

Design for Revitalizing Historical Identity: Case Study Zakho Old Bazaar, Kurdistan Region, Iraq

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Abstract

A town in northern Kurdistan, near the border of Iraq, Turkey, and Syria converge, Zakho was rural center and regional marketplace. The city exhibits remarkable sites dating to various eras, including Dalal bridge and Al-Qeshla, an ancient site with significant religious attraction. Zakho has been a center of religious diversity, dynasty to Muslims, Christians, and Jews, which has significantly influenced the city's rich urban environs and architectural heritage. The old bazaar's architecture reflects multiple historical eras. Zakho old bazaar is located in the area where the river splits into two branches, forming an island. The historical value of the old bazaar relies in its unique architectural elements, materials, and crafts which formed specific cultural and architectural identity for the city. Due to the strategic location, the city had prolific urbanization process toward all directions. The old bazaar left abandoned and subjected to deterioration. In 2022, an initiative project was issued as a competitive design proposal and a detailed budget plan for revitalization of Zakho old bazaar. This research focuses in the design phase of the old Zakho bazaar exploring sustainable urban design principles to make the design ready to be implemented. A contemporary design was proposed with special focus on the city's culture and historical identity restoring the cherished cultural values and repurpose the abandoned commercial activities as initiative attempt for future development in the lavish old site.

Keywords: Architecture, design, heritage, historical city, identity, old bazaar, cultural

INTRODUCTION

Background

Zakho is a town in northern Kurdistan, near the point where the borders of Iraq, Turkey, and Syria converge. It was a rural center and a regional marketplace. The ancient village is often neglected by historians, being only marginally mentioned Al-Tabari (421 B.C.), and William Francis, a famous traveler who commented on it. The appearance of Zakho in the present day coincides in a remarkable manner with what it was described to be in the time of Xenophon. The Greek warrior and historian Xenophon is thought to have passed through Zakho with his army of 10 thousand mercenaries in 401 B.C, defeated by the savage attack by Kurds, or "Carduchians," as he called them [1]. In 1909, the renowned British archaeologist Gertrude Bell visited Zakho and proposed that it may be the site of the ancient town of Hasaniyeh, further connecting the city to its ancient and significant past, leaving behind stunning photos for historical sites, which no longer exist today. Zakho's, history is one of both success and devastation. It is believed that the city was rebuilt on a historic island, continuing its role as an important trade center, both regionally and internationally was clearly significant (Figure 1).

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Zakho has long been a center of religious diversity, dynasty to Muslims, Christians, and Jews, which has significantly influenced the city's rich urban environs and architectural heritage. The old bazaar's

architecture reflects multiple historical eras, though much of its context has been lost due to a lack of proper documentation. The city has remarkable sites dating to various eras including Dalal bridge, which dates back to the 16th century (Al-Abasy 1948), and Al-Qesha, an ancient castle housing a small jail and the offices of the provincial administrator. Stone and suspension bridges linked the island to Muslim neighborhoods, a small Christian quarter, and the boys' primary school [1].

Zakho old bazaar located on the area where the river splits in to two branches forming an island, the old city has unique location with beautiful scenery, as it is geographically elevated. The old bazaar was combined with shops, crafts, khans (warehouse) and hammams (bath), in the era of 19th century. It was sufficient to fulfill the population needs living within the territory. The historical value of the old bazaar relies in its unique architectural elements, materials and crafts which formed specific cultural and architectural identity for the city.

Due to the strategic location of the city, in addition to social, economic and political changes in the region, the city had prolific urbanization process toward all directions. Other commercial streets were developed forming new bazaars in Zakho city. The old bazaar left abandoned and subjected to deterioration. The main reason for this is that, on the one hand, new construction materials and urban forms appeared to re-emerge with the needs of contemporary lifestyle, which was difficult for the historic bazaar to fulfill, since the old bazaar dominated by old buildings, narrow street and poor infrastructure, etc. On the other hand, the absence of awareness within the government agencies for the importance of the historical and cultural value of the old bazaar resulted in leaving the old bazaar abandoned. It started to be turned down physically, economically and socially. The bazaar transformed from a vibrant area to an inhibited bazaar, now named as (The Dark Bazaar).

Research Focus

The development of the city endured several phases. Each of them focused on specific target, marginalizing and revitalizing the old city center, while facing various challenges. The absence of a detailed design was one of the main obstacles to gain one single step toward preserving the cultural identity of the city. The identity of a city is evolved through a long time period. The city is formed with its geographical, cultural, architectural character, tradition and customs and lifestyle [2].

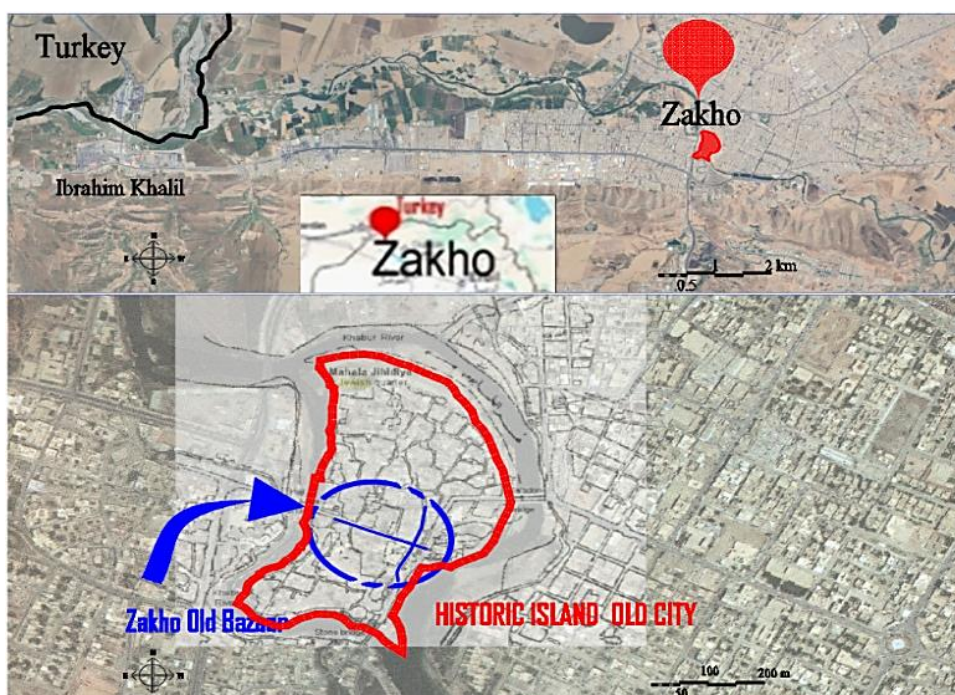


Figure 1. Study area, sources historical map.

