Journal of Design and Built Environment
E-ISSN: 2232-1500 |Print ISSN: 1823-4208
https://ejournal.um.edu.my/index.php/jdbe
Volume 26, Issue 1, 2026

Architectural and Spatial Organization Characteristics in Historical Grand Bazaars of Kirkuk-IRAQ

Adil Ibrahim Aziz[1*], Zainab Hussein Ra'ouf Alobaidi[2] and Sabeeh Lafta Farhan[3]

[1]College of Engineering, University of Kirkuk, Iraq.

[2]Department of Architecture, University of Technology, Iraq.

[3]Department of Architecture Engineering, Faculty of Engineering, University of Wasit, Wasit 52001, Iraq.

*Corresponding author: ae.21.30@grad.uotechnology.edu.iq

Article Info:

Submission date: 14th February 2025
Acceptance date: 12th January 2026

Keywords:

Kirkuk Grand Bazaar, Qirdar Grand Bazaar, Architectural characteristics, spatial organization characteristics, Kirkuk city.

Abstract:

Historic grand bazaars represent one of the most prominent forms of commercial architecture in historic cities due to their functional, social, and economic roles within the urban fabric. this research aims to analyze the architectural and morphological characteristics and spatial configuration of the kirkuk and qirdar grand bazaars, and to evaluate their impact on sustaining functional continuity within the historic city of kirkuk. the research problem arises from the absence of systematic scientific studies explaining how spatial configuration and architectural characteristics influence the functional continuity of historic grand bazaars. the study adopts a mixed method approach combining descriptive analytical and quantitative methods. the study analyze architectural characteristics through historical sources, drawings, local materials, roof forms, openings, and natural ventilation systems. quantitatively, the space syntax methodology using depthmapx analyzes connectedness, integration, and choice. results show that the kirkuk grand bazaar demonstrates high connectivity and a branching spatial pattern supporting movement distribution and functional hierarchy. in contrast, the qirdar grand bazaar exhibits higher integration and choice values, highlighting the role of a longitudinal spatial axis in enhancing commercial activities. the analysis confirms that spatial form strongly influences functional performance and supports sustainable conservation strategies within historic urban centers worldwide today globally.

1.0 INTRODUCTION

Ancient cities embody a rich cultural and architectural heritage, but they face challenges in striking (Kahachi et,al 2025). Historical areas are influenced by a complex spatial morphology, with multiple land uses (Alobaydi,et,al 2023). The historical Grand Bazaars were a specialized form of commercial architecture that formed a crucial structural element in the old market systems of Islamic cities. Their emergence was linked to the development of architecture and commercial activity in the region. The architectural and organizational characteristics of this type of building contributed to consolidating its social and economic role, making it an active urban component distinguished by its functional continuity over long periods. Despite the importance of these styles, many architectural studies that have addressed Grand Bazaars, particularly in Iraq, have focused on historical and descriptive aspects. There is a limited amount of research that has analyzed these buildings from an analytical perspective, linking architectural characteristics with spatial organization as key factors explaining the efficiency of their functionality and continued use. This highlights the importance of spatial analysis methodologies, especially Space Syntax, and their role in understanding and analyzing the formation of movement and spatial relationships within Grand Bazaars, as well as their role in supporting commercial activity and social interaction Figure 1.

