Makkah. The historical architecture in Jeddah reflected the architecture of the cities on the Red Sea. Also, The city of Jeddah is the gateway to the holy city of Mecca, which is frequented by Muslim pilgrims from all parts of the world, as architecture has been greatly influenced by pilgrims coming within hundreds of years.

One of the most important buildings of a unique architectural character, at the local and international levels, is Jeddah's Roshan tower houses. Their specific aesthetic and functional patterns - the absence of a courtyard, decorated Roshan façades, ground floor room used for offices and commerce, rooms rented for pilgrims - reflect their adaptation to both the hot and humid climate of the Red Sea and the specificity of Jeddah.

The Kingdom of Saudi Arabia has shown great interest with archaeological and heritage sites that enhance historical depth and civilization of the Kingdom, the Jeddah region is among the three most important sites established by the Kingdom on her attention list, to be at the forefront of heritage sites Saudi National nominated for registration in a list UNESCO World Heritage.

General Authority for Tourism and National Heritage started working with Jeddah Municipality to transfer this interest of the historic Jeddah region into action plans projects by preparing a plan and a building system that preserves the historical character of the area, and work to classify the historic buildings in them, and pavers Its streets are with stone, and its lighting is with traditional lanterns. As a result, the Historical District Protection Administration was established Maintenance of the traditional buildings in them.

3.3 North American approach in dealing with historical areas in US and Canadian cities

The US was discovered more than 500 years ago. It was named the new world because it had not yet experienced civilization. Planners were required to conserve historical heritage buildings. It was decided that places that constitute historical treasures such as museums shall be kept in place. Markets in old cities such as Boston, Philadelphia, Chicago, and New Orleans comprise of urban structures that are considered to represent and express American history and identity.

3.3.1 Conservation approaches in American cities

Planners in the United States found that some components of the old urban structure expanded beyond their size and the need for heritage conservation became unquestionable. These historical areas serve as a source of revenue for the country. Tunnels and road trains were established to make these areas accessible. Restaurants were also built around these areas.

Planners considered the real use of these historical areas in their plan for conservation in order not to charge these buildings with an unsuitable role. The basis of continuity of any building lies essentially in

how it is used and its ability to resist time. It was noted that some residential communities within areas containing historical sites did not maintain the historical function of those areas. Immigrants in those areas changed the function of the area. Private offices were created in suburbs and stores continued to expand. Parks were designed parallel to highways, but the main building entrances that face highways suffered problems of obstruction and deformation.

The expansion of American cities, which sometimes causes problems for historical and heritage centers, led to a growing vein of traffic movement in and out of urban centers. These veins were however replaced by superhighways and urban design of American cities faced more challenges, as urban centers were established in newly developed areas that surround historical and heritage centers. Regional marketing centers, defined as places close to urban centers, were further developed, became more organized, and shopping malls were installed. Initially, the interaction between these marketing centers and surrounding areas was difficult because of the large number of cars that surround the marketing centers. Solutions were later implemented that led to the diversification of the use of the marketing centers. These marketing centers have become the focus of society. They are close to historical and monumental sites and also attract tourists.

3.3.2 Integration vs seclusion of parts of American cities

American planners had to decide on how to manage different parts of cities while considering the big picture, that is, the city as a whole. They studied the factor(s) that made some parts of a city independent [32]. Rittenhouse Square is an example. It is embodied in Philadelphia Center where fine heritage houses and the best institutions in Philadelphia are located. There is an open space to view of the apartment towers and stores are present in the main towers of city offices.

Integration or seclusion of parts of the city is done not to define one part from the other, but rather to create a big picture. One of the most scenic rivers, Charles River crosses several American cities and one of its banks serves as a cultural heritage structure. The construction of modern highways did not destroy this heritage structure. The river passes through three major universities – Harvard, MIT, and Boston University. Despite the existence of high-rise university buildings that surround the river, an image of the past is visible while traveling along the river. These buildings express the hidden gain in changing certain aspects of this area of the city since it highlights the difference between the image of the past and the present developed reality.