There were several meetings discussing features and criteria of a proposal project to be implemented that could be contemporary and yet preserve culture and historical identity treasures, the city will be the focus for locals and visitors. Sustaining urban identity, especially in historical sites, has become a critical issue [3]. The responsibility of designing an old bazaar of Zakho specifically had embraced vast challenges to overcome. The lack of clear guided strategies within governmental agencies, the lack of experience (with the context of designing for historical sites) of judging bodies in addition to the absence of documentation for the site, made the design phase a real challenging task [4].

Preserving cultural identity of historical sites embodies the social, economic and architectural heritage of community. The process of preserving cultural identity is to balance the architectural elements within contemporary urban design, which is inspired by historical context and updated with modern detailed design and implementation method [5]. The research revealed that the old bazaar has potential resistance against modernism. However, with government support, attempts to strengthen old historical centers will turn challenges into potential [5].

Revitalization of historical bazaars maintains sustainable urban development by re-adapting existing deprived bazaar, and reducing urban sprawl. The old bazaar involves more than 150 shops, with at least 2/3 of them were completely closed when the project started. Re-opening closed shops will generate income for families. Bazaars have the potential to boost economic growth and strengthen social cohesion, fostering community life with wide range of social and economic benefits. At the end, the study stands as a critical contribution to the limited body of knowledge regarding the adaptive reuse of bazaars within the context of modern urban design as an academic contribution.

Objectives and Scope

The research explores key aspects of historical identity, including the bazaar's layout, building materials, historical elements, and construction methods, to propose detailed and implementable design strategies. The objectives include analyzing the historical value of Zakho bazaar by studying its background and current status, yet assessing its physical condition, infrastructure, and architectural characteristics. The study examines design components in construction, and explores their potential reapplication in renovation phase. In addition, governance dimensions are reviewed by addressing regulations to address possible improvement chances, previous renovation plans, and government opinions.

The critical objective is to identify and revitalize the preservation of historically significant lands, sites, and structures for modern use with sustainable features. It is assumed that by implementing the proposed design, the dying old bazaar will be restored to vibrate cultural exchange hub with modernized utilities. Elderly people will benefit from the project, since they have the knowledge to present the intangible feature of Kurdish culture in this unique place. Children will have sense of belonging to such intriguing environment, building deep roots to their identity.

The renovation area was assigned by the independent administration to the old bazaar which includes the old traditional bazaar known locally as "Sika Tari" or "The Dark Bazaar" in addition to the widest branches from both sides. The area embraces the shops in the old bazaar. Despite the fact there were many smaller branches, it was excluded due to financial obstacles. Pleasantly, after the first phase was completed, a second phase embarked shortly, exploring the detailed design proposed for the first phase, as it has the same characteristics.

LITERATURE REVIEW

The article presents the review of traditional old bazaars' key features, values, functions, and architectural value — maintaining architectural identity, while ensuring to provide contemporary urban environment as the main challenge. The historical and cultural significance of a heritage building is huge. Therefore, restoring a heritage structure becomes the ideal approach, as weathering conditions lead to the gradual dilapidation of buildings over time. Recognizing the challenges of heritage restoration is essential

to finding effective solutions. The old bazaar embodies not only the physical historical structures but also the stories of societal evolution and change over time (Gharipour, 2012) [5].

Historical Bazaars

The bazaar was the heart of economy [5]. It is an intended place for buying and selling and supplying various goods. The bazaar is a place where social and cultural activities is seen, and its main elements are the sellers and the buyers. Traditional bazaars in big cities considered the central core of the city. The bazaar has played a key role in the economic, cultural, and even political transformation of cities [5]. Since the beginning of the first century B.C., in many new cities and almost all the old cities, permanent bazaars have existed with pre-constructed spaces, having a vital role in political, economic, social, cultural and in religion. The results of its needs and goals formed the image of the city, in other words, city identity [6].

Physical elements in the traditional bazaars in the Middle East have an independent identity. As the city's business center, bazaars also strengthened social, cultural, and political activities. This incorporated feature gives physical shape to the traditional bazaars, yet it reserves their historical and architectural value despite the changes introduced by the modernized system [7].

The elements that make up old bazaar's identity and guarantee it as cultural heritage are the type of architecture and its complementary role in providing the social welfare needs of society [8]. It is mentioned that the old city center often preforms as a permanent exhibition, a fluxing attraction for culture treasures and a dynamic way of living. Yet it represents the local sense of place and identity as a vibrant, active space (Figure 2) [9].

Urban bazaar was a popular urban space which could accommodate commercial activities as well as social and cultural activities of people. Architecturally speaking, urban bazaar is a covered public passage which is bounded by shops and stores in two sides. It was, therefore, a place for shopping, walking, social dialog, and cultural interaction of people. It has acted as the most important and influential public space in ancient cities [8].

To understand the identity of the environment, we get to know the places which reveal people's culture and their dynamism, and navigate developments in the types of their architecture. Since physical conditions create a special identity, cities are considered one of the greatest achievements of culture and a pervasive social phenomenon of the present age (Figure 2).

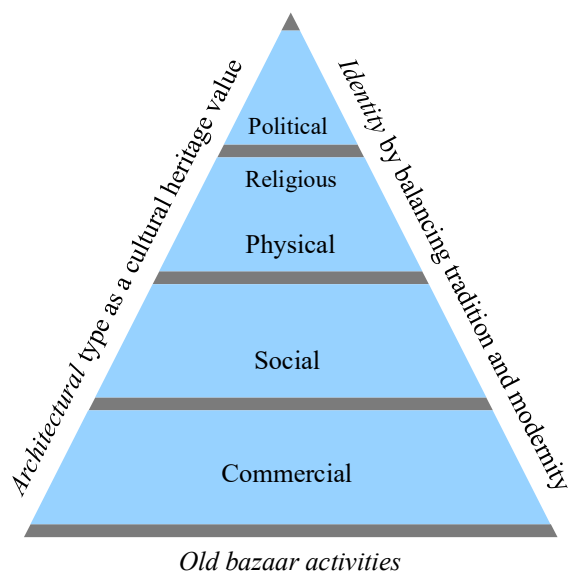


Figure 2. Bazaar functions and activities.