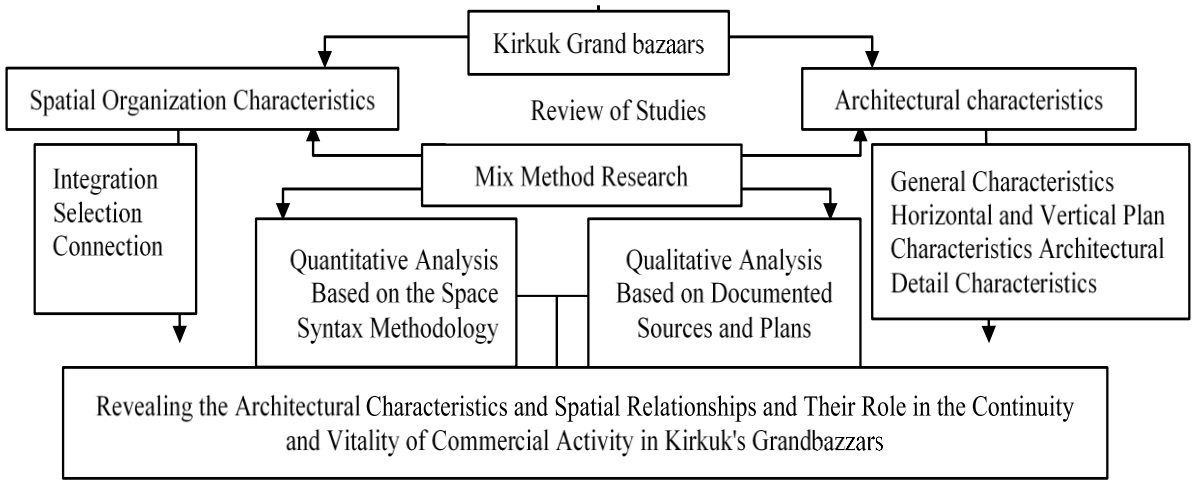


Figure 1. General Methodology of the Research Path (Source: Authors)

2.0 THE COGNITIVE FRAMEWORK OF HISTORICAL GRAND BAZAARS AND THEIR ARCHITECTURAL CHARACTERISTICS

2.1 Linguistic and Terminological Definition of Grand Bazaars and the Reasons for Their Emergence

Grand Bazaar, also known as covered markets or Qaysariyahs, are Arabic terms derived from the Latin/Greek word "Caesar." In Arabic, they refer to places designated for trade, or specifically to markets specializing in valuable goods. Historically, they were organized, enclosed markets with separate gates for entry and exit (Ibn Manzur, Lisan al-Arab; Awad, 1989). In modern usage, they are defined as commercial buildings connected to the traditional souk system of Islamic cities. They consist of a network of covered passageways lined with shops (stores) specializing in the trade of goods, often of high value such as fabrics and precious jewelry. They benefit from a high degree of spatial control and regulation compared to open markets (Awad, 1989; Hmood, 2017). The term also appears in the literature on Islamic markets as a “closed or tightly enclosed market” dedicated to valuable goods, reflecting its specific economic function within the traditional commercial fabric (Awad, 1989).

The Grand Bazaars occupied a distinctive position in Islamic urban planning due to their specialization in the types of goods they sold and their proximity to religious sites such as mosques. The market was not merely a space for trade, but also a space for social interaction, relaxation, and daily life (Hmood, 2017). This necessitated more

organized and protective architectural styles for the trade of sensitive and high-value goods, which contributed to the emergence of the Grand Bazaars as specialized and more regulated commercial spaces compared to open markets. Furthermore, large covered bazaars, such as the Isfahan Bazaar, demonstrate that architectural coverings and continuous linear structures were fundamental features of Islamic markets before the 20th century, providing climatic advantages and organizing commercial activity. This reinforces the understanding of the Caesarea as part of a "covered market" system that aimed to balance commercial function, environmental conditions, and spatial organization (Encyclopaedia Iranica, 2007). Studies have also indicated the diversity of Grand Bazaars patterns and their connection to specialized functions and crafts that support them, such as khans, through structural integration in some of them, pointing to the functional and morphological diversity of the space (Kasmo urban 2023), with a clear presence of site relations and connection to commercial networks in shaping the internal spatial structure of the Grand Bazaar (Al-Qaisi and Faraj 2019) Figure 2.

