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Contextual Preservation and Contemporary Facilitation of Qaisaria in Iraqi Kurdistan Region

Mohammad Ahmed Shehab [1,*], Raz Saeed Faraj [1]

[1] Department of Architecture, College of Engineering, University of Sulaimani, Sulaymaniyah, 46001, Iraq

*Corresponding Author: Mohammad Ahmed Shehab, E-mail: mohammad.shehab@univsul.edu.iq

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Abstract

Qaisarias, traditional marketplace with rich cultural and architectural importance, are distinctive element of urban settings in the Islamic world and beyond. Integrating them into contemporary urban settings is essential to preserve their historical significance and practical purpose. The article examines the integration of Qaisaria's historic buildings in Iraqi Kurdistan's urban setting, highlighting the area's unique architectural legacy. This study highlights deficiencies in existing studies on the impact of formal and synthetic relationships in urban contexts. It emphasizes the need for a more comprehensive understanding and evaluation of how these relationships affect urban cohesion and architectural integrity. By examining how successfully Qaisaria buildings in Erbil and Sulaimanyah integrate with their urban contexts, this research aims to close this gap. Employing a mixed-methods approach, this study combines data obtained from direct field observations, analysis of space syntax, and comprehensive case studies to assess the integration of Qaisaria buildings into their urban environments. The data reveal varying degrees of integration between formal and synthetic relationships. Some buildings display distinct disparities in their formal integrity compared to their synthetic integration, resulting in diverse integration outcomes within their urban surroundings—the discussion centers on the implications of these findings for urban planning and the conservation of cultural assets. The paper asserts that specific assessments are essential to enhance the incorporation of Qaisaria buildings into their urban environments.

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1. Introduction

Urban context plays a crucial role in shaping the development of cities and defining their uniqueness. The balance of vistas, open spaces, and the connections between different structures and the surrounding environment form the foundation for analyzing how buildings fit within their settings. Prior investigations into how buildings fit within urban contexts have typically separated discussions and the importance of formal relationships, which cover geometric and aesthetic elements, from synthetic relationships that address the functional integration within the urban environment. Notably, the research by Cerasi [1], Young [2], Al-Hinkawi & Haki [3], and Broadbent [4] focused primarily on the formal elements. On the other

hand, Alexander [5], Alkubaisy [6], Salingaros [7], and Oktay [8] concentrated on the synthetic aspects. Muneeb [9] attempted to examine both areas but failed to delve deeply into either. This situation highlights a critical deficiency in the literature: the lack of studies that thoroughly integrate both formal and synthetic relationships. This deficiency becomes even more significant in areas with rich cultural and historical contexts, such as the Iraqi Kurdistan Region, where understanding the integration of historical buildings within rapidly evolving urban contexts is crucial.

Existing studies on integrating buildings with urban contexts extensively explore formal and synthetic relationships. However, each study has specific foci and limitations, highlighting the need for a comprehensive approach that addresses formal and synthetic relationships. The heritage buildings known as Qaisaria – which possess enthralling structural facades – are predominantly found in Erbil and Sulaimanyah in Iraq's Kurdistan Region. Designing a building that has aesthetic qualities that are both appealing and functional in its designated context is always an undertaking. It is necessary to consider the formal and synthetic connections between the building and its components concerning the city context [10]. Formal relationships refer to the physical or geometric and visual relationships between the building, its elements, and the surrounding environment. These include the confrontations between its form, scale, and proportions, as well as those of neighboring structures and its position in the overall organization of the city's district [10]. Formal relationships also include connections between the texture and colors of materials used in the construction of the building and other elements of the environment [11].

Synthetic relationships encompass the aspects that connect the building spatially and functionally to its context. These include circulation patterns, access points, and how the building interacts with the surrounding open spaces, buildings, landscape, and road networks. Through a thoughtful examination of the formal and synthetic relationships, architects and designers can create buildings that are integrated seamlessly into their surroundings and contribute to their setting environment [12]. Qaisaria possesses immense cultural and historical significance, functioning as a regional commercial center. These buildings are characterized by unique architectural features that showcase local traditions and craftsmanship.

Nevertheless, the effects of urban development, rapid modernization, and socioeconomic changes on the integrity of these buildings within their context continue to be matters of concern. Most previous studies have concentrated on the architectural and historical elements of Qaisaria [13]. However, it is crucial to understand how the formal and synthetic characteristics of Qaisaria allow their seamless incorporation into their urban context [14].

The study's hypothesis posits that integration into the urban context is diverse and relies on the interplay among elements at the formal and synthetic levels. Strategically, this study's significance is to provide architects, urban designers, and policymakers with valuable insights to help them make informed decisions about preserving, restoring, and adapting Qaisaria during urban renewal projects. The findings

will empower these professionals to navigate the challenges urban development poses. However, the current study's scope is limited to a specific area (the Iraqi Kurdistan region) and building type (the Qaisaria), which may limit the generalisability of the findings. Additionally, the findings can be extended to other regions and building types to provide a comprehensive understanding of the complexities involved in urban development.

This research aims to fill this gap by focusing on the formal and synthetic relationships that influence the level of integration between Qaisaria and their urban context. On the other hand, it evaluates the contextual compatibility of Qaisaria in Erbil and Sulaimanyah. The primary goal is to assess how well these buildings fit into their surroundings. By examining the formal and synthetic relationships between them and their urban context, the study aims to comprehensively understand their current situation and the impact of each relationship on the Qaisaria.

2. Literature Review

This section examines the existing literature on integrating buildings within urban environments, focusing on Islamic markets and Qaisaria. The literature explores the connection between urban architecture and its surroundings, shedding light on how formal and synthetic relationships shape the structure and identity of urban contexts. In addition, it reviews the historical development and significance of Islamic markets, particularly their role in shaping urban growth and social interactions. The discussion also addresses the architectural importance of Qaisaria, highlighting its relevance in historical and modern contexts. By reviewing these studies, gaps in the existing research are identified, forming the basis for the current study on integrating Qaisaria buildings within the urban context of the Iraqi Kurdistan Region.

2.1. Urban Context

As the Oxford Dictionary describes, context encompasses the various circumstances that contribute to preparing and comprehending a situation or idea [15]. The study of context in architecture emerged as a response to the limitations of modern architecture. It argues that buildings are intrinsically connected to their environment physically and psychologically [16]. Contextual architecture, or contextualism, emerged in the United States during the late 1960s. This architectural approach is important because it considers a particular place's physical, social, and economic conditions [17]. Those architects who adopted contextual architecture saw it as a way to overcome the physical barriers modernists erected between architecture and its surroundings. The contextual approach adopted here necessitates a comprehensive grasp of the functional needs of urban and environmental settings. It integrates historic and modern elements to develop a unified urban strategy[18].

Many studies and literature reviews have examined the relationship between urban architecture and its context and formal and synthetic relationships in urban contexts, as shown in Table 1. In A New Theory

of Urban Design, Christopher Alexander describes the various stages of urban growth and the integration of context and social structure [5]. Alexander contends that contemporary cities are plagued by imbalances resulting from the segregation of social groups and the erosion of personal privacy. He highlights the significance of interconnected pedestrian axes, open spaces, streets, and parking in developing a cohesive urban environment. In addition, he examines the contrasting characteristics of traditional and modern cities, underscoring the importance of preserving urban space and embracing positive space [5]. In *'Type, Urban Context, and Language in Conflict; Some Methodological Implications'*, Maurice Cerasi explores the evolution of typology research in Europe during the 1950s and 1960s [1]. He stresses the correlation between building typologies and their urban surroundings, showing how architectural forms arise from cultural and natural influences. In his analysis, Cerasi examines Aldo Rossi's contributions and the Milanese-Venetian school's approach. The primary objective of the Milanese-Venetian school was to identify the underlying essence of historical cities to create a profound connection with the surrounding environment and establish a distinct sense of place. Cerasi highlights how typical plans, street network layouts, and city plan orientations reflect the interplay between buildings and their surroundings. In his work, he highlights the importance of incorporating historical and cultural aspects into urban planning, asserting the significance of these elements for designers [1]. Young (1998) focuses on harmonious relationships between buildings and the urban environment surrounding them [2]. Young explores many elements that play a role in achieving a harmonious context, including form, skyline, proportion, unity, balance, scale, color, detail, texture, pattern, appropriate siting, massing, and rhythm. Including these elements is crucial in developing visually appropriate designs that uphold and elevate the urban setting.

