

# Sustainable Rehabilitation Strategy for Heritage Khans (A Case Study of The Heritage Khan of Alexandria in Iraq)

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**Abstract**--Heritage khans represent an important part of the Iraqi urban and historical fabric, as they have played prominent social and economic roles throughout the ages. However, the urban development that Iraqi cities have witnessed since the early twentieth century has led to radical changes that have caused the deterioration of khans and the loss of their traditional functions as a result of ill-considered interventions that did not take into account their heritage and cultural value. The research problem is the lack of sustainable rehabilitation strategies to address the continuous deterioration of khans due to development projects that are not compatible with the historical characteristics of these khans.

The study aims to provide a comprehensive vision of the strategy for rehabilitating heritage khans in Iraq, with a focus on achieving a balance between preserving heritage identity and sustainable urban development. The study assumes the possibility of achieving sustainable urban development for Iraqi heritage khans by adopting an integrated approach that combines preserving the heritage and architectural values of khans, and meeting contemporary economic and social requirements, through the application of a balanced rehabilitation strategy that ensures the continuity of the role of khans in the urban fabric

The study adopts a methodology consisting of three main parts; The first part deals with a historical review of the development of khans in Iraq, and an analysis of the main stages they went through, in addition to the factors that contributed to the fundamental changes in the heritage khans. The second part reviews the current project to rehabilitate the Khan of Alexandria, as a case study while the third part presents a sustainable rehabilitation strategy in proposing development interventions and their impact on the sustainability of the building, its spatial and functional impact, and its compatibility with the requirements of preserving the heritage identity. The results emphasized the importance of the participation of the local community and governmental and private entities in rehabilitation processes, as well as the need to establish a clear legal framework to protect these heritage buildings from random interventions that threaten their sustainability. The study concluded that there is an urgent need to adopt integrated policies that ensure the preservation of the heritage values of the khans while enhancing their use in the contemporary urban context. The study recommended developing training programs to preserve traditional skills associated with the restoration of historical buildings, and promoting cultural tourism as a means of financing preservation and rehabilitation processes.

**Keywords:** Heritage; khans ; Rehabilitation ; Tourism; Restoration

## 1- INTRODUCTION

The historical centers in Iraqi cities include a large number of heritage buildings and caravanserais with ancient architecture. These areas represent a physical embodiment of local and national culture, as they stand out through their traditional architectural value. Until the early twentieth century, they were witnessing continuous processes of change characterized by slowness, gradualness and adaptation to existing structures, which created a sense of continuity and cohesion in the urban fabric. (Al-Harithy, 2010)

The advent of modernity in the early twentieth century brought about a radical change in these adaptive processes, as historical centres, including khans, began to be considered incompatible with the requirements of the modern era, leading to plans for their complete demolition and reconstruction as part of modernization projects (Leibman, 2012). These attempts were justified by the desire to improve urban conditions and adapt them to contemporary needs, but they led to the loss of many of the historical and heritage values of these areas, as traditional structures were viewed as obstacles to modern development (Ameen, 2021).

In this context, caravanserais, such as the Khan of Alexandria in Iraq, played a fundamental role in social and economic life for centuries, but they were subjected to increasing deterioration as a result of development processes that were incompatible with their heritage characteristics (Mustafa, 2023).

This khan is one of the prominent examples that reflect the challenges facing heritage khans as a result of modern developments, as it suffers from structural and functional problems that require integrated renovation strategies that take into account its historical and cultural value while meeting contemporary needs. (UNESCO., 2016)

## 2- STUDY METHODOLOGY.

The study methodology includes three parts:

- Part One: A historical review of the development of khans in Iraq, and an analysis of the basic stages they went through, in addition to the factors that contributed to the fundamental changes in the heritage khans.
- Part Two: An analytical review and evaluation of the current project in the rehabilitation of Khan Alexandria.
- Part Three: Building the proposed sustainable rehabilitation strategy to study development interventions and their impact on the sustainability of the building, its spatial and functional impact, and the extent of their

compatibility with the requirements of preserving the heritage identity.

### 3- A BRIEF OVERVIEW OF THE HISTORICAL BACKGROUND OF THE KHANS IN IRAQ.

Khans in Iraq are among the most prominent historical landmarks that played a pivotal role in the social and economic life of Iraqi cities over many centuries. These facilities represented vital centers of trade and rest for travelers and commercial caravans, especially on the roads linking Iraq to neighboring countries such as Iran, Turkey and Syria. Iraqi khans are distinguished by their strategic location on the main trade axes, as they were important intersections for commercial movement and the transfer of goods and services between the East and the West. (Al-Sarhan, 2011)&(Greswell, 1958)&(Mohammed, 2016).

#### 3-1- THE ORIGIN AND DEVELOPMENT OF THE KHANS

The history of the emergence of khans in Iraq dates back to early Islamic times, when they began to take shape as simple establishments providing basic services to travelers and merchants. With the flourishing of commercial activity in the Abbasid era, the inns became thriving centers that provided various services including storage, accommodation, and trade exchange, in addition to being cultural and social centers where merchants, scholars, and travelers from different countries gathered. Figure (1) shows illustrative images of some of the heritage Khans in Iraq. The inns were built in strategic locations on the main trade routes such as the Baghdad Road and what connected it to the rest of the governorates. The development of the inns included their management and the multiplicity of their facilities, such as the kitchen, the storehouse,