Design Approaches in Historical Preservation

Historic cities are crucial in shaping a nation's cultural heritage and identity. They possess unique architectural, cultural, and historical significance [10]. Regeneration of these cities involves preserving their heritage while adapting to contemporary needs and challenges. Regeneration initiatives to preserve and revitalize these cities have gained significant attention in recent years. Houben et al. [11] and Kazepov Y. [12] emphasize the importance of balancing tradition and modernity [13]. One of the primary challenges in renovating historic cities lies in the delicate balance between conserving the building's historical integrity and meeting modern standards for functionality, safety, and comfort. The battle between preserving the past and sustaining the future may create tension. Careful decision-making to retain building's essence while ensuring its relevance for present and future use.

According to ICOMOS [14], a successful heritage reuse project modifies a place or building for a compatible reuse while retaining its cultural heritage value [15]. Successful reuse projects incorporate good design for the building, suitable planning for the environment and also the community's concern about the future of the heritage sites.

The adaptive reuse stands as a dynamic strategy in the conservation and revitalization of cultural heritage treasures for new functions, ensuring that their cultural, historical, and architectural features are maintained [16]. The key principles include [17] historical integrity, minimum intervention, compatibility and continuity, sustainability, community engagement, compliance with regulations and innovative functionality.

These principles aim to balance the preservation of historical value with the functional requirements of modern use, while maintaining cultural identity of urban areas. Historic buildings hold a unique charm that captures the imagination of many, including real estate developers. The opportunity to restore and repurpose these architectural treasures can be both rewarding and challenging [18]. Revitalizing historic buildings requires careful planning, creativity, and collaboration. By understanding the historical significance, navigating preservation regulations, balancing modern needs with historic integrity, engaging the community, and leveraging available financial incentives, developers can turn challenges into opportunities and breathe new life into cherished landmarks [19].

METHODOLOGY

The research focuses on the design phase of revitalization of Zakho's old bazaar. The bazaar is located on the island formed by Khabur River, with elevated topography, which adds significant value to the project as a central area for various activities mentioned within literature review. In order to answer the research questions, the following main aspects are examined [20].

Research Framework

The study area was assigned by Zakho's Independent Administration as an initiative project for historical preservation, intended to be ready for implementation in 2022. An official announcement was made inviting companies to apply for the bid. However, very few documents were available at the initial stage to support the design proposal for the revitalization of Zakho's old bazaar. The design had to be submitted along with a bill of quantities to determine the budget, which was limited to a specific financial allocation.

The documentation consisted mainly of a brief project announcement letter and a DWG file containing a site plan of the old bazaar area, which offered limited information about the buildings. While the streets and shop outlines were defined, there was little detailed data about the actual site boundaries. The timeline for preparing the design was compressed to two weeks, followed by an additional four weeks allocated for negotiations with authorities to finalize decisions or suggest improvements. Additional data was gathered on collapsed buildings, which had deteriorated due to improper renovation strategies or harsh weather conditions, leading to demolitions before conservation regulations were enforced.

Several techniques were proposed for implementation to mimic the historical components as reference; however, durability was the controlling factor for renovation strategy, for example, the original roofing system for most shops consisted of timber trunks covered by mud and hay mixture, similar to roofing system in old villages. A new composition was proposed by the researcher to give the same visual characteristic with durable material that assures building quality to match the contemporary styles.

Data Collection

Data collection was the most critical phase, which demanded frequent visits to the site, collecting as much information as possible about every detail within the site. The methods utilized were: interviews, observations, literature review, as well as site examination via maps, and photographs. Large number of photos and videos were used as data to get each detail on the site. However, a lot of the shops were evacuated due to the deteriorated physical elements and poor infrastructure. Combining the site data from the DWG file with observations from the site visit was the starting point for developing the initial design proposal. In addition to this, available historical records for the site were reviewed. Despite the fact that the city had been visited by many famous travelers, their feedback about the old bazaar was very limited. Luckily, I was able to find valuable photos of the island and other historical structures like Dalal bridge and Al-Qeshla of Zakho from reliable sources, like New Castle University website, which presented photos taken by the British archaeologist Gertrude Bell in the beginning of the 1900s.

The old bazaar movement was a combination of various circulation patterns dominated by vehicles, small cars, motorcycles, pedestrian and even heavy-cargos were seen by the researcher on the site. This type of circulation negatively affected the viability of the bazaar, since the road was as narrow to be 4 meters or less in some alleys, which is so small for heavy-cargo to maneuver in the site.

A detailed design projects in old city centers faced critical challenges; however, the desire to get the design implemented was a pushing factor for the project's success. First of all, the absence of reliable documentation for the site was a real challenging factor. There were limited rules and regulations regarding renovation of old sites. As mentioned previously, it was the first project dealing with historical sites in Zakho. In addition to the fact that there were very few experts with the proficiency to negotiate critical decisions. Additionally, there were financial restrictions which led to minimize the designed area affecting the quality of some martials. The proposed design relied on analyzing the site outline and buildings (in the site and out the site within Zakho territory, building style for the same time period), in terms of construction material openings, arch types, roofing systems and pavements.

Following data collection, the researcher started site analysis, as a proposal design and a strategy for the future. This included people's perceptions, and their interaction with the unique project to be embarked as soon as possible. It is not veiled that this type of project was the first in Zakho that involves such a significant number of people from close perspective. The perception of people was rare and reluctant for the project in the beginning. The problem is that the authority had no previous clear plans for the project, which resulted in ignoring the local people from the design phase, which lead to negative implications during the implementation phase. Kalogiannidis Stavros [21], emphasizes that urban design is affected by various factors such as political and economic inputs, which may push the development in favor of specific sector ignoring the others. In addition to a centralized management system based on political desires rather than people's demands, planners must take the lead in balancing conflicting interests with the project's requirements.

Documentation

For the design phase, several tools and software were used to accomplish the design process, starting from mobile smart phone with 32 MP resolution camera to take photos, and videos for the site. A total station is an electronic/optical instrument used in modern surveying and building construction that uses electronic transit theodolite in conjunction with electronic distance meter. AutoCAD 2020 software was used for site analysis and detailed 2D designs, while Rhino 7 was used for 3D modeling, and 3-dimensional

presentation of the proposed design. In addition, Photoshop, Microsoft Office Excel, Word and PowerPoint were used to complete the task.