(a)
Grand Bazaar, Isfahan, Iran

(b)
Grand Bazaar, Istanbul, Turkey

(c)
Egyptian Grand Bazaar, Istanbul, Turkey

Figure 2. (a,b,c) Historic Grand Bazaars in Islamic Countries (Source: Edgü, 2012)

2.2 Grand Bazaars' distinctive architectural features

Several distinctive features that set them apart from other traditional markets characterize grand Bazaars. The most prominent of these is the use of vaulted or domed passageways, which contribute to a more temperate interior climate and promote natural ventilation. These vaults also provide overhead lighting through distributed skylights (Hmood, 2017; Encyclopaedia Iranica, 2007). Additionally, the recurring arrangement of shops on either side of the passageways, with varying or equal sizes, creates a clear functional regularity. This allows the building flexibility to adapt to the commercial activities taking place within it without requiring radical changes to the overall structure (Awad, 1989). A gradual entrance is another important architectural feature. Many Grand Bazaars rely on a gradual spatial transition from the public street to a more controlled interior space. This enhances the sense of security, reduces the feeling of abrupt transition, and helps guide users within the commercial space (Hmood, 2017).

It was also distinguished by its diverse architectural styles, ranging from simple linear designs to complex, branching patterns that formed urban commercial hubs, allowing the internal spatial structure to interact with the external movement patterns (Iranica Bazaar article 2025). Furthermore, it possessed economic value as a place of attraction for heritage tourism (Hasan, p. G., Mahmood, Y. & Salman, A.S. 2023, p. 52). The function and styles of the Grand Bazaars were also crystallized in Islamic cities in Egypt, the Levant, Iraq, Morocco, and Iran (Hmood 2017). The Grand Bazaars were not merely spaces for buying and selling, but rather spatial and social systems linked to the urban fabric of the place, oriented towards residential and commercial areas, and featuring a mosque, as well as architectural coverings (wooden/domed/stone vaults) to serve comfort, ventilation, and lighting. (Hmood 2017). Studies have also indicated the multiplicity of Grand Bazaar patterns and their connection to specialized functions and crafts that support them. Such as khans, through structural integration in some of them, pointing to the functional and morphological diversity of the place (Kasmo 2023). with a clear presence of urban site relations and connection to commercial networks in shaping the internal spatial structure of the Grand Bazaar (Al-Qaisi and Faraj 2019) Figure 3.

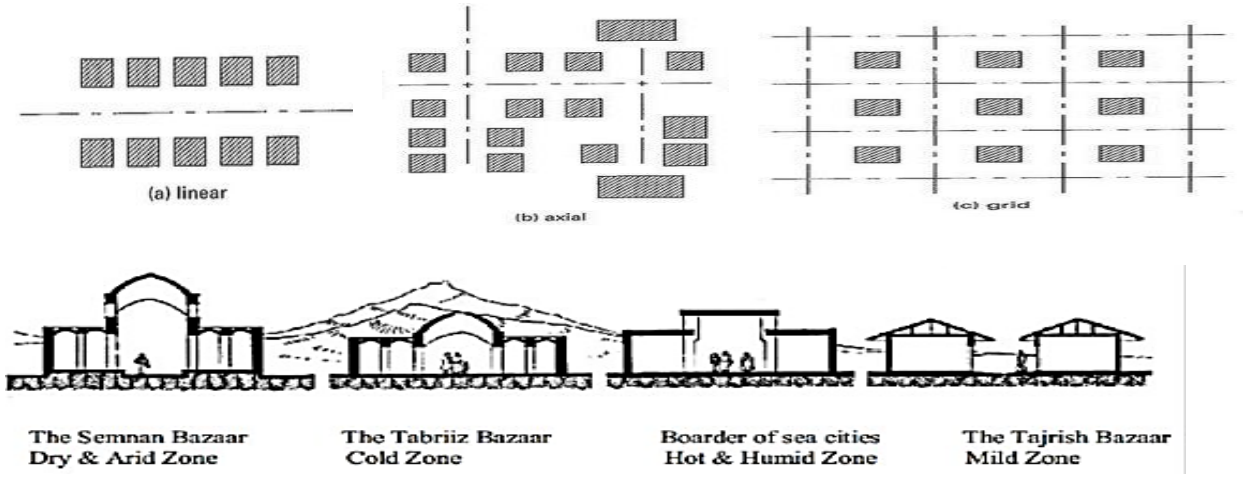


Figure 3. Morphological and architectural characteristics of horizontal and vertical plan forms of historic grand bazaars (Source: Taghizadehvahed, 2015)