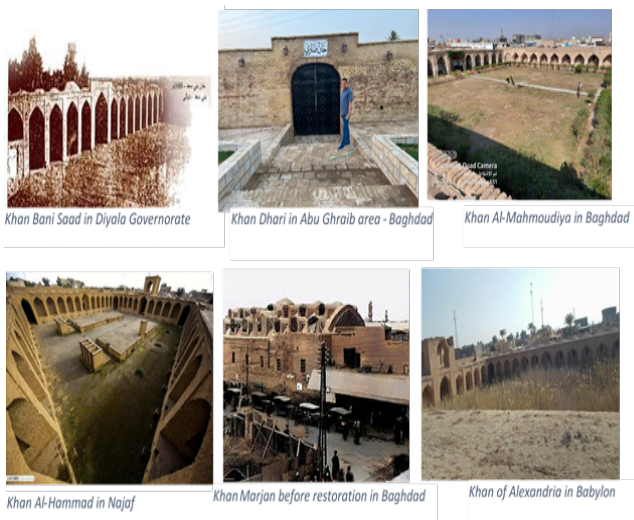


Figure 1 illustrative images of some heritage Khans in Iraq Source: Google Image

the mosque, the bathroom, the café, the stable, the livestock pens, and one or more shops to provide what the traveler or his animal needed.(Jalil, 2006) . In the big cities, the inns were numerous, and the city inns were much better than the road inns, as they contained many rooms equipped with tables for

sleeping, sitting and heaters. The more the inns developed, the more the number of workers in them increased, as each of the inn's facilities had one or more men, depending on the size of this facility. The number of guards and those responsible for the animals also increased, as well as a workshop for repairing carriages and blacksmithing and what this included of the needs of travelers and inn guests. Therefore, many inns were the nucleus for the emergence of villages and cities. We find Iraqi villages and cities, as well as certain areas known for their inns, such as Khan Bani Saad, Khan Dhari, Khan Azad Al-Yusufiyah, Khan Al-Hamad, Al-Mahawil, Al-Mahmoudiyah and Alexandria as a case study. (Khalil Ibrahim Nouri, 2007) (Mohammed, 2016)

#### 3-2- HISTORICAL STAGES OF THE MODERNIZATION OF THE KHANS.

The historical periods that the khans in Iraq went through can be divided into two main periods:

The first was before the republican rule, including the Ottoman rule, the British occupation, and the royal rule.

The second is the republican rule until now

##### 3-2-1- THE FIRST PERIOD: MODERNIZATION BEFORE THE REPUBLICAN ERA:

The khans in Iraq have witnessed transformations over the different eras, as they were affected by several factors, the most prominent of which are:

- The Ottoman era: The khans witnessed great prosperity during this period with the expansion of the commercial infrastructure, as the khans were considered an important part of the economic system of the Ottoman Empire.(Mohammed, 2016)
- British colonial era: The importance of khans declined with the advent of modern transportation systems such as railways and paved roads, which led to some khans turning to other, non-commercial functions.
- With the modernization and urban expansion processes that Iraqi cities witnessed in the twentieth century, many inns were demolished and some of them were converted to new uses that were not compatible with their original function, while some of them were exposed to neglect and extinction..(Zidan, 2022)

Heritage inns have been exposed to a number of challenges that have led to their continued deterioration. The most prominent of these challenges are:

1. Random urban expansion: Population growth and urban expansion have led to encroachment on the spaces allocated for inns and a change in the nature of their use
2. Neglect and lack of clear protection policies: The absence of effective planning to preserve these monuments has led to them losing their original importance and being gradually damaged..
3. Economic changes: The shift in commercial and economic activities led to the loss of the khans' commercial function, making them neglected and

underutilized.(UNESCO., 2016) & .(Labadi Sophia, Giliberto Francesca , Rosetti Ilaria , Shetabi Linda, 2023)

4. While rehabilitation strategies are needed, the preservation of Iraqi khans, such as Khan Alexandria, requires the adoption of effective strategies that aim to achieve a balance between preserving heritage values and meeting the requirements of modern urban development. This requires the development of clear legal protection plans, the involvement of local communities in restoration processes, and the development of sustainable tourism programs that contribute to the reintegration of these landmarks into the contemporary urban fabric. (Shaker, 2024)

Royal era and according to what he mentioned (Al-Miyaj, 1979) 'The Iraqi khans, like their counterparts in other cities, maintained their traditional architectural character until the first decades of the twentieth century. This period witnessed a gradual development that adapted to the organic urban structure that had formed over time. However, modernization policies during the period of royal rule in Iraq imposed radical changes on the social and spatial structure of the khans, as these buildings were considered an ancient heritage and unsuitable for the requirements of modernity. The government at that time adopted an authoritarian modernization policy similar to the European model, where urban development plans were implemented that included the removal of large parts of the traditional khans in favor of the construction of modern roads and new administrative buildings. One of the most prominent symbols of these modernizations was the construction of wide roads that led to the isolation of many khans from the surrounding urban fabric, resulting in the loss of their functional and social roles.(Al-Mosawi, 2017)

The royal government adopted a strategy based on combining nationalism, urban modernization and secularism as a program for managing cities. One of the most prominent interventions witnessed during that period was the removal of parts of the historical markets surrounding the khans in order to facilitate control of commercial activities, which led to the isolation of the khans and the loss of their economic function .(Darawisheh, 2019) .This period was accompanied by planning trends and economic, social and functional transformations that affected the modernization work in the khans.

### 3-2-1-1- PLANNING TRENDS

The renewal of Iraqi cities continued through the removal of old walls and the re-planning of urban areas according to modern grid models, while some eastern and southern parts of the khans remained untouched due to the presence of cemeteries and religious areas that prevented urban expansion towards them.