DESIGN PHASE PRESENTATION

Concept Development

The design philosophy is ingrained in preserving the value of cultural identity for Zakho's old bazaar while rationally introducing modern functionality. We aim to preserve the site's historical significance by engaging its traditional architectural elements, materials, and craftsmanship in new design ideas. At the same time, we add new contemporary infrastructure and adapted spaces to meet the needs of today's users. The goal is to create a pleasant balance between the old and the new, where modern merges with old elements rather than overshadow the historical character. Focusing on community and sustainability, the revitalized bazaar will become a vibrant space that celebrates its relevance heritage and remains operative for future generations.

The guidelines addressed for the detailed design project was aimed to minimize interference to partial interference and demolition (unfortunately) was the only option for risky elements. The design outline follows a detailed analysis of original items from the site that will be presented in this article. Imagining the detailed components of the old collapsed structure was the main resource for the detailed design proposal. Therefore, a practical implementable approach was defined for the concept of design outline to preserve the cultural features of the site, such as local materials, building processes, and aesthetics. Zakho city is home to several historic landmarks characterized by their unique architectural styles and use of local materials. Some of the most striking landmarks in Zakho are: Delal Bridge and The Zakho Castle (Al-Qeshla).

Delal Bridge, or Pira Dalal in Kurdish, thought to have Roman origins, while the present structure appears to be from the Abbasic era (Al-Abasy, 1948). With a height of over 16 m and length of 115 m, the picturesque bridge was built using large river stones. It was made with large stones which gives the aesthetic value to the bridge. The bridge went through several environmental catastrophes, standing strong and resistible. The most recent was a flood in 2023, when water raised about 5 m above its normal level, destroying most the surrounding structures (some of them recent constructions), leaving Dalal bridge standing strong and beautiful. I was present, watching the power of the nature destroying everything around it, leaving the bridge with minor harm. It was truly an impressive experience (Figure 3).

The Zakho Castle, also known as "Al-Qishla", stands on the western bank of the Khabur River. Since its exact construction date is vague, archaeologists suggest it dates back to the 13th or 14th century AD [22]. The tower predates the castle itself, built upon the ruins of an older structure. The castle went through significant reconstruction, losing much of its historical characters. Zakho Centenarians (elderly) has pictures belonged to different eras with no reliable sources (Figure 4).

Inspiration began from landmark's details, especially the arche types, proportions, and materials used in these significant historical sites. Despite of the fact that, these landmarks had been constructed in various eras with several layers of renovation styles; this does not diminish their value and uniqueness.

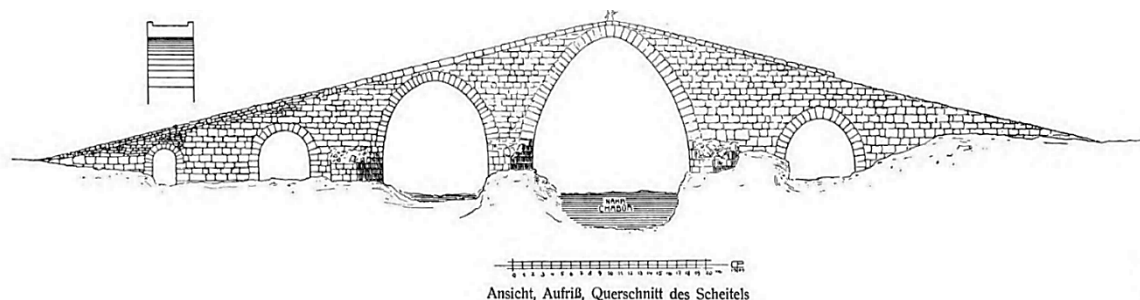


Figure 3. Diagram for Dalal Bridge.



Figure 4. Khan entrance, Al-Qeshla entrance, Al-Qeshla details, Al-Qeshla site.

Layout and Planning

The historical old bazaar located in the heart of the city, with the road entrance located on the south bank of the Khabur River. The bazaar has twisted accesses and narrow alleys that keep the cultural privacy, ends to the east with the castle “Al-Qeshla”, which is placed at the south edge of the Khabur River. Along the road, there were shops on both sides with various shapes, areas and facilities. However, most of them were evacuated due to the collapse of their roofs and/or walls. Additionally, there are houses that belonged to well-known people in the previous eras. These too were evacuated either due to collapse of some parts (House 2 Figure 5) or because the owners were not interested to live in them (House 1 Figure 5). The main road, with shops on both sides, was about 150 m in length, sub-road branches were about 100 m long, and another road with shops on one side was about 100 m in length, facing Al-Qishla. However, Al-Qishla was excluded from this phase by the authorities. In conclusion, around 300 m of bazaar in length was to be renovated. The proposed design for revitalizing the old bazaar combined with several strategies:

- *First, pedestrian road:* Converting the old bazaar into a pedestrian road was the most important strategy. Despite the fact that it faced challenge, as there are several houses around the narrow paths; however, more innovative strategies were used to solve the challenge.
- *Second, improve infrastructure:* The old bazaar’s service quality was devastating due to the maintenance process, as most individual renovation processes were blocked by the Directorate of Antiquities in Zakho. Electricity, plumbing, and drainage services were in bad condition.
- *Third, ploy-steel roofing system:* The proposal suggested to cover the main road with steel structure roofing system covered by polyethylene sheets, combined with ventilation by elevated spans to ensure natural air ventilation throughout the road passage. In addition, nearby houses were proposed to be converted into facilities serving as tourism-based infrastructure (e.g., utilities, restaurants, café, etc.).
- *Fourth, multi-use of shops with traditional features:* Reserve original façade, wooden doors and LED-lighting elements in order to enrich the cultural identity. It was proposed that the shops along the road to be facilitated as cultural activities, such as handcrafts, cultural foods, cultural clothes and so on. Since historical identity is composed of both tangible and intangible features, the proposal of re-assigning the specific activity of the shops along the old bazaar is to make a combination of cultural identity that also supports economic development.
- *Lastly, new gates for the old bazaar:* Based on site analysis, it was proposed to add four gates, two of them for the first phase of the project and two in the upcoming phases [23].

The integration of traditional and modern architectural features engages examining historical design principles, techniques and materials, with modern innovative application to create spaces that are culturally profound, functional, and visually pleasing (Figure 5). This approach enquires meeting modern needs, such as technological advancement, sustainability and accessibility, while preserving the heritage and architectural identity of Zakho’s old bazaar.