2.3 Spatial Organization and Its Importance in Explaining the Success of Grand Bazaars Sections

Spatial organization is defined as a structure of relationships between spaces that is not reducible to the characteristics of each individual space, but rather to the structural arrangement that connects them, generating patterns of movement and social perception within the building (Hillier 2007). It is expressed through organizational patterns (axial or linear, central, radial, grid, or axial with sub-cores) determined by relationships of proximity, visual dominance, and access routes (Ching 2014). This is viewed through the lens of the reciprocal relationship between the spatial composition of a place (streets, passageways, spaces) and the patterns of social and economic behavior that arise within it. Spatial organization is as much a product of lifestyles and societal culture as it is a material response. Spaces are shaped by the culture and values of the community, as well as by the mode of use, and not solely by climate and materials (Rapoport 1969). This is clearly evident within the traditional markets associated with the khans (caravanserais), where these relationships become more pronounced because the function (housing, exchange, storage) directly intersects with the form through varying visual clarity, connection points, and degrees of depth that influence the distribution of users' movement patterns (Hillier 2007; Yamu et al. 2021). The spatial organization of the Grand Bazaars is directly influenced by a set of key factors, the first of which is the social factor, which determines the patterns of privacy and publicity, the commercial nature of the area, and consequently, the distribution of spaces and their functions (Rapoport 1969). Secondly, there is the climatic and environmental factor, which is linked to architectural styles such as roofing solutions, openings, ventilation, and lighting, like domes and skylights that regulate light and air in the Grand Bazaars (Ching 2014; Hmood 2017). Third, there is the functional and economic aspect, which is related to the type of caravans, the amount of trade, the position of entrances, the size of courtyards, and the proximity of storage places and stables (UNESCO 2022; Yamu et al. 2021). Fourth, there is the structural component (space syntax), which represents structural qualities such as integration, connectedness, and selection that demonstrate "accessibility" and movement possibilities and assist explain the arrangement of uses within the structure (Hillier 2007; Yamu et al. 2021).

Furthermore, from a structural and spatial analysis perspective, historical markets and souks are understood as networks of movement and social interaction. The spatial network structure, in terms of the organization of passageways, intersections, and entrances, is reflected in the distribution of movement within the building, the concentration of commercial activities along specific axes, and the opportunities for social interaction at spatial nodes. In this context, Space Syntax methodologies have been widely used to analyze the “logic” of movement and integration in historical spaces, as syntax measures, such as integration, connectivity, and selection, allow for

a quantitative explanation of why certain axes are active and certain spaces function as key points of attraction within the commercial system. (Hillier & Hanson, 1984; Yamu, van Nes & Garau, 2021).

Examining spatial relationships among passageways, nodes, entrances, and degrees of depth and visual clarity reveals the underlying logic governing the distribution of commercial activities and the regulation of movement within the market, while also explaining how spatial configuration enhances social interaction and controls levels of privacy and publicity. Consequently, spatial analysis is essential for understanding the spatial characteristics of historical markets and interpreting the reasons behind their formation and long-term resilience.