Alkubaisy delves into the captivating world of the inspired image in traditional Arab cities in '*The Inspired Image in Urban Context*'. Alkubaisy explores the influence of the urban environment on the creation of these images, with a particular concentration on the effects of connections at various scales (cellular, intercomponent, and holistic) [6]. Her research highlights the significance of physical structures, lighting, shadow effects, and social behavior in shaping the urban context and the impact of the urban environment on the creation of expressive imagery. Factors such as the lighting intensity, the orientation of relationships, and the organization of space all contribute to this process [6]. In addition, the author explores different aspects of the urban environment, including organization, formation, openness, texture, and scale, stressing the significance of establishing harmony and coherence in the urban context by focusing on visual appropriateness and formal unity [6]. At the same time, Broadbent delves into the formal characteristics of the urban context, especially the interplay between bonding-formal characteristics and visual formal characteristics [4].

Salingaros presents a fresh perspective on urban philosophy in '*Towards a New Urban Philosophy: The Case of Athens*'. The author explores the intricate connection between the urban fabric and

environmental disasters, focusing on the postwar architectural landscape of Athens [7]. Then, the author highlights the importance of blending historical and modern elements and incorporating natural elements of the surroundings. Salin-gyros supports the concept of mixed-use development, pointing out the importance of preserving significant urban features and encouraging the use of engaging building facades to enhance street vitality. This research underscores the significance of governing the correlation between mass and space to establish a harmonious urban setting [7].

In *'How Can Urban Context Maintain Urban Identity and Sustainability?'* Oktay examines the urban contexts of Taormina in Sicily and Kyrenia in North Cyprus [8]. She contends that examining urban environments through a historical lens is crucial, considering the interplay between human activity, architectural structures, and the natural world. Oktay highlights the importance of individuals experiencing a sense of belonging and identity linked to their connection with a particular place and explores the significance of local urban context elements, such as districts and public domains, in upholding urban identity and sustainability [8].

In a study conducted by Al-Hinkawi & Haki [3], the authors analyse the evolution of urban environments in response to various internal and external factors, highlighting the significance of maintaining a consistent architectural style to avoid urban disorder [3]. The study's findings suggest that a comprehensive understanding of the connection between different levels can be achieved by considering the significant aspects of the urban environment [3]. In contrast, Muneeb describes the urban context as a complex of social and urban systems interconnected with urban occurrences [9]. Focusing on the visual aspects of the urban environment, including the skyline, Muneeb examines how tangible and intangible factors, such as physical structures and lighting, influence them. Muneeb highlights the significance of comprehending these elements to establish a harmonious urban setting [9]. The literature reviewed here was chosen because it offers valuable insights into the various facets of the urban context in architecture. However, most of these publications underscore formal or synthetic relationships between structures and the environment without fully exploring both aspects.

Based on previous studies, an essential set of traits has been identified to help assess buildings and their relationships with their context. Formal and synthetic relationships in architecture and urban studies refer to interactions between architectural elements and their settings. This framework addresses the physical appearance, design, and style of buildings in the urban environment. These considerations include size, ratio, materials, and architectural features. Synthetically, the framework explores incorporating buildings into the larger urban environment. This involves the interaction of buildings with the surrounding infrastructure, landscape, and cultural heritage, resulting in a unified and harmonious urban environment. Additionally, the framework considers the role of buildings in shaping urban identity and creating a sense of place.

Formal and synthetic relationships play a crucial role in assessing the integrity and contextual compatibility of the historic Qaisaria in Erbil and Sulaimanyah City, as discussed below. Examining these connections yields valuable information on how the architectural features of Qaisaria engage with the surrounding urban environment. It showcases the cultural, historical, and social importance of these areas in Erbil and Sulaimanyah. A better understanding of these buildings will aid in proving the hypothesis, which aims to incorporate them into the diverse urban environment, relying on the connections between its components at both the structural and artificial levels. These relationships must be preserved to achieve sustainable urban development while maintaining the authenticity and character of these historic structures. Comprehending the interaction between Qaisaria, their surroundings, and other urban elements is crucial to evaluating their integrity and detecting any deficiencies that must be addressed in future urban development strategies.

2.2. Islamic Markets

Markets (souqs), public spaces customarily found in traditional Islamic cities, served as hubs for commercial activities within urban environments [19]. Markets and urbanization have a strong correlation; the presence of a bazaar was essential to the development of any traditional Islamic city [20]. The markets in Islamic cities contributed significantly to the development of Islamic civilization, surpassing markets in ancient Western societies such as Greece, ancient Rome, and medieval Europe [19]. Islamic morphology affects a city's internal structure and components. As shown in Figure 1, the mosque was the city's focal point, with the remaining structures, including the markets, arranged around it. An enclosed marketplace connected the mosque with the city's most significant public structures. Such markets varied in the types of goods they offered; some shops might sell books. The Islamic city was harmoniously incorporated into the climate and natural environment, aligned with the requirements of its inhabitants.

Additionally, the climate of Islamic cities affected the urban layout, architectural structures, commercial centers, and places of worship such as mosques, hotels (khans), and shrines. Wooden or metal vaults shielded the markets and their patrons, and the streets on both sides were covered to protect commodities such as silk and other textiles. The covering patterns of commercial streets exhibit variations based on climatic conditions and available construction materials [21].

The interplay between economics and religion has influenced the growth of Islamic bazaars since their inception. The fundamental distinction between the functioning of this particular type of bazaar adjacent to a mosque and other bazaars, such as modern and luxury markets in Islamic countries and shopping malls in non-Islamic nations, persists [22]. The market in the Islamic city serves as a central hub for trading and craft, situated in the city's historic district. It is also a significant area for social interactions associated with the mosque. It is a sociocultural feature of the traditional Islamic urban lifestyle, a socioeconomic and religious stronghold, and a center for political protest movements [19].

2.3. Qaisaria

The term '*qaysariyya*', or '*QAISARIA*' (the plural form), refers to covered corridors serving marketplaces. In the context of archaeological investigations, the term refers to a specific architectural design inspired by Islamic principles [23]. It derives from the Greek term *'qaysariyya'*, meaning *'Caesar's market'* or *'Imperial market'*. These structures served as stores and residences during the Greek era, operating under royal oversight. Subsequently, they were employed in Byzantine architectural practice in Syria, Palestine, and North Africa, as well as in Islamic architectural practice [24]. When Abdul Aziz bin Marwan constructed the earliest Egyptian commercial street buildings at Foustat during the Mamluk era in Egypt, the commercial street, including Qaisaria, held paramount significance as a planning component in the urban centers in the East and the West [24].