As in other cities, a new layout was imposed on top of the traditional fabric of the khans, with expansions concentrated in specific areas, such as the northern and western districts, while the old areas remained deteriorating and disconnected from the modern urban environment. These changes were accompanied by the construction of government facilities using modern materials and construction methods that were quite different from the traditional character of the khans. (Al-Jawi, 2008)

### 3-2-1-2- ECONOMIC AND SOCIAL SYSTEMS.

Until the twentieth century, Iraq's economic communities were based on a vertical system based on families and small handicrafts, but modernization led to the replacement of these structures with more modern systems based on industrial production and broader commercial systems. These changes led to the disappearance of some khans that could not adapt to economic transformations, while others were converted into warehouses and service buildings far from their original purposes. (Nahi, 2024)

With the increasing interest in modern industry and urban planning based on economic growth, the needs of historical areas such as khans were ignored, leading to their gradual loss of commercial importance. The lack of urban planning policies aimed at integrating heritage into development processes led to the deterioration of many important heritage buildings. By the end of the 1970s, calls began for the need to preserve and rehabilitate khans as part of the national identity. Urban planning reports called for a review of demolition and urban reuse policies to achieve a balance between modernity and heritage preservation.(UNISCO, 2003)& (Alsaliq and Alshami, 2015).

### 3-2-2- EXAMPLES OF MODERNIZATION PROJECTS IN THE FIRST PERIOD

The period between 1920 and 1940 witnessed the implementation of many development projects that directly affected the khans, the most prominent of which are:

1. Building modern roads: The construction of new roads led to the isolation of some khans from their traditional commercial axes, which led to a decline in their economic role. The introduction of modern transportation systems such as railways and public bus lines led to the khans losing their role as stopping centers for commercial caravans, which contributed to their gradual marginalization. The inability of modern means of transportation to adapt to the organic planning of old neighborhoods led to the marginalization of the khans in the eastern and northern regions of cities, which led to their social and economic deterioration.. (Al-Hashemi, 2003).
2. Establishing administrative and industrial buildings: such as the textile factory in Baghdad and the sugar factory in Mosul, which led to a shift in economic activity away from the khans..(Al-Janabi, 1985)
3. Urban modernization of residential areas: This led to the transfer of many residents and merchants from traditional areas to new neighborhoods that enjoyed modern infrastructure. The traditional urban fabric of the khans underwent radical changes during the first three decades of the twentieth century, as the historical areas became divided into two contrasting parts: the old city, which remained characterized by its narrow, organic streets, and preserved some of its traditional functions despite its deterioration. And the modern areas, which were built according to a modern grid pattern with larger areas and

improved architectural quality, which attracted the wealthier residents and pushed the poor to the neglected old parts. (Al-Jawi, 2008)

### 3-2-2- THE SECOND PERIOD: MODERNIZATION IN THE REPUBLICAN RULE UNTIL NOW:

In the late first period, which carried a trend towards returning to traditional values, and rejecting the European-style architectural patterns adopted by the previous regime. This period was accompanied by planning trends and economic, social and functional systems that affected the khans. (Almamori, 2010)

#### 3-2-2-1- PLANNING TRENDS.

This period witnessed a remarkable acceleration in urbanization and urban expansion, which led to the erosion of the traditional urban fabric of the khans. These expansions caused increasing pressure on the historical areas due to the high demand for modern commercial and residential services. According to (Al-Jumaily, 2018) Urban expansion in Najaf, Karbala and Baghdad has put great pressure on the khans, as many of them have been converted into commercial spaces at the expense of their historical functions.

#### 3-2-2-2- SOCIAL AND ECONOMIC SYSTEMS

Social changes have led to a redefinition of the role of khans in Iraqi societies, as they moved from major commercial centres to new types of uses such as museums, heritage markets, and cultural centres. Despite these efforts, some khans have faced challenges in adapting to new developments due to poor strategic planning and insufficient budgets for their maintenance. (Al-Azzawy, 2016)

#### 3-2-2-3- GOVERNMENT INVESTMENT IN DEVELOPING RELIGIOUS AREAS

The increase in investment has led to a focus on redeveloping the areas surrounding religious shrines, which has led to the marginalization of some khans and their reuse in new functions that are incompatible with their original nature. (Al-Rawi, 2009)

#### 3-2-2-4- SIGNIFICANT POPULATION GROWTH

Continuous modernization, despite its apparent traditional character, has contributed to the process of urban change in Iraq, leading to fundamental changes in the role and function of khans. As modernization efforts continue, the preservation and rehabilitation of khans remains a challenge that requires a delicate balance between development needs and the requirements of cultural heritage preservation. Several studies have recommended the need to raise cultural awareness of the importance of khans as part of Iraqi identity and to encourage cultural tourism as a means of preserving these historical monuments (Detwiler, 2008) (Abdullah, 2007) (UNESCO, 2003)

## 4- STUDY AREA: KHAN ALEXANDRIA IN IRAQ.

### 4-1-CASE STUDY:

Khan Alexandria is located in Babylon Governorate, on the trade route linking Baghdad and southern Iraq, where it represents a prominent model of traditional Iraqi khans. The

khan dates back to the Ottoman era, when it was built to provide accommodation and storage services for commercial caravans heading to and from Baghdad. Khan Alexandria is considered the second main stop for travelers and visitors on the Hilla-Baghdad road. (Al-Sarhan, 2011)