3.0 LITERATURE REVIEW

Grand Bazaars are considered as the most significant specialized architectural units in the historical market system. Through his examination, Hakim showed that the creation of the Grand Bazaars was more than just a phenomenon in form, but that it occurred due to economic and social evolution related to the growing significance of fine craftsmanship trade, especially textile, jewelry, and precious metal commerce. This required a more secure and regulated architectural form than open markets. Its morphological aspects, including its channels, shops layout as well as construction methods and materials played a role in retaining its economic and social function throughout history; this created a successful model for commercial architecture in Islamic cities (Hakim, B.S., 2017). The research also showed that the Grand Bazaar so clearly has a special structure established around in network of covered passageways with way to Bazaar mosque and for commercial area. Besides, it is structurally considered that the arrangement of entrancement is a key morphological characteristic among Isfahan Grand Bazaars by which passing through this progression from street to market with an ordered spatial series including small courtyard or open arcade, covered vestibule and inner commercial passage strongly stands out. The analysis of the study also indicates that this hierarchy of space was not only a visual feature, but served to facilitate a formative organization, controlling over spending physical movement and avoiding sudden changes in direction as well as helping to direct the user down into the centre of the Bazaar. It also records various architectural details in the Grand Bazaar - for example of vaulted brick ceilings above passageways, assembled continuously above them connected by small domes at the passageway intersections and open to outside with skylights providing a distributed natural illumination. Moreover, the interior facades are divided into several storefronts with semicircular arch on the shop body where bricks and stucco decorations occur in entrance space and central circulation area which contribute to show and clarify perception of space and it main axis (Balali Oskouei, A. & Alimi, A(2021).

There are few other types of research conducted about the spatial organization of market and Bazaar in some historic cities such as Syria, Turkey, Iran and Iraq, prospect to understanding the correlation between form of space performs the function is related with social and economic activities. The orientation of passages, entrances, and shops affects the movements of people and commercial transactions within these spaces as argued by Hillier & Hanson. That is the core of the Space Syntax methodology connects morphological structure with social action in a space (Hillier and Hanson, 1984). Meanwhile, the research of Yamu, van Nes and Garau indicates that the investigation of structural values -- entailing integration and connectivity can be used to interpret the social and economic efficiency of historic spaces that should inform conservation and reuse activities in urban built environment (Yamu, van Nes, and Garau 2021). Similarly, Kan and Altun argue that examining the spatiality of Ottoman markets reveals the "organization logic" underpinning their commercial prosperity and operational continuity (Kan and Altun 2018). Shehab 2024) on the other hand integrates structural analysis of GBs in his research that employed a combination of formal-visual and structural analysis to investigate the relationship between GBs and their urban context in Erbil and Sulymaniyah. The researcher used the Space Syntax method to measure the degree of openness to the street, permeability, height-plot size, and “visual integration” with neighboring buildings, in addition to measures of urban integration. The study concluded that the Grand Bazaars function as semi-integrated nodes within the commercial fabric, and that the decline in visual permeability and the

weak integration of entrances with the surrounding streets negatively affect their economic performance. Hence, it proposed a theoretical framework for dealing with the Grand Bazaars as heritage assets whose spatial integration must be enhanced while preserving their historical structure. Ghasemi and others also pointed to the sociomorphological concept by studying the relationship between elements of spatial composition (a longitudinal main corridor, a point of intersection of corridors, a small enclosed courtyard) and their relationship to indicators of social sustainability such as participation, interaction, sense of place, and security. This was achieved by measuring variables related to spatial structure (the interconnection of corridors, the centrality of spaces, proximity to the mosque and religious institutions) and their relationship to the continuity of the Bazaar's social and economic role, and its role in producing socially sustainable spaces compared to modern shopping centers. Edgü also used the Axial Map program to analyze the spatial organization within the Bazaars to identify indicators such as integration and choice. He concluded that corridors with a higher "choice" value represented important traffic routes within the Bazaar and were therefore prominent commercial locations. In addition to using the DepthmapX software in Balalye Oskui's (2022) study to produce maps of the distribution of structural values, which were then linked to questionnaires about social interaction within the market, thus connecting spatial structure to user behavior, (Demirel,2023) used the methodology of spatial composition analysis in a large market (Kapalı Çarşı) to examine how internal layout, such as aisles, openings, and symmetry, contributes to keeping the market active for centuries. By measuring connectivity and integration indicators, the power of the central "nodes" in shaping movement becomes apparent.