In the Mamluk era, a Qaisaria was an architectural structure that featured a central courtyard surrounded by shops that displayed and stored goods [25]. Above the shops were residential floors that accommodated traders. Later, during the Seljuk period, caravanserais (roadside inns) were built to accommodate commercial travelers. The Ottoman period witnessed the emergence of three architecturally distinct market structures: the Han, Bedestan, and Arasta, as illustrated in Figure 2. These structures exhibit a typological continuity [26]. According to AlBardosti, the Bedestan constructed by Beyazit I in Bursa exemplifies a typological configuration that is relatively uncommon. However, Bedsitan architecture is characterized by its intricate wood carvings, vibrant colors, and traditional geometric patterns. This style is often associated with spiritual and religious significance and can be found in the design of mosques.

However, the earliest and most recent urban Ottoman khans were architectural structures featuring inner courtyards encircled by porticos. Emir Han, whom Orhan Bey constructed in Bursa, displays the basic arrangement. The Arasta was a thoroughfare flanked by commercial establishments, which could be covered or open; meanwhile, it is celebrated for its fusion of diverse design elements from various cultural and artistic traditions [27]. The Islamic waqf system, which refers to a religious endowment or charitable trust in Islamic law, has significantly shaped the architectural landscape of many regions where the Bedsitan, Khan, and Arasta styles are prevalent [28].

Moreover, the establishment of waqf has facilitated the construction and maintenance of religious and communal buildings, including mosques, madrasas, and public facilities, and the construction of revenue-generating commercial buildings and buildings for charitable purposes. The waqf system has been referred to in travelers' writings, highlighting the variety and significance of waqf-funded buildings in the cities they visited, emphasizing their role in urban life, architectural styles, and cultural significance [29]. The primary source of income for charitable organizations, such as mosques, hospitals, nursery schools, imarets, refectories, and sebils (fountains), comes from commercial buildings. The Khans, Bedestans, and Arasta were constructed as constituent elements of a waqf and established primarily to provide financial support to the waqf's non-income-generating establishments [30].

Table 1. Review of previous studies on formal and synthetic relationships in urban context (Researchers)

	Study	Formal Relationships	Level	Synthetic Relationships	Level
1	Alexander [5]	Yes	Mid	Yes	Intensive
2	Cerasi [1]	Yes	Mid	Yes	Rare
3	Young [2]	Yes	Intensive	No	Rare
4	Alkubaisy [6]	Yes	Mid	Yes	Mid
5	Salingaros [7]	Yes	Mid	Yes	Intensive
6	Oktay [8]	Yes	Mid	Yes	Intensive
7	Al-Hinkawi & Haki [3]	Yes	Intensive	Yes	Mid
8	Broadbent [4]	Yes	Intensive	No	Rare
9	Muneeb [9]	Yes	Mid	Yes	Mid

Table 1. showcases the emphasis placed by earlier studies on formal and synthetic relationships within urban contexts. Although formal relationships are consistently examined across all studies, the attention given to synthetic relationships varies, with some studies focusing on them more heavily than others.

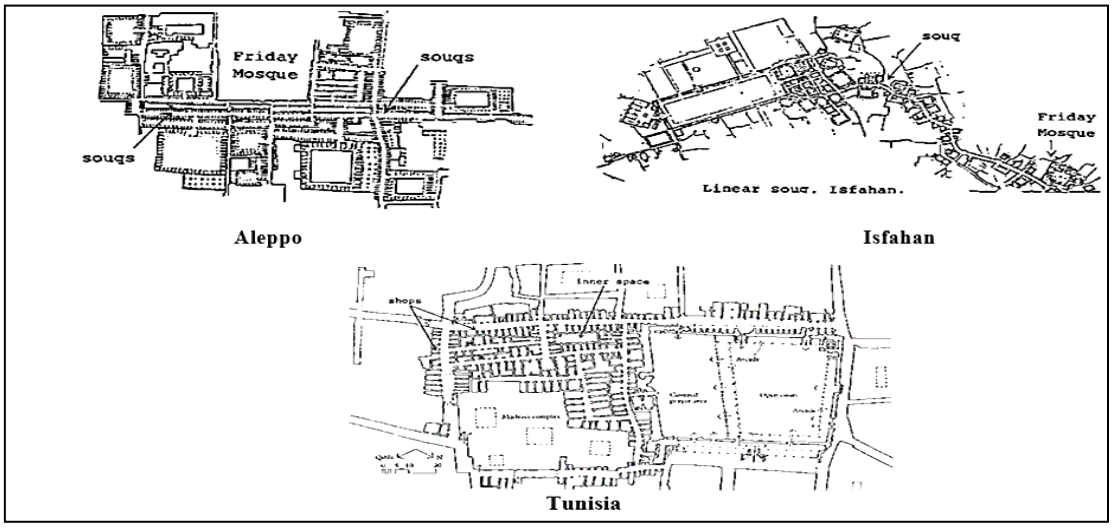


Figure 1. The pattern of souqs and mosques in some Islamic cities [31]

Figure 1 illustrates how traditional Islamic cities were organised, with the mosque positioned as the central feature. Markets (souqs) and other surrounding structures were arranged to complement the mosque's role, enabling both social and commercial activities. This arrangement demonstrates the thoughtful integration of cultural, functional, and environmental aspects in the urban design of Islamic cities.

Figure 2 highlights the unique architectural styles of market structures from the Ottoman period, focusing on the Khan, Bedestan, and Arasta. These structures demonstrate a consistent typological design, with the Bedestan showcasing elaborate woodwork, bright colors, and traditional geometric patterns. These decorative features often held spiritual and cultural significance, reflecting the rich architectural traditions of the time.

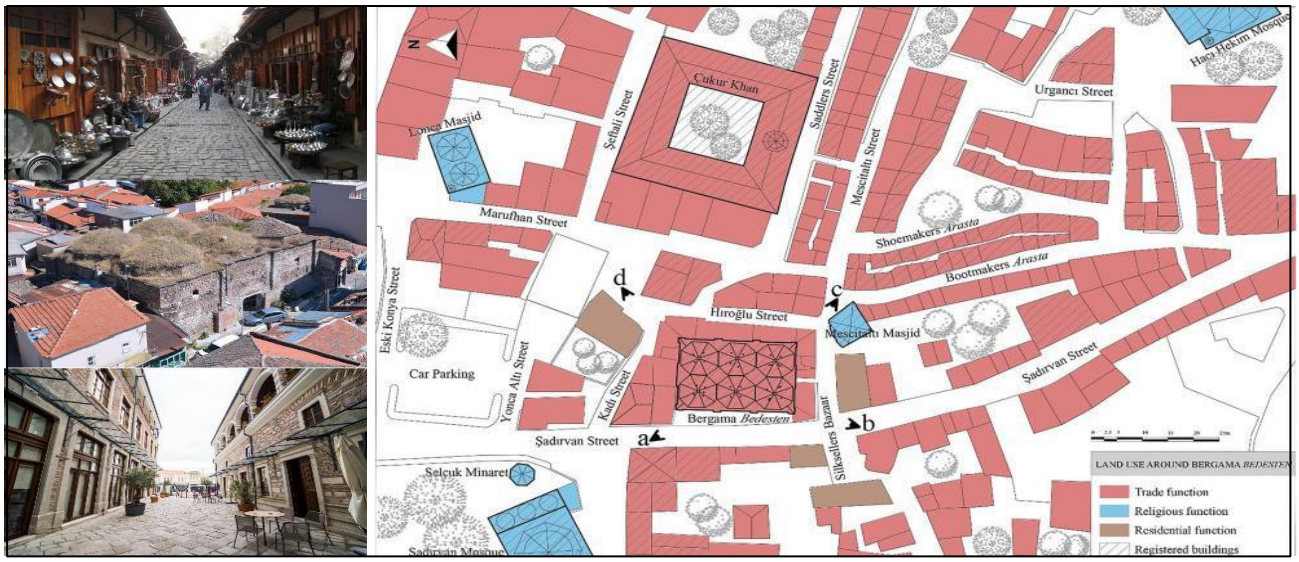


Figure 2. The spatial organization of Bedestan, Khan, and Arasta [32]