The khan is distinguished by its unique architectural design, which combines Islamic engineering elements and local construction techniques. It contains a large inner courtyard surrounded by living rooms and warehouses, in addition to areas designated for receiving merchants and travelers. The traveler James Buckingham, who was impressed by the Khan of Alexandria in terms of construction and architectural style and its difference from other khans in Iraq, especially on the Baghdad-Mosul road, in addition to the services it provides in terms of food and drink, in addition to the khan's other facilities such as the kitchen, stables, a place for prayer and a shop, mentions. (Buckingham, 1968)

The Khan consists of three castles built in successive stages according to need. Khan Alexandria is located north of Babylon Governorate. As shown in the figure(2). Its history dates back more than 300 years. During the Ottoman era, its function was that

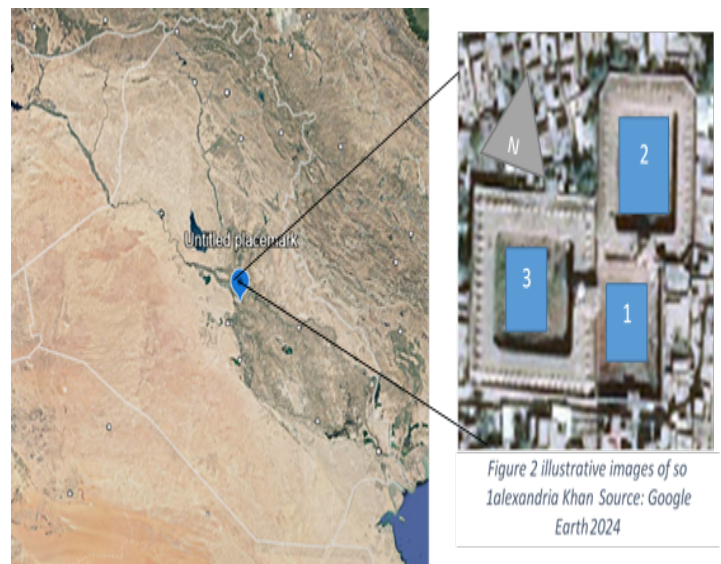


Figure 2 illustrative images of so  
1alexandria Khan Source: Google  
Earth 2024

merchants used it as a place to display their goods and a place for their horses to rest as they headed south and north. It was a rest stop for pilgrims coming from faraway places. It consists of three large castles built in successive periods in the sixteenth century AD in the centre of Alexandria, which is now called the old area. Each of these three castles contains many domes that still stand to this day. Without any changes occurring to them except for some minor changes due to climate factors After the revolution of urban and industrial development, the spread of hotels, and the emergence of vehicles and means of transportation, the need for the Khan of Alexandria was satisfied, like the rest of the khans, and its use remained local in the trade of food, agriculture, and livestock until the sixties of the last century, after which it was completely neglected and closed. It is expected that it was built in the sixteenth century. It contains one fortified door to enhance security. The traveller

(John Asher) mentioned his impression of the Khan of Alexandria, saying: "On January 7, 1865 AD, at sunset, we headed to the Great Khan of Alexandria and pitched our tent in its courtyard to spend the night there. This Khan was built by the Prime Minister of Iran for visitors to the shrine of Imam Ali, peace be upon him.(Asher, 2007) . This Khan is considered the nucleus of the development of the ancient city of Alexandria at that time. It was a commercial center that strengthened the economic aspect of the city, in addition to the cultural aspect, as cultural forums and public events for the city were held there, and sports events were held in the first squares of the Khan. Until it was neglected and abandoned in light of modern developments on the urban, economic and social levels in 1950 .(Salman, 2024)

In the previous sections, the main factors that led to the social and spatial transformations in the historical core of the khans in Iraq were analyzed, with emphasis on the different influences of successive political regimes, whether secular or religious, traditional or modern. It was shown that all these regimes, despite their different ideologies, shared the use of the urban structure of cities as a tool for projecting power and influence and enhancing prestige. Figure ( 4 ) shows the heritage centers (the Khan of Alexandria, the Mosque of Alexandria, and the Mosque of Alexandria).



*Neglect, some parts are destroyed and debris is accumulating*  
Source: Google image 4

The historical continuity of destruction and redevelopment of the urban fabric of Khans through large-scale interventions by ruling authorities represents a common pattern in dealing with these heritage monuments. The rehabilitation project Khan of Alexandria in Babylon Governorate is a clear example of the redevelopment-based approach adopted by the central government in recent decades, where work is being done to restore the khan, reuse it, and seek to modernize and repurpose the area in ways that are in line with modern urban requirements.(Salman, 2024)



*Figure 4 illustrative images of so Aerial photo of Alexandria Khan and the Mosque of Alexandria.*  
Source: Google Earth 2024



*Figure 5 illustrative images of so Aerial photo of Khan Alexandria and the main and secondary roads leading to it.* Source: Google Earth2024

#### 4-2- BACKGROUND OF THE STUDY AREA: KHAN ALEXANDRIA IN BABYLON

The study area is located in Khan of Alexandria in Babylon Governorate, which is one of the prominent historical landmarks that reflects the traditional architectural character of the city of Hillah.