3.3.3 Main principles applied in North America

Figure 6 presents images of some American historical heritage sites. From a review of how Americans deal with historical heritage in their cities, the following can be deduced:

- 1- Public awareness was raised to draw attention to the need for conservation of old heritage sites. The American people responded to this largely.
- 2- Unique architectural features of old heritage sites were maintained and were not blurred due to new, non-deliberate treatments.

3- Despite the race for capital and investments in the US, monumental buildings were not demolished for the sake of new projects and profitable opportunities. These buildings were taken into consideration during the planning of new projects.

4- Aesthetic aspects of the city and its surrounding nature were maintained.

5- Heritage sites served different purposes and were integrated with modern areas.

6- Folk buildings and drawings were maintained in many US cities since they were considered as important monuments that represent the real US heritage.

7- Old and new city views and their aesthetics in terms of parks and gardens were maintained and their monumental landmarks were protected.

4. Results And Implications

A top priority of the urban planning sector in the Arab world is the protection, restoration, and revival of historical heritage sites. The methodology applied in this work is similar to the urban studies approach in the Arab World. It takes privacy into account as well as natural planning and design of cities and settlements. Through the review of the European, Saudi Arabian, and the North American approaches in dealing with heritage buildings, it is evident that a new concept of conservation implicitly requires the involvement of all areas in charge of urban and rural planning. It includes the revival of historical heritage buildings based on:

- a. Increasing awareness of the importance of historical sites, including the use of invitations in mosques and community involvement for revival and maintenance of these buildings.
- b. Viewing historical centers as comprehensive entities that include historical heritage buildings and recognizing the resulting maintenance problems, including problems related to population, traffic movement, and economy of the region.
- c. Conducting maintenance, organization, and restoration of any historical building following the urban planning standards. This is based on available documentation and detailed analytical studies with attention to the historical values of the region.
- d. Performing a detailed study and analysis before every step of protection, renewal, and rehabilitation of the historical environment.

The best method to protect historical buildings and structures is to involve them in the contemporary and critical functions of the city. All historical areas shall be respected during maintenance, revival, and rehabilitation work on historical buildings. If some historical buildings will be used for contemporary functions, it is necessary to evaluate and choose the most important components of the entire building. Components that distort the appearance or function of the building may be modified, when needed.

In the process of revival of old parts of a city, modern architectural solutions that are characterized by creativity may be acceptable and sometimes very necessary. However, the overall symmetry of the historical environment should be considered. For the protection and revival of historical centers, continuous cooperation is necessary between the urban planning department and the department concerned with the maintenance of historical buildings. It is also necessary to find integrated and interrelated establishments to protect and conserve historical areas and heritage buildings, as was presented in the above experience of the USA where there were three authorities in charge of this duty, which are the Establishments of Protection of Cultural Heritage, Urban Planning Departments, and Housing Establishments.

5. Conclusion And Recommendations

In this research, One area of potential research is to focus on the weight determination process. Particularly, the weights used in our research were focused on Canada and Saudi Arabia. Thus, as an extension, including weights from more countries could be studied in terms of its impact on the overall sustainability rating. This will also improve the model flexibility.

Saudi Arabia has four weather zones and the developed rating model examined a heritage building in one of the four zones. The rating model can also be examined for other types of heritage buildings present in the other three zones in Saudi Arabia.

Since the majority of the building assessment systems are re-evaluated yearly or every two years, the proposed method should follow the same re-evaluation frequency to keep the system up to date.

Course certification on sustainable development is essential for the person assessing the building for him or her to be able to perform an authentic assessment.

Since this research works well for residential buildings, a similar model can be developed for commercial buildings like schools and hospitals.

Building professionals must decide on the prerequisite criteria for the proposed method. This cannot be done now, based on the suggestions of experts, until the model has been extensively applied for heritage buildings

BIM can be integrated into the newly developed rating model. This will allow for a rapid assessment and a better automated data transfer process. BIM can manage the large data required for sustainability assessments. Hence, future research can focus on the incorporation of the developed model into BIM packages, specifically, Revit® and ArchiCAD®. Exploring the integration of heritage building information modeling (HBIM) with the proposed method would be valuable.