3. Methodology

The study commences with an initial investigation to explore the subject matter and progress into analytical inquiry. It employs qualitative and quantitative (mixed methods) exploring the integration of historic Qaisaria buildings within their urban contexts in Erbil and Sulaimanyah. This study performed a detailed analysis of three historic Qaisaria buildings, two of them in Erbil city and another in Sulaimanyah city, to identify the shortcomings that prevent these buildings from meshing with their urban contexts by beginning with a comprehensive literature review to establish a foundational understanding of the relevant urban and architectural contexts. The research was centered on the empirical phase, in which detailed case studies of three historic buildings were conducted. Qualitative methods, field observations, site measurements, architectural plans, and photographic documentation and analyses were used to collect firsthand data on the physical conditions and urban integration of these structures, which are presented in figures and tables. This study examined formal relationships through field observations and analytical comparisons, evaluating architectural scale, material texture, color matching, and aesthetic alignment with the surroundings. The space syntax approach, a quantitative method, was used to assess synthetic relationships with a focus on accessibility, public space interaction, and connectivity to assess how well these buildings integrate with their urban environments. The results of these analyses are organized into two tables that capture and compare the critical aspects of formal and synthetic relationships, with each table focusing on a specific relationship. This study will provide insights into highlighting the similarities and differences and pinpointing areas needed.

4. Case Studies

Case study of this research is Qaisaria, which its design often reflects both practical and aesthetic considerations, ensuring a functional marketplace while contributing to the urban fabric of the city [33].

This study focuses on how Qaisaria buildings in Erbil and Sulaimanyah interact with their urban surroundings and how these historic structures adapt to modern urban development.

4.1. Iraqi Kurdistan Region

The Iraqi Kurdistan Region is in northern Iraq and is known for its distinct cultural heritage and historical significance. The region is home to several ancient cities, including Erbil, considered one of the oldest continuously inhabited cities in the world [34]. Erbil and Sulaimanyah represent essential urban centres in this region, each with unique urban morphology [35]. Erbil's circular city layout centred around the ancient citadel contrasts with Sulaimanyah, which features a more modern, grid-like street pattern [36]. These cities provide valuable case studies for examining how historic architecture, such as Qaisaria buildings, integrates into traditional and modern urban environments [37].

The Iraqi Kurdistan Region was selected for this study due to its unique blend of historical and contemporary urban forms [38]. Erbil and Sulaimanyah offer contrasting examples of urban development. Erbil's radial layout and dense historical core offer a fascinating example of traditional urban design, while Sulaimanyah's grid-based, more modern structure reflects different planning strategies [35]. These variations in urban form provide an opportunity to explore how Qaisaria buildings integrate within their respective environments, allowing for comparative analysis [37]. This regional focus helps highlight the study's broader relevance regarding how heritage buildings can be preserved and adapted in rapidly modernizing urban areas [34]. By examining these case studies, this study aims to provide a deeper understanding of how distinct spatial arrangements and formal elements interact with and influence their surroundings, thereby informing sustainable urban development practices.

4.2. Old Qaisaria in Erbil

Following periods of growth and contraction, Erbil expanded during the late Ottoman era, extending beyond the citadel hill. In the 19th century, a new area was developed at the southwestern base of the hill. Simple wooden sales huts were the first market structures. The narrow pathways between these huts were covered with reed and straw mats to shield them from the sun [39]. Later in the 19th century, these temporary structures were replaced by sturdy commercial buildings featuring vaulted passageways. Among these structures were the Qaisaria, known as The East Qaisaria (or Qaisariyat al-Khayatin) and The West Qaisaria, which is what is illustrated in Figure 3, which are among the oldest architectural remnants in the lower part of Erbil's city center. Due to neglect, seismic activity, and conflicts in the late 20th century, the Qaisaria have deteriorated significantly and are at risk. Collapses on the upper levels have rendered many rooms unusable, although the ground floors are still operational and maintained temporarily by the merchants. Contemporaneously, Iraqi Kurdistan's rapid economic growth has put immense pressure on Erbil's urban landscape. The market area falls in the buffer zone of the UNESCO World Heritage application for the Citadel of Erbil [39].

4.2.1. The East Qaisaria

The East Qaisaria was constructed on an irregularly shaped piece of land by the Chalabi family, Turkish merchants, towards the end of the 19th century. A small, single-story section in the southwest represented the first construction phase. Later, the family added the main section of the two-story building.

4.2.2. The West Qaisaria

The West Qaisaria was likely erected shortly after The East Qaisaria, towards the end of the 19th century, and was also owned by the Chalabi family. The structural layout and design of The East Qaisaria and The West Qaisaria are similar, as shown in Table 2. However, The West Qaisaria has a slightly smaller floor. The merchandise offered is less traditional than that of The East Qaisaria , featuring imported goods such as wool blankets, travel bags, children's clothing, and shoes instead of locally made textiles. Restoration efforts for The West Qaisaria involve revealing, preserving, and adding to the original stone cladding, repairing flaws in the brick exterior, and restoring a wrought-iron window grille with wooden framing. For both Qaisaria's East and West buildings, the primary formal relationships are shown in Figure (4).

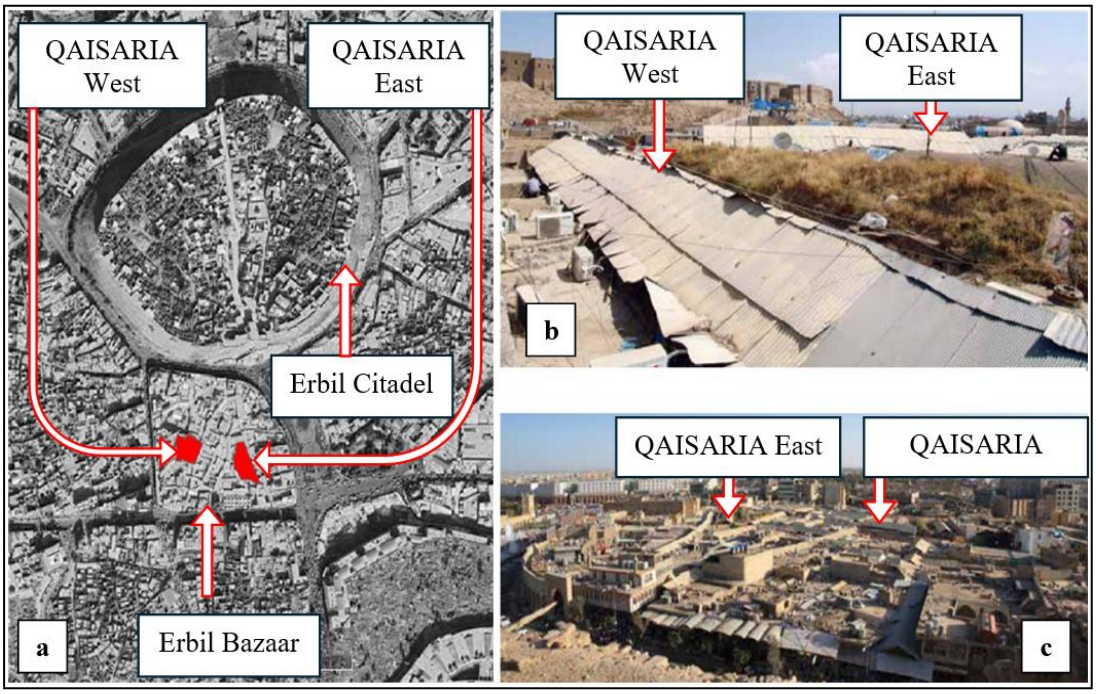


Figure 3. Different views illustrate the locations of The East Qaisaria and The West Qaisaria within the Bazaar in Erbil city: (a) Top view, (b) From the bazaar towards the citadel, and (c) from the citadel towards the bazaar [39]

Figure 3 illustrates the positions of The East Qaisaria and The West Qaisaria, two historically significant market buildings in Erbil's lower city center. Over time, they have experienced considerable damage due to neglect, earthquakes, and past conflicts, placing them vulnerable. Located within the buffer zone of the UNESCO World Heritage site application for the Citadel of Erbil, these markets hold great cultural and historical value.