Key elements of layouts, materials, and construction method conserve historical continuity, while modern infrastructure (e.g., electricity, sanitary and plumbing) improves functionality. Sustainable design includes traditional materials like type of stones and elements, wood, and steel with modern, and

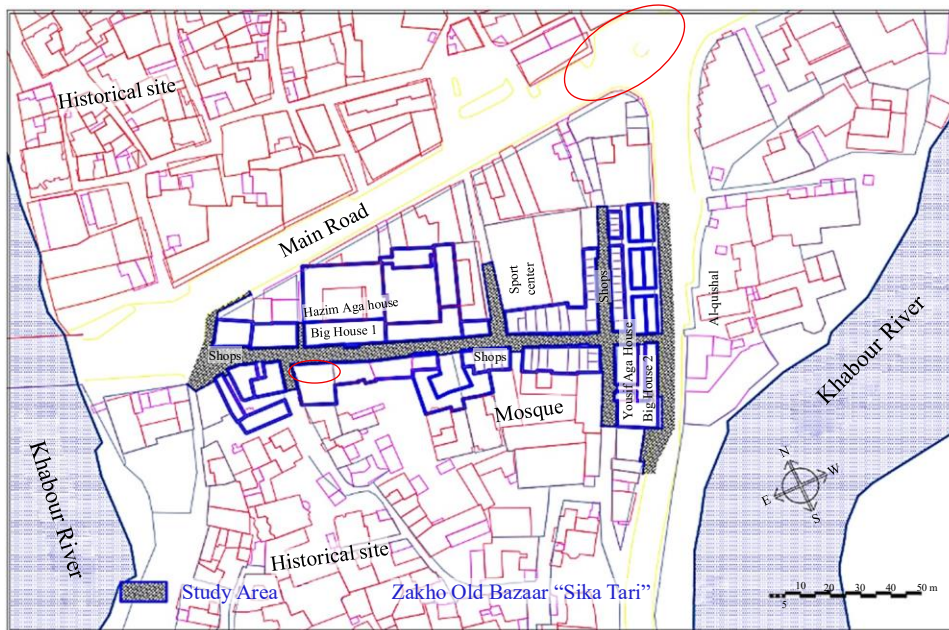


Figure 1. Study area, source (Directorate of Tourism of Zakho) modified.

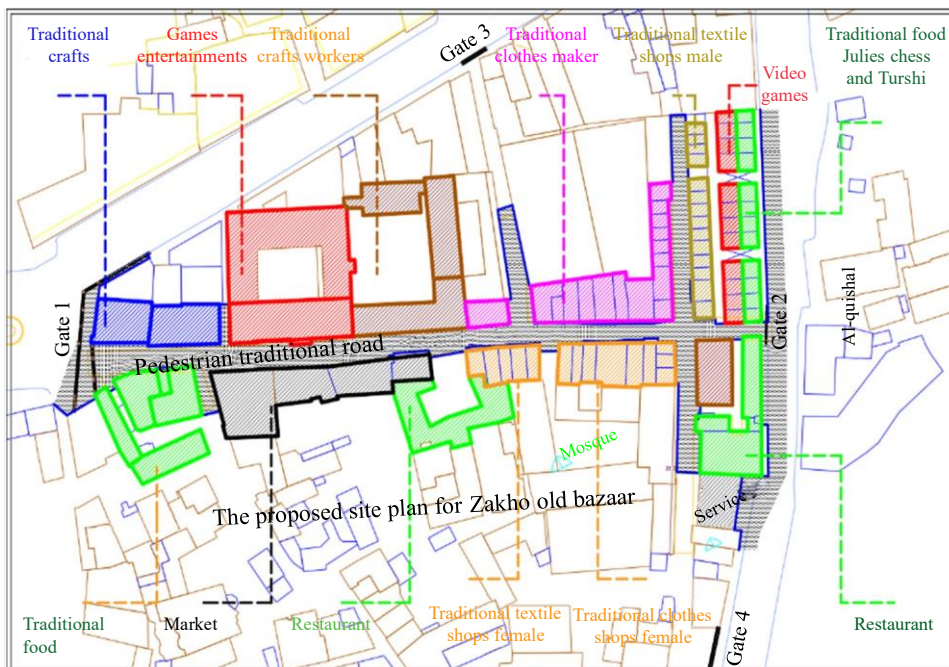


Figure 2. The proposed site plan designed.

eco-friendly methods. Balancing aesthetics ensures new constructions match historical treasures, creating visual harmony. Finally, represented spaces must associate with their community rules, revitalizing historical structures such as old bazaar into vibrant places, active centers that intriguing their unique social and cultural purposes while meeting contemporary demands.

In the case of Zakho old bazaar (Figure 6), the integration process would demonstrate: preserving traditional architectural features like arches, roofing systems, and decorative elements; modernizing the structure to incubate contemporary commercial activities and social events; collaborating sustainable technologies to guarantee energy efficiency. Finally, using design strategies that reflect the cultural spirit of Zakho while addressing the needs of its current users.

Detailed Design Decisions

This article explores the significant features of Zakho bazaar and their integration into the proposed design. Key elements, including roofing systems, awning, arche's typology, façade and other architectural elements, are analyzed in detail, demonstrating how traditional characteristics have been purposefully employed to ensure the design reflects the bazaar's historical essence.

Roofing

Roofing system in the old bazaar delves the multicultural identity for the bazaar, as there were several roofing types with different quality of materials and structure reliability, which implies the era that they belong to.

- *The first type*, vaulted (dome) roofs, is the oldest roofing system. This type of roofing belongs to 18th or 19th century found in few shops in bad condition. The design proposed to maintain dome type roofing and re-construct them in the implantation phase when there was no risk of collapse (Figure 7).
- *The second type* consists of timber trunks covered with bay leaf mat. The last layer is a mixture of mud and hay, these materials were locally sourced and build by local workers. This type has been widely used in most of the villages in Kurdistan, dating back to era older than 18th century and continuing until today. The shops were in deteriorating condition with a lot of problems. Majority of shops were built by this type, which is why the researcher focused on it to propose a suitable compatible method to reconstruct.
- *The third type* — steel section supported roofs, belongs to the era pre 1950s, before concrete been produced. The structures of this type were in better condition, making renovation or modification suitable option for them. This type was found in two houses, and a few shops (Figure 8).
- *The last type*, reinforced concrete roofs, belongs to era after the 1950s. A suitable option to modernize this type was to harmonize it with older methods of construction.



Figure 7. Roofing: Vault (dome) types is the oldest roofing system.



Figure 8. Roofing: Steel section supported roofs belongs to the era pre 1950s.