The preceding discussion demonstrates that the study of ancient markets in general, and Grand Bazaars in particular, was conducted at two levels. The first level entailed researching and comparing the architectural characteristics of historical Grand Bazaars using a variety of indicators, including construction period, building techniques and materials, horizontal and vertical plans, the number of entrances, the shape of the passageways, shop distribution, heights, and architectural details. This was in order to describe its formal, structural and functional traits as well as to understand how space and internal organization were shaped there so that the building could be investigated for its space relationships, strengths/weaknesses that would then be related to its spatial mechanisms. The second level studied the spatial form of GBs on the horizontal plan, in terms of integration, connectedness and selection. The idea was to reveal how connections and spatial relationships were organized in the urban tissue and test levels of connectivity, mobility, control and projection in order to understand space performance and analyze patterns of uses or behaviors Table 1.

Table 1. Theoretical Framework of Architectural Characteristics and Spatial Configuration of Grand Bazaars (Source: Authors)

Main Variables	Secondary Variables		Possible Values / Indicators	Code
Architectural Characteristics A.1	General characteristics A.1.1	Location	Within the historic market	A.1.1.1
		Building materials	Local materials (stone and gypsum)	A.1.1.2
		Construction techniques	Traditional techniques (semi-circular vault system and square-based vaults)	A.1.1.3
		area	1500	A.1.1.4
			1000	A.1.1.5
			500	A.1.1.6
		Relation to surroundings	Adjacent from one side	A.1.1.7
			Adjacent from two sides	A.1.1.8
			Adjacent from three sides	A.1.1.9
	Architectural characteristics of horizontal	Plan configuration	Grid	A.1.2.1
			Branching	A.1.2.2
			Mixed	A.1.2.3

	layouts (Ground floor) A.1.2	Corridor configuration	Linear	A.1.2.4
			Intersecting	A.1.2.5
		Shops	Single-space units	A.1.2.6
			Multi-space units	A.1.2.7
		Entrances	5–2entrances	A.1.2.8
			10-6entrances	A.1.2.9
		Movement nodes	Single node	A.1.2.10
			Multiple nodes	A.1.2.11
			Connecting two movement corridors	A.1.2.12
			Connecting three movement corridors	A.1.2.13
			Connecting four movement corridors	A.1.2.14
	Horizontal layouts of the first floor A.1.3		Includes storage areas	A.1.3.1
			Includes resting areas	A.1.3.2
	Vertical layout characteristics A.1.4		Entrances Clearly defined entrances	A.1.4.1
			Openings Proportionate openings	A.1.4.2
			One elevatıon	A.1.4.3
			Tow elevatıon	A.1.4.4
			three elevatıon	A.1.4.5
	Roofing system A.1.5		Semi-circular vaults and arches	A.1.5.1
			Small domes	A.1.5.2
	Lighting and ventilation A.1.6		Roof openings	A.1.6.1
			Side openings	A.1.6.2
			Open inward	A.1.6.3
			Open inward and outward	A.1.6.4
			Natural lighting and ventilation	A.1.6.5
			Animal motifs	A.1.7.1
			Vegetal motifs	A.1.7.2
Spatial configuration characteristics (Space Syntax) A.2	(Connectivity) A.2.1		High	A.2.1.1
			Medium	A.2.1.2
			Low	A.2.1.3
	(Integration) A.2.2		High	A.2.2.1
			Medium	A.2.2.2
			Low	A.2.2.3
	(Choice) A.2.3		High	A.2.3.1
			Medium	A.2.3.2
			Low	A.2.3.3

4.0 KIRKUK CITY

Kirkuk is one of the ancient cities located in northern Iraq, and it is distinguished by an architectural history whose roots extend back thousands of years. Seljuk and Ottoman ruins still bear witness to its ancient history, as its architectural remains vary between military buildings such as the Ottoman barracks (Yunus, S.M.2020 pp.11–19) and commercial buildings Figure 4.