Table 2. General Information on The East Qaisaria and The West Qaisaria inside the Bazaar in Erbil [39] (Researchers)

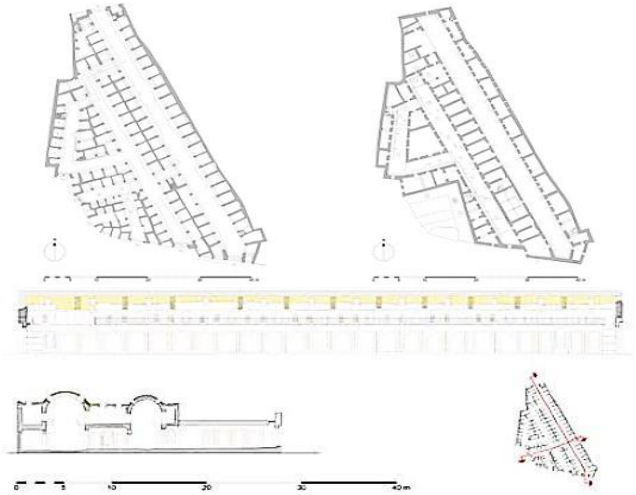
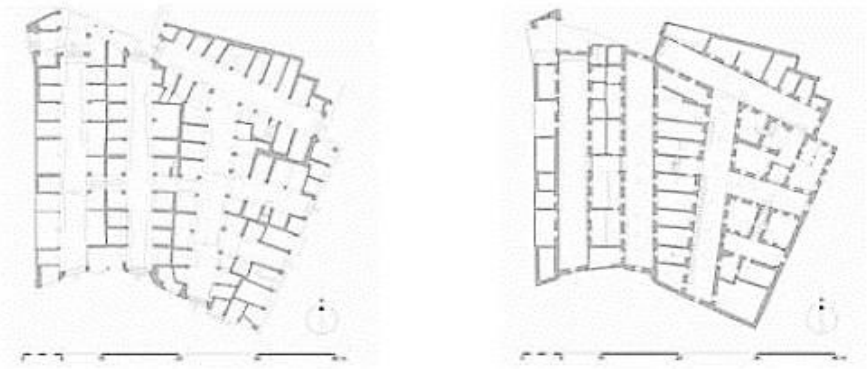
Building	**Old Qaisaria in Erbil-The East Qaisaria**
Location	Old city centre of Erbil, As in Islamic cities, the Qaisaria is near the mosque, the primary market.
Year	Late 19th Century
2D Plans	
General Information	•A small single-story section was built in the southwest, representing the first phase of construction. •Subsequently, the two-story main section was added, integrating the two parts into a building. •Seven access gates leading to the neighboring bazaar streets. • Semi-circular arches for the shops, while the semi-circular arches were used for the entrances and paths • A network of alleys with 3 to 4 meters wide and up to 60 meters long. •It accommodates 107 shops on the ground level, with some shops combined to create larger retail spaces through wall openings. • Unfortunately, the vault over the eastern corridor collapsed in the 1970s and has since been replaced by a sheet metal roof supported by a steel frame • The primary construction material is original brick with an iron window grille and wooden framing.
Building	**Old Qaisaria in Erbil City- The West Qaisaria**
Location	The old city center of Erbil, As in Islamic cities, the Qaisaria is near the mosque, the primary market.
Year	Late 19th Century
2D Plans	
General Information	• Two stories in the main section. • Eighth access gates leading to the neighboring bazaar streets. • A network of alleys, 3 to 4 meters wide. • Semi circler arches were used mainly for the shops, while the semi-circular arches were used for entrances and paths • It accommodates 80 shops on the ground level, with some shops combined to create larger retail spaces through wall openings. • The West Qaisaria lacks the longstanding presence of individual shop owners in The East Qaisaria . • The primary construction material is original stone cladding with an iron window grille and wooden framing.

Figure 4 highlights the formal relationships of The East Qaisaria and The West Qaisaria in Erbil City, emphasising their integration within the urban environment. These relationships involve the physical and visual connections between the buildings and their surroundings, including their form, scale, and proportions in relation to nearby structures. Additionally, they reflect how the texture and colours of the materials used in construction align with the broader architectural and environmental context.

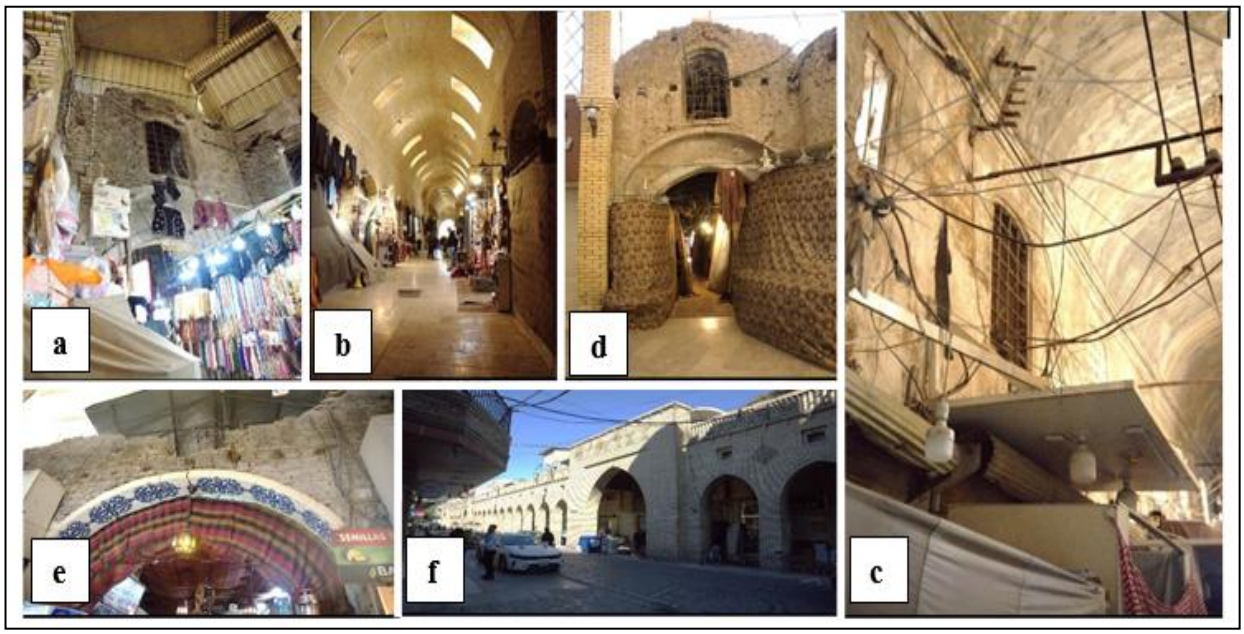


Figure 4. Formal relationships showing the relations of (Part-Whole) in Erbil City-The East Qaisaria and The West Qaisaria building: (a), (b) and (c) from the The East Qaisaria , (d) and (e) from the The East Qaisaria and (f) from outside towards both from the Qaisarias (Researchers)

Table 2 provides a detailed overview of The East Qaisaria and The West Qaisaria in Erbil's old city center, including their 2 D plans and key architectural features. It highlights details such as the number of stories, access gates, types of arches, construction materials, and the number of shops. These attributes reflect the functional and structural design of traditional Islamic marketplaces.