6. Future Research Opportunities In Hbs

Based on the research gaps identified by conducting the systematic review of HBs in the previous section, some research directions can be derived for future research consideration. Figure 5 shows three main research opportunities in HBs which are summarized in the following fronts:

Established international and local building standards such as ISO, CIBSE, and ASHRA exist and their criteria should be compared with the proposed method. This will enable the establishment of a standard for evaluating the sustainability of heritage buildings.

The developed model should be applied to other types of heritage buildings that have other functions such as governmental or residential. This might point to the relevance of other factors and the prevalence of other problems.

The developed rating model can be applied to other regions in Saudi Arabia. The varying climatic conditions in different parts of both countries might emphasize some factors more than others. This will also demonstrate the flexibility of the developed model.

Building a prediction module to forecast the building's deterioration rate would be a novel extension of the tool that would aid the establishment of a more comprehensive set of upgrade alternatives.

A maintenance and rehabilitation protocol based on the proposed method can be established for heritage buildings in the KSA. This will also promote the sustainability of heritage buildings and be beneficial to decision-makers in their efforts to maintain the condition of their heritage buildings.

The addition of new factors, indicators, and sub-indicators will lead to a more robust version of the proposed model. This will also enable the applicability of the model to different regions and climatic conditions.

Declarations

AVAILABILITY OF DATA AND MATERIALS

The data is available from the corresponding author under reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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AUTHORS' CONTRIBUTION

Abobakr did the interviews and the studies and drew the conclusions. Samer participated in writing the draft. Saleh supervised the work and gave directions.