##### 4-2-1- TRADITIONAL URBAN PLANNING OF THE STUDY AREA.

study area includes two main historical districts that represent the commercial and social heart of the khan: the old market district and the heritage mosque of Alexandria, which were greatly affected by modern urban projects imposed during the 1970s. Despite repeated modernizations, the traditional urban

fabric still exists in some areas, as the khan has preserved its traditional layout of a central courtyard surrounded by shops, residential rooms and commercial warehouses. As shown in Figure (5). According to (Detwiler, 2008), the relationship between the elements of the khan and the urban planning of the city was the result of a gradual development that lasted for decades. The urban environment of the khan of Alexandria lacks the aesthetic and functional (economic) values that are compatible and supportive of the values of the building, as the viewing angles are limited to a close distance from the khan. The khan is a landmark in the city and a common symbol in the memory of the residents, so it needs to provide an urban space that contains the khan block and raises the level of visual chaos. The uses in the urban environment of the khan, which are mostly commercial, have exceeded the residential function, so it is suggested that this encroachment be dealt with through removal (development policy), and the functions of the urban environment are not suitable in attracting people to the khan and its surroundings. On the functional level, it has inappropriate functions that do not contribute to the revitalization of the area and are not suitable for its historical value. Moreover, the residential function has encroached on the urban surroundings of the khan. As for the visual dimension, the urban surroundings of the khan suffer from visual distortion and a large group of aesthetic problems such as the loss of harmony, diversity and unity between the elements and components of the urban landscape. (Al-Sarhan, 2011)

#### 4-2-2- FACTORS AFFECTING THE DEVELOPMENT OF THE REGION

The area has witnessed many planning interventions over the past decades, which led to the fragmentation of the urban fabric as a result of the implementation of infrastructure projects such as the construction of modern roads and public squares. It is clear that the main connecting street narrows to the khan, whose entrance is not clear as a result of the visual distortion of the markets that cover the facade of the khan. This led to the isolation of the khan from the surrounding residential areas, which affected its functional and social connection to the rest of the city As shown in Figure (6). The urban environment of Khan Alexandria lacks the aesthetic and functional (economic) values that are compatible and supportive of the values of the building, as the viewing angles are limited to a close distance from the khan. Therefore, it needs to provide an urban space that contains the khan block and raises the level of visual chaos. The uses in the urban environment of the khan, which are mostly commercial, have exceeded the residential function, so it is suggested that this transgression be dealt with through removal (development policy). Also, the functions of the urban environment are not suitable for attracting people to the khan and its surroundings, so there is a need for a mechanism to change the functions to functions that do not harm the historical values of the khan. (Shaker, 2024). It was found that Khan Alexandria needs integration in the functional dimension due to its non-operation, as there is no current function that occupies the building while all its other values are available (social symbolism, authenticity, temporal beauty). It was also found that the residential buildings in the urban surroundings of Khan Alexandria greatly affect the integration of the building and its urban surroundings (inappropriateness of the surrounding

functions and inappropriateness in economically activating the area). There is a state of very strong social connection of the residents with Khan Alexandria. (Zhang and Dong, 2021)

#### 4-3- THE EFFECTS OF IMPLEMENTING THE MAIN STREET ON KHAN ALEXANDRIA.

Despite the expected benefit of the main axis linking the governorates, it did not affect the Khan in a positive way due to the lack of well-thought-out plans to visually link the Khan to the axis and the accompanying expropriations. The implementation of the Karbala-Baghdad axis project as a main axis linking the north of the city to its south, and contains wide pedestrian paths on each side, in addition to green areas in the middle. Despite the ambitious goals of this project, its impact was negative on Khan Alexandria in several ways:

##### 1. Isolating the Khan from the rest of the city:

The construction of the road separated the historic area from its new urban surroundings, which led to a decrease in the number of visitors and a decline in commercial activity.

##### 2. Economic transformations:

Large parts of Khan's surroundings were converted into shops, which raised rental prices and displaced many of the original residents.

##### 3. Traffic congestion:

Congestion rates in the area increased due to the heavy traffic flow, which affected the accessibility of the historic sites. (Detwiler, 2008)

#### 4-4- CONCLUSIONS AND LESSONS LEARNED.

The case study of Khan Alexandria is a clear example of the challenges facing historical areas in Iraq in light of rapid urban expansion and modernization. Although development projects aim to improve infrastructure and achieve economic development, they often lead to the loss of the targeted areas' historical and heritage identity.

The research aims to use Khan Alexandria's proposed rehabilitation strategy as a successful model for balancing cultural heritage preservation and modern urban development. This provides a unique opportunity to promote cultural tourism in Babylon Governorate. With the continuation of restoration and development efforts, the Khan is expected to become a prominent tourist destination in the region.

The redevelopment of Khan Alexandria represents a significant challenge in balancing heritage preservation and modern development. The experience highlighted several lessons learned, including:

- The importance of involving the local community in planning processes to ensure the preservation of the social and cultural character of the area.
- Developing flexible strategies aimed at balancing economic development and preserving heritage identity.
- Promoting integrated planning that takes into account environmental and social factors alongside economic requirements

## 5-REVIEW OF THE CURRENT REHABILITATION PROJECT OF KHAN ALEXANDRIA IN BABYLON:

The current project for the rehabilitation of the khan represents a case study model, which is reviewed for the purpose of analysis, criticism and building a proposal for a sustainable rehabilitation strategy for the khans in Iraq. Figure No. ( ) shows the main stages of implementing the rehabilitation program

### 5-1-THE FOUR MAIN STAGES OF IMPLEMENTING THE KHAN ALEXANDRIA REHABILITATION PROGRAM.

The rehabilitation of Khan Al-Iskandaria in Babylon Governorate began in 2021, as part of the Rehabilitation of Archaeological Sites in Iraq Project. The project included several overlapping phases, and faced many challenges related to land and property acquisition, financing, technical implementation, and architectural design. These challenges contributed to delaying the project and causing significant changes to the scope of implementation and timeline. (Alsumaria News, 2021)