4.3. Naqib Qaisaria in Sulaimanyah

Naqib Qaisaria in Sulaimanyah, one of the oldest commercial hubs in the Kurdistan Region, embodies the city's historical legacy amidst modernization efforts. Founded in 1900 in Bazrgani district, as shown in Figure 5, one of the oldest districts in the old city center of Sulaimanyah, by Sheikh Mustafa Al Naqib, this marketplace has maintained its original essence and appeal with irregular spatial organization, as shown in Table 3. Initially inhabited by the Jewish community of Kurdistan during Sheikh Mustafa's reign, the Qaisari transitioned in the early 1950s when the Jewish population relocated to Palestine, making way for Muslim residents. Over the years, the Qaisari endured adversity, which is evident from its visible damage and past narratives. In 1957, a severe flood in Sulaymaniyah caused extensive damage to several sections of the Qaisari, prompting a collective effort from civilians, including youth, educators, and community leaders, who provided financial aid to the affected individuals. The marketplace faced another challenge in

1988 during the Ba'ath regime when it was deliberately set on fire, leading to a complete reconstruction spearheaded by the local community [40]. Sheikh Mustafa reflects on the resilience displayed by the community in revitalizing the marketplace despite the significant losses, which required starting anew from the ground up. The building's construction involved a substantial workforce comprising workers and architects, most from Iran, specifically the Kurdish cities of Sna (Sanandaj) and Kermanshah, chosen for their rich architectural heritage, as illustrated in Figure 6.

Figure 5. Location of Naqib Qaisaria in Sulaimanyah from different top views

Figure 5. displays the location and top view of Naqib Qaisaria in the Bazrgani district of Sulaimanyah. Established in 1900, this historic marketplace is one of the oldest in the Kurdistan Region. The figure provides insight into the Qaisaria's position within the city, showcasing its connection to the surrounding urban layout and its role as a vital cultural and historical landmark.

Figure 6. Formal relationships showing the relations of (Part-Whole) in Naqib Qaisaria building, Sulaymanyah [41] (Researchers)

Figure 6 examines the formal relationships of Naqib Qaisaria in Sulaimanyah, emphasizing its connection to the surrounding urban environment. Compared to nearby structures, these relationships include the building's physical and visual alignment with its surroundings, such as its form, proportions, and scale. Furthermore, they highlight how the materials' texture and colors.

Table 3. General information on the Naqib Qaisaria building in Sulaymanyah [41] (Researchers)

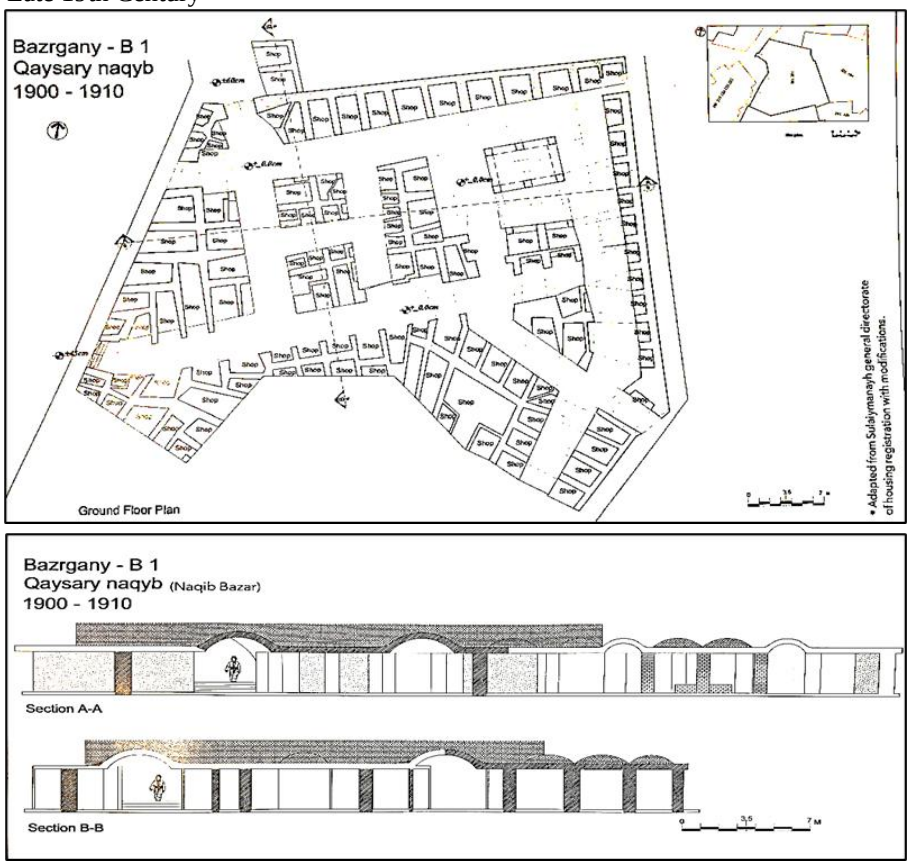
Building	**Naqib Qaisaria in Sulaimanyah City**
Location	The old city center of Sulaimanyah City
Year	Late 19th Century
2D Plans	
General Information	• Two stories in the main section. • Eighth access gates leading to the neighbouring bazaar streets. • A network of alleys, 3 to 4 meters wide. • Semi circler arches were used mainly for the shops, while the semi-circular arches were used for the entrances and paths • It accommodates 80 shops on the ground level, with some shops combined to create larger retail spaces through wall openings. • The West Qaisaria lacks the longstanding presence of individual shop owners seen in The East Qaisaria . • The primary construction material is original stone cladding with an iron window grille and wooden framing.

Table 3 presents a comprehensive summary of the Naqib Qaisaria building in Sulaimanyah City, showcasing its 2D plans and main architectural features. It details elements such as the number of stories, access points, arch styles, building materials, and shop layouts. These features demonstrate the practical and architectural characteristics of traditional Islamic market designs.

5. Findings

The following section presents the findings of this research, highlighting the formal and synthetic relationships of the Qaisaria in Erbil (East and West) and Sulaimanyah. Detailed analysis and comparisons identify key features and characteristics of these buildings, focusing on how they interact with their urban context.