Figure 9. Roofing: Timber tree trunks, it was the local material build by local workers.



Figure 10. Roofing: Reinforced concrete roofs which belongs to era after 1950s.

In conclusion of the physical analysis, the solution was essential for timber trunk roofing. As mentioned before, most shops with this type of roof were unsuitable for contemporary use. A reconstruction proposal was adopted in the design phase, offering contemporary solution, while keeping the place's identity. A combined roofing system with several layers was proposed (Figures 9 and 10). The new roof was composed of timber trunk (local production) distributed in 0.6 m interval along the short span, covered by interlapped palm mat layers (also local production), and finally 0.15 m reinforced concrete was the last roofing. The rainwater was discharged through pipes connected to a separate pipe grid that ends in the river. This method gave the same historical identity ensuring durability, eco-friendliness and sustainability of the roofing system.

Walls

Three types of construction materials for walls were found on the site.

1. *Natural stones* modified into rectangular shape. It is the most common construction material for mountainous areas, which locally called (bare bazi), it means natural stone reshaped by human. This method indicates its high-cost for construction, as although natural stones are available nearby, reshaping and transporting them to the site requires labor and resources.
2. *Stream stones*: Rounded, organic rocks in mixed sizes that bring a riverbed type of effect, used seamlessly for both exterior and interior walls (Barzevk in Kurdish). These stones were used as construction material for load bearing walls as well as for footings. The mortar used at the time was lime and water mixture — a very plastic and creamy paste made by carbonation process. However, rapid dry process reduced carbonation resulting in poor adhesion and poor durability, which resulted in deterioration of building condition as the stone has the identity essence.
3. The most recent material found in some shops is concrete blocks, sometimes used partially, and in other cases, the entire structure was built using concrete blocks. It was explicit that the concrete blocks were extraneous substance material and not original. However, due to the low cost, concrete block was the easiest choice for local renovation (Figure 11).

The design strategy was to bring back the structure to its original form. For wall materials, only two types were used, excluding concrete blocks, as they do not belong to the original character of the place. When more than one material was found in single structure, the design proposed to renovate it was the oldest one.



Figure 11. Wall cover typology reshaped. Natural stone, stream stone and concrete block.



Figure 12. Arch typology in Zakho old bazaar.

The structures built in natural stone were in a better condition than those made with stream stones, due to the deteriorated mortar in stream stones. As a result, renovating structures made of stream stones incurred extra costs.

Arches

There were mainly two types of arches in the old bazaar. Most of the old shops had half rounded shape in the study area. There was another type which is called Abbasy style. It was used at entrances of old khans (warehouse) and the castle, which has also been imitated in some shops in recent years. The construction method in the old bazaar was made by wooden skeletons to start building from both sides simultaneously, the last stone called key stone piece (Figure 12).

The researcher proposed the same method to be mimicked in the new design for collapsed parts of the structures. The researcher proposed the Abbasy style for the entrances with a unique design for the main entrance located in the south near the riverbank, and a simpler design for the other locations.

Windows

It was mentioned previously, the old bazaar has two houses—House 1 and House 2, which became main historical sites. In addition, elements from sites beyond the old bazaar were analyzed to make a broader understanding of the detailed architectural features. Beautiful oak- framed windows were found within the collapsed structure, protected by steel bars, describing unique place identity. It is the aesthetic sample for the origin of cultural proficiency of the workers of that time (Figure 13).

Most of the windows were in rectangular shape, rather than arched, which is common in most historical buildings. Windows had small width, did not exceed 1.1 m, more diversity was observed in their heights. As a researcher, I believe, the reason to reduce the width but not the height was that they were creative to reduce the cost and time for construction. They used oak sections for window lintels instead of arches, as arches take more time and cost to construct. Another possible reason that they may have decided to have their own style, which is also a rational objective.

Doors

There was very little information about the original typology of door's material and physical shapes. In the current situation, the original elements have been replaced by various so-called contemporary



Figure 13. Arch typology in Zakho old bazaar for sites no more exists.



Figure 14. Windows in Zakho old bazaar, house 2 windows, another house in the same area.



Figure 15. Old shop's doors in the old bazaar.

materials (Figure 14). As the researcher noticed, most of the shops were dominated by corrugated galvanized steel roller doors that could be slid up or down. Additionally, the old arches were hidden by PVC glassed structure. They look weird and outstanding the original door types in the bazaar. Whether the doors were made of steel or glass, it was clear that the original ones were wooden, as some parts still remained to their original condition. The reason behind such disparities likely relates to the low income of the owners (person who run the shop mainly by rent) and in addition, the absence of supporting programs by the government.

The designer, in corporation with Zakho independent administration's engineers, agreed to visit sites similar to Zakho bazaar. At the end of negotiation, the final decision was to replace the doors with wooden doors inspired by the old bazaar of Mardin.

Floor Pavement

The main elements of street-scape are paving, street lighting, street furniture, planting, amenities, and public utilities (Figure 15). Zooming into Zakho old bazaar, most of these elements have been existed. Small details were noticed on the site; however, they were often found in hidden corners or sometimes extraordinary details inside shops, like a bench look like sitting place or a palace for setting a green element. In addition, regarding paving, the original material no more exists, since the floor was paved by several layers during the evolution. However, it was noticed that wall materials were used for paving, included rectangular-shaped stones as well as stream stones.

It was agreed that basalt would be chosen as pavement material for the old bazaar. This can be addressed both as a weakness and a strength. It is considered a modern material for paving which suits both old and new construction. Basalt has a pleasing view and its dark color reflects the identity of the bazaar and gives the façade more value.

Enhancing usage in historical bazaars ensures they continue functional and relevant for contemporary users while enhancing their cultural identity. This involves innovative integration of modern systems to improve comfort, accessibility, and overall user understanding without conceding the historical essence.

Accessibility

- *Pedestrian pathways:* Ensure a free barrier design, entrances, and accessible interiors for all. Integrate ramps, wider walkways without disrupting historical features.
- *Seating and rest areas:* Integrate comfortable seating and resting spots that reflect traditional craftsmanship while providing contemporary needs for relaxation.
- *Green area:* These are for revitalizing the area and increasing the vibrancy within the community.
- *Sun protection:* Provided the sun shading shelters that cover the old bazar pedestrian paths ensuring natural ventilation system within the detailed design.