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Figures

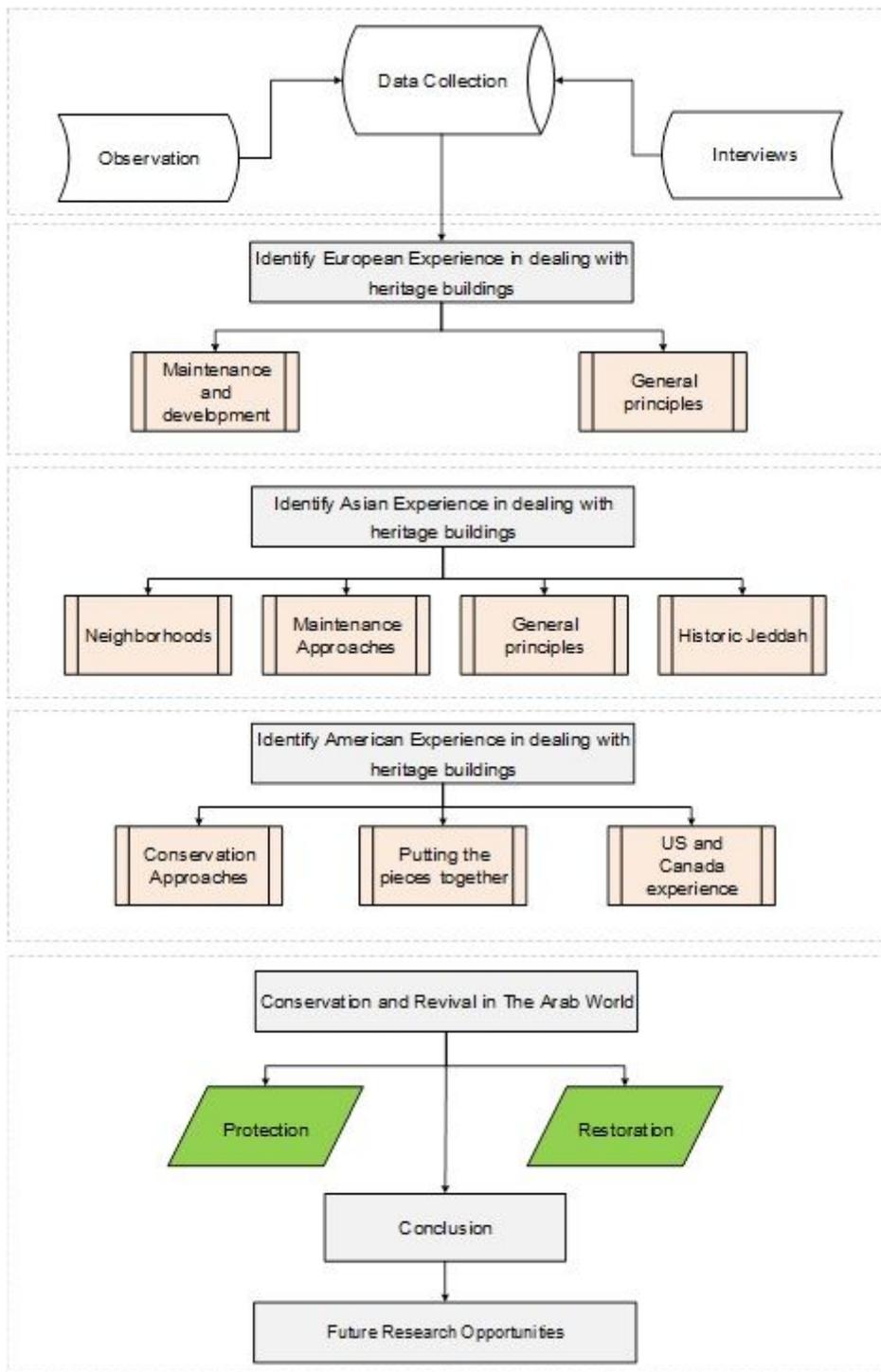


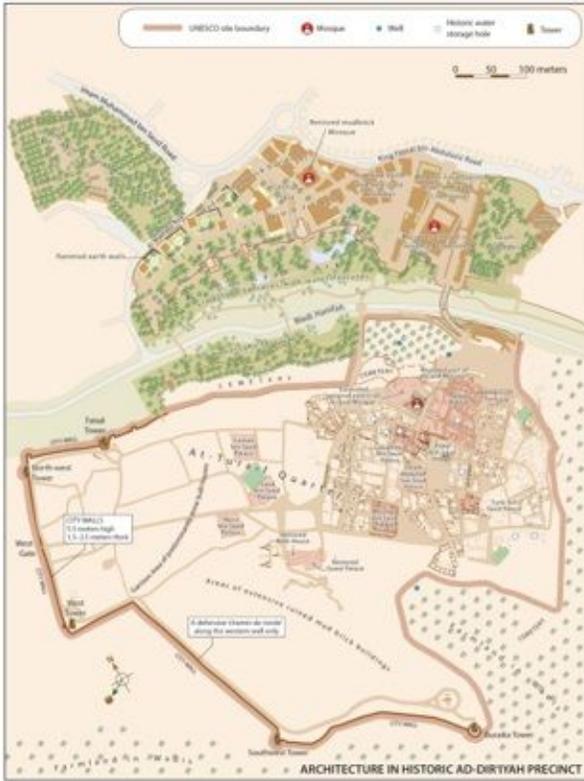
Figure 1

Research methodology flowchart



Figure 2

Images of investigated sites in Rome and Paris



Plan source:
Al Bujairi Heart of the Call_p88

Picture source:
<https://asg-architects.com/portfolio/ada-atturaif-living-museum/>