Table 4. Formal (Part-Whole) Relationship Comparison (Researchers)

	Level / Relationship	**Old Qaisaria in Erbil (The East Qaisaria)**	**Old Qaisaria in Erbil (The West Qaisaria)**	**Naqib Qaisaria in Sulaimanyah**	**Overall Score**
1	Formal Bonding, (Scale: 1 Low -2 Mid Low - 3 Mid - 4 Mid High -5 High)				
1-A	Degree of openness of the street (Setbacks Openings ratio to the street)	No setback relations – Confused openings ratio (1)	No setback relations – Confused openings ratio (1)	Unclear setback relations – weak openings ratio (2)	1
1-B	Architectural Scale Height-Plot size	Subordinate (2)	Subordinate (3)	Proportional (4)	3
1-C	Permeability In-out	Mid Permeability (3)	Mid Permeability (3)	Low Permeability (1)	2
2	Formal - Visual, (Scale: 1 Low -2 Mid Low - 3 Mid - 4 Mid High -5 High)				
2-A	Constructional Expression Expression	Semi Similar (3)	Semi Similar (3)	Different (1)	2
2-B	Buildings Integration Integration	Mid Integration (3)	Mid Integration (3)	Low integration (1)	2
2-C	Visual Relation to the Surroundings	Intermediate (3)	Intermediate (3)	Weak (1)	2
2-D	Rowing	Out of the row (1)	Out of the row (1)	Diverse (2)	1
2-E	Hierarchy	Mid Hierarchical (3)	Mid Hierarchical (3)	Hierarchical (4)	3
2-F	Visual Cohesion				
2-F-1	Formal Unity	Semi Unified (3)	Semi Unified (3)	Weak (1)	2
2-F-2	Number of Floors	Appropriate (4)	Appropriate (4)	Appropriate (4)	4
2-F-3	Continuity of Facades	Semi Connected (3)	Semi Connected (3)	Disconnected (1)	2
2-F-4	Building Style	Partial (4)	Partial (4)	Different (1)	3
2-G	Visual Appropriateness				
2-G-1	Clarity of Use	Subtle (2)	Subtle (3)	Obvious (4)	3
2-G-2	Diversity	Mid connect (3)	Mid connect (3)	Disrupts cohesion (1)	2
2-G-3	Shape	Multilinear integrated (4)	Multilinear integrated (4)	Multi-linear - Deformed (1)	3
2-G-4	Colour	Semi similar (3)	Semi similar (3)	Confusing (1)	2
2-G-5	Material	Stone with Brick (5)	Stone with Brick (5)	Brick (5)	5
2-G-6	Building Limits	Isolated (1)	Isolated (1)	Clear and semi-connected (4)	2
				Total Score = 44/90 =48.8/100	

The findings are structured in two main tables: one for formal relationships and another for synthetic relationships in Table 4 which outlines the formal relationships of the Qaisaria in Erbil (East and West) and Sulaimanyah, comparing aspects such as degree of openness, architectural scale, permeability, constructional expression, building integration, visual relations, rowing (a stylistic classification and representation that is based on specific formal elements and their arrangements, such as geometry, proportions, and decorative motifs), hierarchy, visual cohesion and visual appropriateness. Each aspect is rated on a scale of 1 to 5, with 1 indicating a low level of integration or harmony and 5 indicating a high level. The table helps to identify how well each building integrates with its surrounding urban context in terms of formal- bonding and formal visual relationships.

Table 5. Synthetic (Part-Whole) Relationship Comparison (Researchers)

	Level / Relationship	**Old Qaisaria in Erbil City (The East Qaisaria)**	**Old Qaisaria in Erbil City (The West Qaisaria)**	**Naqib Qaisaria in Sulaimanyah City**	**Overall Score**
1	Accessibility	Accessible from all sides (4)	Accessible from all sides (4)	East is weak; North, West, and South are pedestrian accessible (2)	3
2	Efficiency	Low efficiency (1)	Low efficiency (1)	High efficiency (3)	2
3	Pedestrian Continuity	Semi-continuous (2)	Semi-continuous (2)	Semi-continuous (4)	3
4	Space Cohesion				
4-A	Coupling	Lack of assembly (1)	Lack of assembly (1)	Semi assembled (4)	2
4-B	Interdependency	Low Interdependent (1)	Low Interdependent (2)	Mid to high Interdependent (4)	2
5	Integrity	Mid to high (3)	Mid to high (3)	Low to Mid (2)	3
6	Connectivity	Semi isolated (1)	Semi isolated (1)	Mid connected (3)	2
7	Space Strategy	Misleading (1)	Misleading (2)	Distorted (4)	2
9	Direction	Aligned with urban axis (4)	Aligned with urban axis (4)	Misaligned (2)	3
10	Orientation	Semi Definite (3)	Semi Definite (3)	Indefinite (1)	2
11	Intelligibility	0.57 (3)	0.57 (3)	0.6 (3)	3
12	Homogeneity	Low to Mid (2)	Low to Mid (2)	Mid (3)	2
13	Spatial Relation with Contexts	Semi Sequential (2)	Semi Sequential (3)	Sequential (4)	3
				Total Score =32/65=49.2/100	

Table 5 presents the synthetic relationships of the Qaisaria in Erbil (East and West) and Sulaimanyah, focusing on aspects such as accessibility, efficiency, pedestrian continuity, space cohesion, integrity, connectivity, space strategy, direction, orientation, intelligibility, homogeneity and spatial relationships with their settings. Each aspect is rated on a scale from 1 to 5, where 1 indicates a low level of the respective relationship, and 5 indicates a high level. This table aids in diagnosing deficiencies in the functional and spatial integration of the buildings with their urban context.

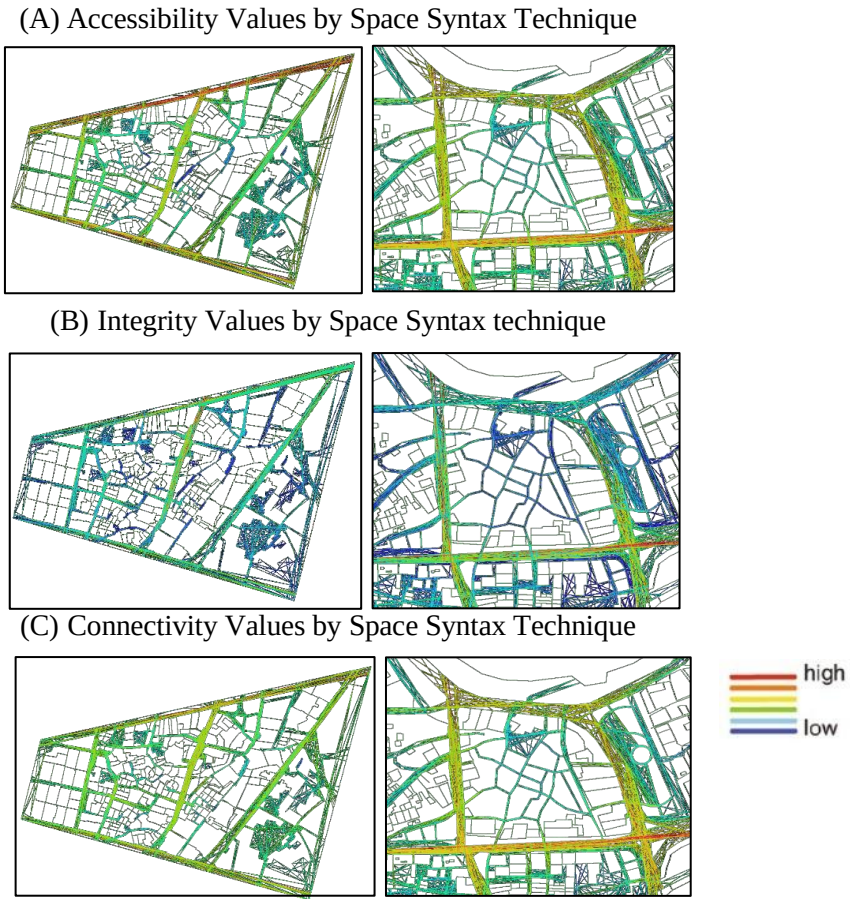


Figure 7. Analysis of (A) Accessibility, (B) Integrity, and (C) Connectivity b Space syntax technique (Researchers)

Figure 7 illustrates the analysis of accessibility, integrity, and connectivity for Qaisaria buildings in Erbil and Sulaimanyah through the space syntax technique. The analysis uses color coding, with red symbolizing areas of high value and blue indicating low value. This figure provides insight into the spatial and functional integration of the Qaisarias within their urban surroundings.