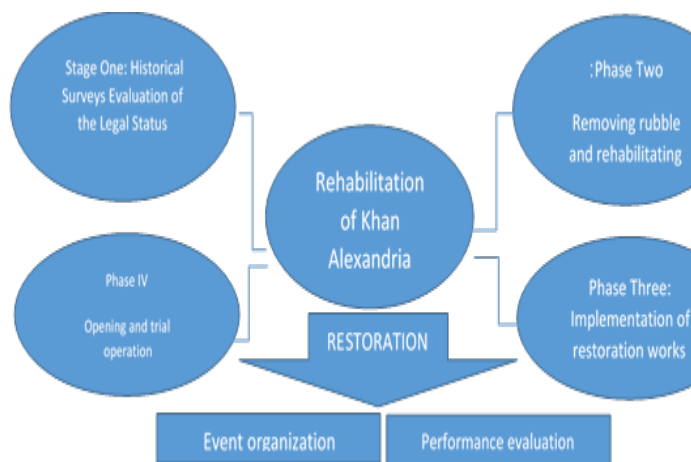


Figure 7 shows the stages of work in the Khan of Alexandria according to the plans. Prepared by the researchers

#### 5-1-1-FIRST PHASE (2021-2022): PLANNING AND PRELIMINARY STUDIES.

At this stage, the Babylon Antiquities Inspectorate began conducting preliminary studies to rehabilitate the khan, which included:

- Historical and architectural surveys to assess the condition of the remaining buildings and identify damaged parts that require reinforcement or reconstruction.
- Assessing the legal status of the lands, as some adjacent properties had to be expropriated to create parking lots and improve access to the site.
- Developing general plans that define the initial architectural designs, including preserving the heritage character of the khan while providing modern facilities such as tourist services and heritage restaurants)

- At this stage, the project faced difficulties in coordinating between the various governments agencies, in addition to the need for additional funding to ensure the completion of the necessary detailed studies.(Babylon Antiquities and Heritage Inspectorate, 2020)

#### 5-1-2-THE SECOND PHASE (2022-2023): REMOVING RUBBLE AND REHABILITATING THE INFRASTRUCTURE:

The actual rehabilitation work for the khan began in 2022, and this phase included:

- Removal of debris and random accumulations that had accumulated over the past decades led to a significant improvement in the overall appearance of the site.
- Restoration of damaged walls and strengthening of foundations to ensure structural stability.
- Improving basic infrastructure, such as providing sewage, electricity and water networks to meet the site's future needs. (Babylon Antiquities and Heritage Inspectorate, 2020)

However, this phase faced some obstacles, such as the need for more funding and over-reliance on government agencies, which led to delays in implementation.

#### 5-1-3-THE THIRD PHASE (2023-2024): IMPLEMENTATION OF RESTORATION WORKS AND SITE DEVELOPMENT.

At this stage, the focus was on implementing the final architectural designs and developing the site to be ready to receive visitors. This stage included:

- Creating modern facilities inside the khan, such as a small museum that displays the history of the site and the old commercial activities that were practiced there.
- Creating green spaces and pedestrian paths to improve the visitor experience and make the Khan a tourist attraction.
- Improving the interior design of the shops and rooms inside the Khan while preserving the Ottoman heritage character of the Khan. (Babylon Antiquities and Heritage Inspectorate, 2020).

At this stage, the project faced repeated administrative changes that led to delays in some construction work, as reports from the Iraqi Ministry of Planning indicated that weak management was one of the main reasons for the slow implementation. (Salman, 2024).

#### 5-1-4 -PHASE FOUR (2024-2025): OPENING AND TRIAL OPERATION.

The pilot operation phase of the Khan will begin in mid-2024, and this phase includes:

- Evaluating the Khan's overall performance after completing rehabilitation works (restoration only), including testing services and tourism facilities.

- Organizing cultural and tourism events to highlight the Khan's importance and attract local and international visitors.
- Evaluating the economic and social impact of the project on the local community and providing job opportunities in the tourism and hospitality sectors. (Salman, 2024)

#### 5-2- CHALLENGES FACED BY THE PROJECT.

According to the Babylon Antiquities Inspectorate, the project faced several challenges during the implementation stages, most notably:

- Difficulty of access: due to the narrowness of the road leading to the khan for bulldozers and cars
- Residential encroachments on the Khan wall
- Lack of infrastructure services, some of which encroach and affect the wall (houses adjacent to the wall)
- Funding difficulties:(Babylon Antiquities and Heritage Inspectorate, 2020)

The rehabilitation project of Khan Alexandria can be considered a model for the challenges facing heritage preservation projects in Iraq. Despite the delays, ongoing efforts aim to transform the Khan into an important tourist and economic landmark that reflects the region's history and promotes sustainable development

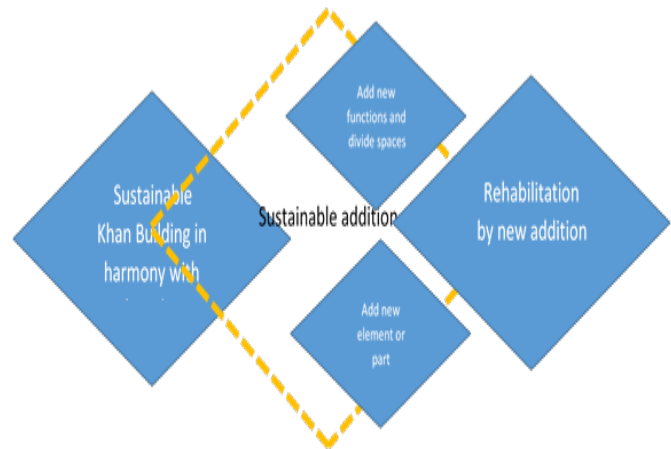
### 6- BUILDING A SUSTAINABLE REHABILITATION PROPOSAL FOR THE HERITAGE KHAN OF ALEXANDRIA IN BABYLON.