Infrastructure

The old bazaar had severe deficiencies for an appropriate infrastructure, including electricity, water supply and healthy sanitation system. The quality of infrastructure on the site was poor and risky, the design proposed replacing the existing grids rather than renovating the old grids, as most of them were made of outdated materials, such as galvanized pipes in the water grid system. Electricity grids were in bad condition, further worsened by visual contamination caused by hanging wires. The proposal includes equipping the bazaar with fire extinguisher system in addition to water reservoir to ensure all shops have access to clean water.

- *Sustainability solutions:* Introduce green infrastructure, such as solar panels, rainwater harvesting systems, and waste management strategies.
- *Technology integration:* Provide modern facilities such as security systems, Wi-Fi, and charging stations to meet modern user expectations.

Sustainable Design Considerations

Thoughtful strategies can ensure that the bazaar becomes environmentally responsible while preserving its cultural and architectural identity. Using eco-friendly materials into Zakho old bazaar requires a balance between sustainability and the conservation of its historical principles.

Renovating Zakho old bazaar involves strategies that balance sustainability with historical preservation. Locally sourced materials like stone, wood, and clay, along with modern alternatives such as recycled bricks and stones from the site, natural insulation, and lime-based plasters, ensure compatibility with the historical fabric. Renewable energy solutions, including energy-efficient LED lighting and discreetly placed solar panels, reduce energy consumption while maintaining the bazaar's ambiance. Water conservation techniques like rainwater harvesting systems and enhanced traditional drainage, minimize water waste without altering the historical layout. Passive design strategies utilize natural ventilation through arches and courtyards and optimize daylighting with skylights to reduce artificial lighting. Green infrastructure, such as planters, vertical gardens, and permeable paving, improves aesthetics, air quality, and rainwater management while respecting the spatial character. Pedestrian pathways ensure safety and viability in the old bazar. Giving privilege to local people to be a part in implementation phase enhances a sense of responsibility and belonging to the place.

Integrating these strategies, the old center can serve as an icon for modern sustainability practices while preserving its unique historical identity. This approach ensures that the bazaar remains practically functional, environmentally responsible, and culturally relevant for both present and future generations.

DISCUSSION

Cultural Impact

The design of Zakho old bazaar thoughtfully protects its cultural identity by respecting its historical spirit while incorporating improvements that reinforce its role as a community and commercial center. Key architectural characters, such as arches, roofing system, traditional facades, and courtyards, have been carefully preserved to maintain the bazaar's visual and spatial features. These elements, iconic to Zakho's heritage, serve as markers of cultural continuity and provide a sense of place uniqueness for visitors. The use of locally sourced traditional materials, including stone, wood, and clay, ensures harmony with the original construction while maintaining authenticity. Additionally, sustainable alternatives like local bricks and lime-based plasters reinforce the commitment to traditional craftsmanship while supporting environmentally sustainable practices.

The revitalized design also prioritizes the bazaar's commercial and social functions, ensuring it continues to serve as a vibrant place for trade, cultural events, and social interaction. The design protects Zakho old bazaar's cultural heritage while improving its relevance, making sure it remains a livable, functional, and culturally specific space for future generations.

Practical Usability

The revitalization of Zakho old bazaar strikes a delicate balance between preserving its historical charm and meeting contemporary needs. Through the thoughtful integration of modern infrastructure and functionality, the design ensures that the bazaar remains both practical and culturally significant.

A key aspect of the project is improved accessibility, with features such as ramps, pathways, and accessible entrances. Clear and strategically placed signage enhances navigation and user comfort. Modernized infrastructure plays a critical role in successfully adapting the site while safeguarding its visual integrity. Upgraded drainage systems, a concealed electrical grid, and improved water supply enhance usability. Additionally, fire safety measures and advanced security systems align the bazaar with modern safety standards.

Sustainability is another cornerstone of the redesign. Energy-efficient LED lighting has been carefully installed to maintain the historical ambiance while improving visibility and reducing energy consumption. Solar panels align with environmental goals, while passive design strategies optimize natural ventilation through open pathways, courtyards, and arches, minimizing the need for mechanical cooling. Skylights reduce dependence on artificial lighting, creating a naturally bright and inviting atmosphere. Together, these enhancements ensure that Zakho old bazaar continues to thrive as a cultural landmark while adapting to the needs of modern life.

Lessons Learned

The design process of revitalization of Zakho old bazaar has offered valuable insight lessons that can guide similar projects (future revitalizing phase 2, 3,..) focused on historical spaces. A key lesson is the careful balance between historical conservation and modern functionality. Maintaining architectural significance such as courtyards, arches, and traditional materials ensures historical permanency, while integrating contemporary elements like energy-efficient lighting, natural lighting, and accessibility characters enhance usability. This balance offers spaces to return to their cultural soul. The sensitive context design has also proven essential; understanding spatial significance of the site strengthens its cultural and social values, and the connection between the revitalized design and the community engagement. The use of locally sourced materials and traditional craftsmanship not only conserve authenticity but also supports local economy.

Sustainability has been a crucial principle, presenting that contemporary environmental goals can be merged with historical integrity. Passive strategies, natural ventilation, modern solutions, for e.g., solar panels and rainwater harvesting, conclude how heritage sites can adapt to environmental standards.

Attention to detail, such as lighting and integrated infrastructure, highlights how powerful design decisions can match rather than prevail historical characters. These details emphasize that a universal approach, harmonizing preservation, usability and sustainability, ensures that historical sites remain resistant, functional, and culturally significant for coming generations.

CONCLUSION AND RECOMMENDATIONS

Summary of Findings

As the first attempt to revitalize a historical site in Zakho, the design phase outcome will have a significant role in sustaining revitalization projects in Zakho. Since the project covered limited area from the old urban fabric of the city, the outcome will be intriguing as first step is done, making it easier to continue the process. The design phase of the Zakho old bazaar gave a futuristic modern image of the devastated current situation of the old bazaar, uncovering precious treasures, never seen before in the abandoned site.

Seeking searching, and elaborating, the challenging equilibrium between reserving cultural and architectural identity against modern functionality, came out with conscious implementable strategies that only fit for Zakho bazaar, since they rely on inputs from the unique city of Zakho. Some of those strategies:

- Retained the bazaar's cultural and architectural identity by restoring significant elements such as arches, and traditional facades.
- Used locally sourced materials like stone, wood, and clay to ensure authenticity.
- Revived traditional craftsmanship, enhancing cultural continuity
- Introduced modern infrastructure, including improved water supply, drainage systems, and rainwater harvesting.
- Emerged sustainable strategies such as natural ventilation, daylight optimization, led lighting, and rainwater harvesting systems.
- Created accessible pedestrian pathway, with ramps, widened pathways, and inclusive entrances ensuring that the bazaar incubate all users, including individuals with disabilities, locals and visitors.