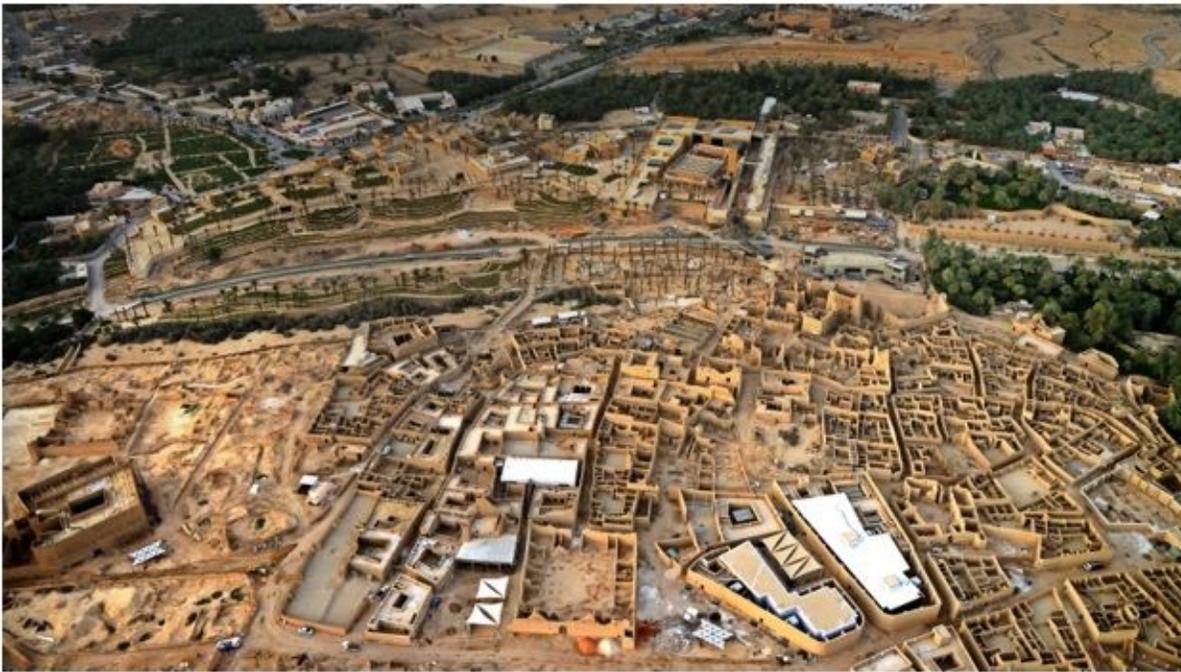


Figure 3

Old Dir'ayah city and development plan



Figure 4

Historic homes in Jeddah

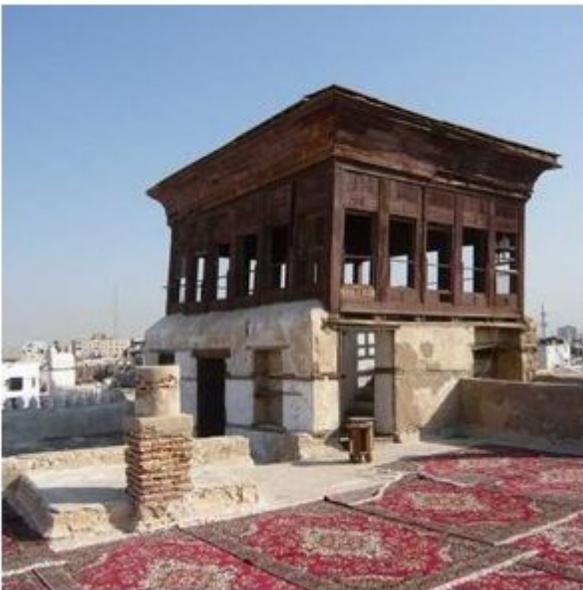


Figure 5

Historic Jeddah buildings

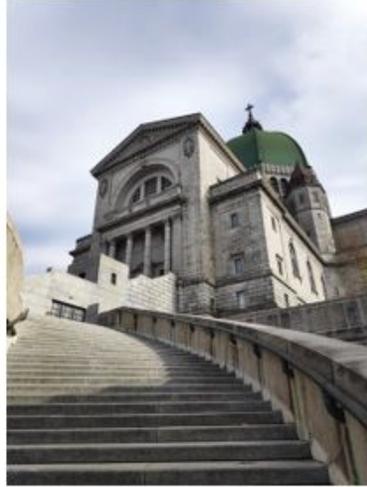
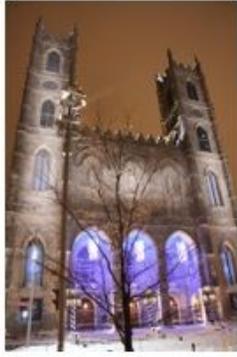


Figure 6

Images of investigated sites in Montreal and Quebec City