#### 6-1- PROPOSED DEVELOPMENT PROJECT

In general, it aims to transform the area into a modern commercial and touristic center. The project focuses on:

- Improving the infrastructure by creating a new road network to facilitate access to the area.
- Rehabilitating historical buildings to preserve the traditional character of the khan while introducing modern architectural elements.
- Creating pedestrian walkways to connect the khan to the surrounding areas and enhance the visitor experience.

In detail, it aims to implement sustainable rehabilitation and apply it as a strategy by developing the building through contemporary additions at the functional, element, and detail levels. Therefore, the research will address the sustainable rehabilitation strategy at two levels: the level of the heritage building (the khan) and the level of the urban environment. As follows: figure no. (8)



The figure no. (8) shows a diagram of the proposed strategy for the sustainable rehabilitation of the heritage khan. Prepared by the researchers

6-1-1- THE FIRST STAGE: USING MODERN TECHNOLOGY IN SUSTAINABLE REHABILITATION PROCESSES INCLUDES THE FOLLOWING:

6-1-1-1- DIGITAL DOCUMENTATION AND ARCHITECTURAL PRESERVATION: EFFECTIVE DOCUMENTATION WORK IS CARRIED OUT USING TECHNIQUES SUCH AS

- 1- D scanning to document the architectural details of the khan
- 2- Documentation through GIS to analyse the urban changes of the Khan
- 3- Artificial intelligence, such as the (Uni-smart) model, to analyse the literature related to heritage.
- 4- Creating an accurate digital model that contributes to restoration work without distorting the original identity.

#### 6-1-1-2- ENHANCING THE TOURIST EXPERIENCE

This is done through virtual reality (VR) in the destroyed places of the inn and to explain the inn's work in previous times. An example is the Khan Janjah experience in Iran, which allows visitors to experience history interactively

6-1-2- THE SECOND STAGE: PLANNING STAGES. THIS STAGE INCLUDES:

#### 6-1-2-1- DATA ANALYSIS AND PRIORITIZATION:

- 1- Structural condition assessment: using BIM models to analyze structural weaknesses
- 2- Identify elements that need rapid intervention, such as (arches and domes)
- 3- Classify priorities and sort works into (emergency preservation, preventive restoration, and functional improvement)

6-1-2-1- DESIGNING AN INTEGRATED REHABILITATION PLAN

- 1- Integrating sustainability into the design (using local materials) and integrating renewable energy systems (solar panels, air conditioning systems, and smart lighting).
- 2- Compliance with international conservation standards: by adhering to international and local principles and charters and applying LEED or BREEM standards for sustainability.

6-1-2-2- FIELD IMPLEMENTATION WITH COMMUNITY PARTICIPATION THROUGH

- 3- Involving local craftsmen and training them on modern restoration techniques.
- 4- Integrating traditional crafts into the new designs added.
- 5- Periodic monitoring through the local antiquities and heritage inspectorate.

6-1-2-3- CONTINUOUS MONITORING AND MAINTENANCE THROUGH:

- 6- Smart monitoring system using (Drones) to periodically inspect the external structure
- 7- Data analysis via platforms such as (GIS) to detect subtle changes
- 8- Adaptive maintenance by updating plans based on environmental performance reports

6-1-2-4- FINAL DOCUMENTATION AND EVALUATION:

- 9- Publish the results through a comprehensive report with a comparison between the condition before and after rehabilitation (pictures and tables), and share the data with organizations such as UNESCO and others
- 10- Measure the community impact by surveying the population's opinion on improving the quality of life. And analyze the increase in the number of tourists or local economic activity.

Table No. (1) Shows the planning and implementation stages. Prepared by the researchers.

Tools used	The scheduled period	Stage
BIM Software	1-2 months	Data analysis
AutoCAD software and simulation model	3 months	Sustainable design
Recycled materials + IOT sensors	6-12 months	Implementation
Drones+GIS	Continuing	Monitoring

6-1-3- THE THIRD STAGE: THE TRIAL OPERATION STAGE. THIS STAGE IS IMPORTANT TO REDUCE FINANCIAL RISKS, IMPROVE THE USER

EXPERIENCE, AND ENHANCE CONFIDENCE. THIS STAGE INCLUDES:

- 1- Testing smart systems and infrastructure.
- 2- Operation training.
- 3- Trial operation by hosting visitors.
- 4- Final evaluation before opening.

6-2- REHABILITATION AT THE URBAN LEVEL:

To ensure the integration of the khan with its urban surroundings and enhance its role as a cultural and economic centre, the following procedures must be followed:

6-2-1- ANALYSIS OF THE SURROUNDING URBAN ENVIRONMENT THROUGH:

- 1- Study the terrain and current uses: (Determine the nature of the surrounding areas (residential, commercial, and industrial) using Geographic Information Systems (GIS) tools. And analyze the flow of traffic and pedestrians around the inn.
- 2- Evaluate the challenges: discover weaknesses (such as road congestion, lack of parking spaces, or lack of green spaces).

Improving the infrastructure can be explained according to the table (2) prepared by the researcher.