The design carefully balances the preservation of cultural heritage with the enhancement of functional performance, ensuring the space remains relevant, adaptable, and meaningful for future generations.

Recommendations for Implementation

A successful transition from the design to the implementation phase requires several reasonable steps to ensure the revitalization of Zakho old bazaar is achieved effectively while preserving its cultural and architectural identity.

- *Detailed documentation* of the site details, including architectural drawings, materials, building's descriptive condition and construction guidelines, should be finalized to ensure clarity pre-embarking execution. A thorough assessment of the site conditions, including structural reliability, existing utilities, and historical features, must be conducted to identify any challenges and align the construction process with preservation demands.
- The *procurement of skilled labor and materials* is precarious. Cooperating with local craftsmen and technicians will ensure traditional building techniques are protected, while the local source for materials such as stone, wood, and clay will maintain authenticity. Modern eco-friendly solutions, like solar panels and rainwater harvesting systems, should be planned early to be integrated seamlessly with traditional construction.
- *Implementation phase* should be accelerated to minimize disruption to the local community's commercial activities. Explicit timelines, budgets, and resource management plans must be established to monitor progress effectively. Regular stakeholder engagement with the local community, authorities, and contractors will ensure alignment with cultural, social, and economic needs. Finally, rigorous quality control and preservation oversight throughout construction will ensure historical features are protected while modern elements are applied, resulting in a functional, sustainable, and culturally enriched space.

Future Research Directions

To evaluate the long-term success of the Zakho old bazaar revitalization project, future research should focus on studying its post-implementation impact across cultural, social, economic, and environmental dimensions.

- *Culture preservation assessment* is essential to define how consciously the revitalized bazaar preserved its historical identity. Researchers can study the condition of conserved architectural elements, the integration of traditional materials, and the observation of visitors and locals about the visual impacts of the space. Surveys and interviews can help scale the project's contribution to increase cultural awareness.
- *Socio-economic impacts* should be analyzed to understand the bazaar's role in boosting community engagement and reviving economic activity. Metrics assessment could be applied such as increased foot traffic, growth in artisanal, social and commercial activities. Further research can explore accessibility, inclusivity and how improvements impacted the experience of diverse users including individuals with disabilities, locals and visitors.
- *Environmental assessment* should be evaluated by studying the performance of sustainability like natural ventilation, energy-saving systems, and water conservation techniques. Research can measure energy consumption, environmental footprint, and user enjoyment with eco-solutions.

Heritage revitalization projects globally could be improved by exploring Zakho old bazaar future researches.

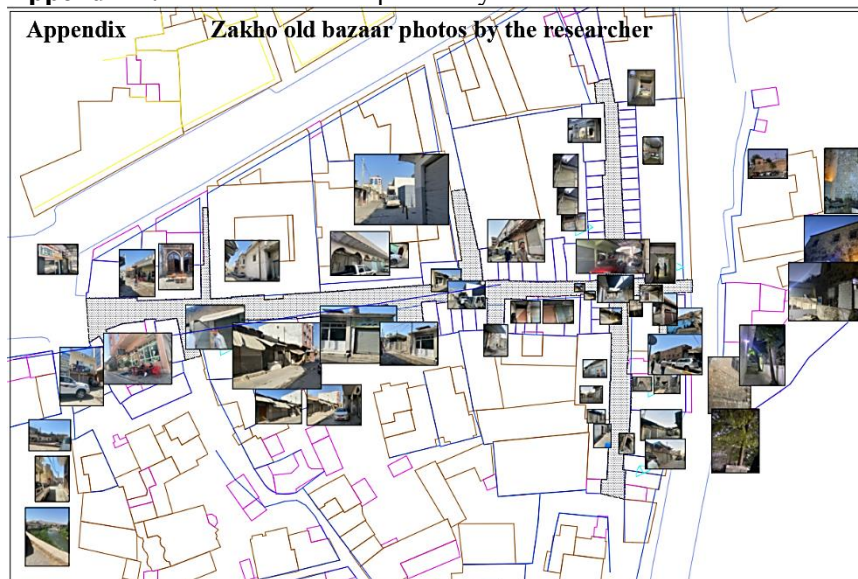
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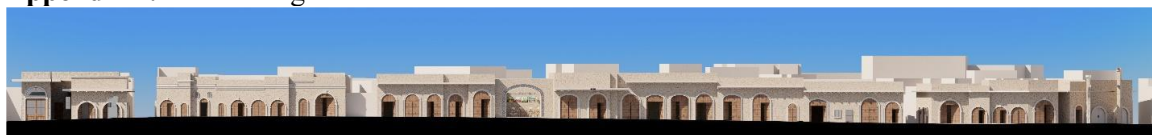
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APPENDICES

Appendix 1. Zakho old bazaar photos by the researcher



Appendix 2. Detail design set for Zakho old bazaar 2D



Render 1. Panorama north side.



Render 2. Top view without sheller.

Render 3. Top view with sheller.

Appendix 3. 3D design rendering set for Zakho old bazaar



Render 4. Top view west, entrance.



Render 5. Front entrance.



Render 6. Top view, east.



Render 7. Entrance details.



Render 8. House 1 view.



Render 9. Zakho old bazaar in contemporary design.



Render 10. Zakho old bazaar in contemporary design.



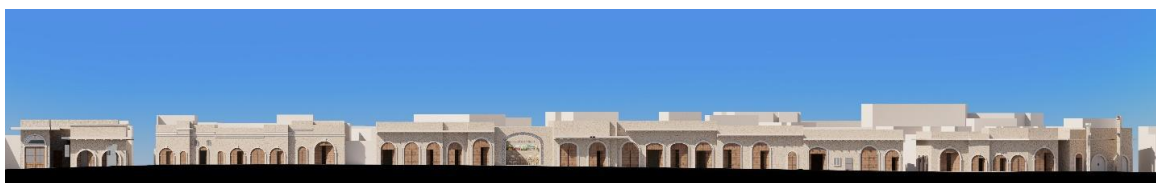
Render 11. Panorama south side.



Render 12. Shops along the bazaar.



Render 13. House 1 design.



Render 14. Shops restaurants.



Render 15. Modern space with old style.



Render 16. Inspiration from traditional building methods.



Render 17. East side shops opposite to the castle.



Render 18. House 2 north east.



Render 19. House 2 south east.