Analyzing the formal and synthetic relationships of the Qaisaria in Erbil and Sulaimanyah reveals vital insights into their integration with their urban contexts. The formal analysis of the Qaisaria buildings, including the Old Qaisaria in Erbil City (East and West) and Naqib Qaisaria in Sulaimanyah, reveals significant variations in their architectural features and how they are incorporated into their respective urban environments. The key characteristics that contribute to the high score 4 of Old Qaisaria in both East and West are the number of floors, building style, and shape, highlighting its solid architectural features. It is worth mentioning that the material quality of all buildings consistently receives a high score of 5, indicating excellent use of materials. Similarly, the building designed by Naqib Qaisaria in Sulaimanyah receives a score of 4 for proportion, hierarchy, number of floors, clarity of use, and building limits. Additionally, the material used in the construction achieves a high score of 5.

Conversely, areas with low scores of 1 indicate notable difficulties. Old Qaisaria in both East and

West face issues with the degree of openness, rowing, and building limits, suggesting limitations in spatial configuration and boundary definition. Naqib Qaisaria struggles with permeability, construction expression, building integration, and visual relationships with the surroundings. Additionally, it exhibits deficiencies in formal unity, continuity of façade, building style diversity, shape, and color, highlighting profound integration and aesthetic issues. The architectural aspects that remain in all buildings receive moderate scores ranging from 2 to 3.

On the other hand, within the synthetic relationships, The Old Qaisaria in Erbil City (East and West) demonstrates exceptional accessibility and direction, with a high score of 4. This indicates excellent entry and exit points and alignment with urban directions. In contrast, the efficiency, space cohesion, and connectivity levels in Old Qaisaria in Erbil City (East and West) and West are significantly inadequate, with all three aspects receiving a low score of 1. This indicates significant shortcomings in practical space implementation and restricted engagement with the urban surroundings. Naqib Qaisaria has a low score of 1 in orientation, which suggests it does not align well with its urban surroundings.

In contrast, Naqib Qaisaria demonstrates exceptional proficiency in Spatial Relationships, Coupling, Space Cohesion, and Pedestrian Continuity, achieving a maximum score of 4 in each category. The high scores indicate strong spatial integration, efficient connection of spatial functions, and smooth pedestrian movement within its urban context.

The remaining aspects, including integrity, intelligibility, and homogeneity, and the overall performance in all buildings typically range from 2 to 3, indicating a level of performance that is generally low to mid-level. These scores indicate no major failures in these areas, but there is potential for improvement to enhance their functionality and integration within the urban environment. The thorough analysis of the Qaisaria buildings uncovers notable disparities in their degree of incorporation into urban environments. Visual cohesion is a prominent aspect of formal relationships, as indicated by its high scores, which demonstrate a solid architectural balance. Nevertheless, significant obstacles regarding openness and rowing are observed, with both aspects receiving low scores. There is a lack of high-scoring attributes in synthetic relationships, particularly regarding intelligibility. This indicates potential difficulties. Most other aspects in both relationship categories fall within the medium range.

6. Discussion

This research explored the formal and synthetic relationships of Qaisaria buildings in Erbil (East and West) and Sulaimanyah. The results indicate varied levels of integration with their surrounding urban contexts, showing alignment with, partial agreement to, or divergence from previous studies. This section critically reflects on these findings compared to existing literature, providing detailed interpretations and implications.

As formal relationships, The significance of formal relationships, including material quality, architectural style, and building scale, has been extensively highlighted in earlier studies by Alexander [5], Cerasi [1], Al-Hinkawi, and Haki [3]. This study corroborates these observations, as Qaisarias in both cities scored high in material quality (5) and number of floors (4), demonstrating strong architectural coherence. Alexander [5] emphasized the importance of maintaining physical harmony through appropriate material use and proportions, which aligns with the findings of this study. Likewise, Al-Hinkawi & Haki [3] emphasized the role of hierarchical clarity in design, supported here by the proportional and hierarchical alignment observed in the Qaisarias.

In contrast, the study uncovered challenges in openness, permeability, and visual integration, scoring low (1). These outcomes contradict the findings of Broadbent [4] and Young [2], who regarded these factors as crucial for creating cohesive urban environments. The discrepancy suggests that modern urban changes and inadequate preservation strategies may have weakened the traditional spatial and visual links between the Qaisarias and their surroundings. Interventions that focus on enhancing spatial openness and strengthening visual connections are necessary to improve their integration within the urban fabric. Synthetic relationships, including accessibility, pedestrian continuity, and spatial cohesion, are pivotal for effective urban integration, as highlighted by Alexander [5], Salingaros [7], and Oktay [8]. The findings of this study align with these perspectives, particularly in the area of accessibility, where Qaisarias scored high (4). For instance, the Old Qaisaria in Erbil showed well-defined entry and exit points aligned with urban pathways, reaffirming its function as a pedestrian-friendly urban hub. These observations validate Alexander's emphasis on interconnected pedestrian systems as a cornerstone of cohesive urban design [5].

Additionally, Salingaros underscored the need for spatial cohesion and functional integration in urban spaces [7]. While this study found moderate spatial cohesion in Qaisarias (scores ranging from 2 to 3), deficiencies in efficiency and connectivity (both scoring 1) highlight a lack of full integration with their urban settings. These shortcomings suggest that while some synthetic relationships are moderately effective, disconnection between Qaisarias and surrounding spaces limits their functionality.

Oktay emphasized the importance of aligning historic marketplaces with their spatial and functional surroundings to ensure sustainability [8]. While this study found pedestrian accessibility aligned with urban needs, it identified significant shortcomings in orientation and connectivity, particularly in the Naqib Qaisaria, which scored poorly (1). This divergence from Oktay's findings reflects the challenges of modern urban dynamics and changing land-use patterns.

The deviations from earlier research highlight the challenges of rapid urbanization, shifting functional requirements, and insufficient urban planning on integrating Qaisarias. Modern development often prioritizes contemporary infrastructure over the preservation of traditional spatial relationships, leading to fragmented urban landscapes. Furthermore, the original design of Qaisarias, optimized for traditional

economic activities, may no longer align with the demands of contemporary urban environments. To address these challenges, this study emphasizes the need for targeted interventions to improve formal and synthetic relationships. These include enhancing connectivity, fostering spatial cohesion, and reimagining the functional roles of Qaisarias to meet modern needs while preserving their cultural value.

7. Conclusion

This research examined the formal and synthetic relationships affecting how historical buildings fit within urban surroundings. Through thorough analysis, the study identified key elements that either support or challenge the effective integration of these structures into modern cities. While factors like architectural harmony and accessibility were found to play an essential role in improving urban integration, difficulties related to spatial connectivity and openness emerged as significant obstacles. These insights are valuable for urban planners and policymakers as they strive to balance preserving historical architecture and meeting the needs of growing cities.

This study adds to existing research by offering an in-depth look at how historical buildings interact with their urban environments. Unlike previous works, it combines the analysis of both formal and synthetic relationships, addressing a fundamental gap in the conversation about urban integration. By examining these two aspects, the study provides a complete understanding of how heritage buildings can be more effectively integrated into modern urban areas.

Future research should focus on finding strategies that enhance the spatial integration of historic buildings, particularly in places where connectivity and openness are lacking. Studies that explore the integration of different types of buildings in varied urban contexts could further expand the relevance of these findings. Although this research mainly focuses on urban integration, the results suggest that future studies could also investigate the potential for preserving and adapting historic buildings. Keeping these structures functional in modern cities while preserving cultural value will be critical for achieving sustainable urban development.

Declaration of Competing Interest: The authors declare they have no known competing interests.

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