The details	Procedure
Expansion of secondary streets to connect the Khan to the main areas, with the addition of pedestrian paths	Developing the road network
Establish a nearby transportation station equipped with screens displaying arrival times and electronic booking applications.	Smart transportation
Providing important services to visitors and residents of the old area	Public facilities
Using solar-powered lighting with motion and environmental sensors	Other services such as sustainable lighting

- 3- Integration with neighboring areas:
  - o Establishing a functional network by linking the Khan to commercial areas via shaded pedestrian walkways or suspension bridges and designing tourist paths that link the Khan to other heritage sites in the area.
  - o Enhance economic activity by allocating areas for handicrafts and traditional restaurants around Khan to support the local economy, and establish an open market (Open Bazaar) that displays local products inspired by heritage.
- 4- Enhancing public spaces and green areas:
  - o Enhancing green spaces and revitalizing the urban environment that includes the heritage khan through Smart gardens with a design equipped with smart irrigation systems based on weather data and groundwater readings so as not to affect the heritage

- building negatively. And planting local plants that adapt to the climate.
- 5- Interactive squares by creating platforms for folk art shows or interactive workshops.
  - 6- Community participation in organizing workshops for residents on the importance of preserving heritage and how to benefit from the heritage khan. Involving schools in educational programs on the history of the region and sustainability techniques. Collecting residents' opinions on proposed urban changes using dedicated applications .
  - 7- Integrating technology into urban services through:
    - o Smart urban platform in developing a unified application that provides information about the heritage khan and city services. And using visitor data to improve event planning.
    - o Smart monitoring systems based on algorithms to monitor population density and manage crowds during events.
  - 8- In conclusion, the sustainable rehabilitation of the urban environment of the Khan is no less important than the restoration of the building, as it requires integrated planning that includes infrastructure, community participation and environmental sustainability while preserving the heritage identity of the area. This transformation creates a qualitative shift for the Khan from an isolated area to a vibrant heart of the city that attracts investments and enhances the quality of life.

#### 7- EXPECTED RESULTS OF THE PROJECT.

- 1- Raising the economic value of the Khan: The project is expected to attract new investments in the tourism sector.
- 2- Improving the quality of life: Providing facilities and services that meet the needs of visitors and local residents.
- 3- Enhancing the cultural and historical role of the Khan: Transforming it into a cultural center that reflects Babylon's historical identity.

The heritage Khan of Alexandria in Babylon. The Rehabilitation Project can be considered a model for reviving Iraqi heritage by balancing modernity and preserving cultural identity. The planned improvements are expected to transform the Khan into an essential regional tourist and cultural destination. Adopting a "sustainable rehabilitation" approach that allows for modern construction techniques while respecting historical authenticity and involving international experts in architectural conservation to ensure the adoption of global best practices. The reorganisation of Khan Al-Alexandria's ownership structure represents an essential step towards

developing a sustainable investment environment in the region, focusing on achieving a balance between heritage preservation and economic development. Despite the social and economic challenges that the project faced, the government directives and financial strategies followed are expected to ensure the long-term success of the project.

#### 8- CONCLUSIONS

The case study of Khan Alexandria in Babylon shows that the site has undergone major transformations over the past century, while maintaining its religious and commercial importance as a major stop for caravans and commercial vehicles. Despite major changes in government systems and urban planning methods, Khan Alexandria continues to play a pivotal role in shaping the urban fabric of the Alexandria area, as it is analyzed across three main phases of structural change in the area.

By analyzing the influence of ruling authorities on the social and urban development of the khan, it is shown that political, economic, and cultural forces played a role in rehabilitating the site in line with government priorities. Political and economic pressure, along with cultural factors, led to a strict modernization approach that focused on achieving economic gains rather than preserving the full historical character of the khan.

This study emphasizes the great importance of heritage khans in Iraq, such as Khan Alexandria in Babylon, as vital symbols of cultural and historical identity, which face increasing threats due to unplanned urban expansion and the lack of sustainable rehabilitation strategies. By analyzing the historical and contemporary challenges facing these khans, the study concluded that the optimal solution lies in adopting an integrated approach that combines preserving heritage values and keeping pace with the requirements of modern urban development.

The most prominent results were the balance between heritage and modernity, as the study showed that the use of modern technology is an effective tool in documenting and restoring khans without distorting their identity, while tools such as virtual reality (VR) enhance the interactive tourism experience. The results emphasized the need to involve the local community and craftsmen in the restoration processes, which enhances belonging and ensures the sustainability of the project through the transfer of traditional knowledge.

As reviving the khan as a cultural and economic center requires improving the surrounding infrastructure (such as smart road networks and green spaces), and linking it to neighboring areas through tourist corridors and sustainable economic functions. The project faces challenges such as urban encroachments and lack of funding, which requires strengthening the legal framework and adopting partnerships between the public and private sectors. The Khan Alexandria Rehabilitation Project thus represents a pioneering model for the revival of urban heritage in Iraq, proving that combining modern technology with traditional practices is not only possible, but necessary for balanced urban development. This approach is not merely a response to the challenges of the present, but an investment in the future, transforming the khans from neglected ruins into vibrant hearts, restoring the city's identity and enriching the history of future generations.

## 8- RECOMMENDATIONS:

- 1- Adopting sustainability standards: Integrating local building materials and renewable energy systems (such as solar energy) to ensure environmental and economic efficiency.
- 2- Promoting cultural tourism: Transform Khan into a tourist destination through heritage events and smart applications that promote its history.
- 3- Supportive legislation: Enacting strict laws to protect heritage sites from random interventions, and linking urban planning with heritage preservation policies.

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