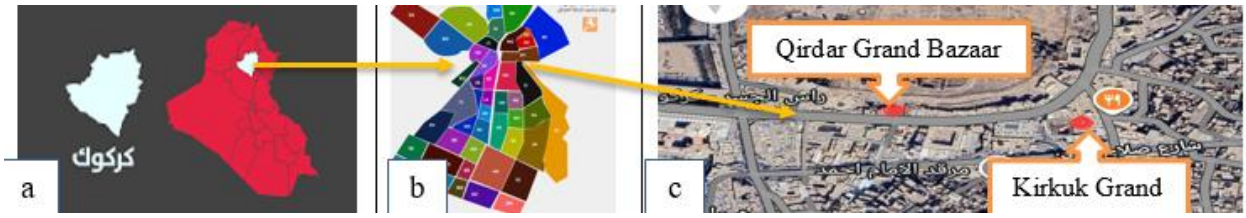


Figure 4. (a,b,c) Location of Kirkuk within Iraq, urban districts of the city, and the Grand Bazaar layout showing the locations of Kirkuk and Qirdar Grand Bazaar.

Kirkuk historic markets and Grand Bazaars were established within the old city center near the citadel and the mosque (Al-Qaisi and Faraj 2019), Grand Bazaars of Kirkuk represented the nucleus The city's commercial activity was facilitated by a system of covered passageways and adjacent shops, organized in a way that allowed for the smooth, natural movement of shoppers while maintaining a gradation of privacy between public and semi-public spaces (Hmood 2017). This system has been able to endure to this day despite urban changes (Sabah, Q.2023, pp. 615) and serves as a suitable model for studying the relationship between spatial structure and commercial function in Iraqi historical cities.

The historic Grand Bazaar is considered one of the most important markets in the city of Kirkuk, having maintained its commercial activity to the present day due to several architectural and functional factors. Most notably, it contains historic khans and Grand Bazaar, particularly The Kirkuk Grand Bazaar dates back to 1855 AD during the Ottoman era, and the Qirdar Grand Bazaar dates back to 1883 AD. Kirkuk Grand Bazaar plan is characterized by an irregular configuration and covers an area of approximately 2,625 m², whereas Qirdar Grand Bazaar exhibits a regular plan with a relatively smaller area of about 850 m², reflecting differences in morphological structure and commercial capacity between the two Grand Bazaar in figure 5 and figure 6.

Figure 5. Ground plan and elevation of Kirkuk Grand Bazaar (Source: Kirkuk Antiquities Directorate)

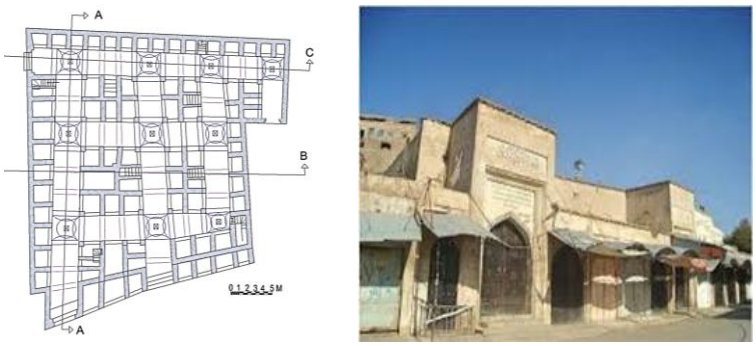


Figure 6. Ground plan and elevation of Qirdar Grand Bazaar (Source: Kirkuk Antiquities Directorate)

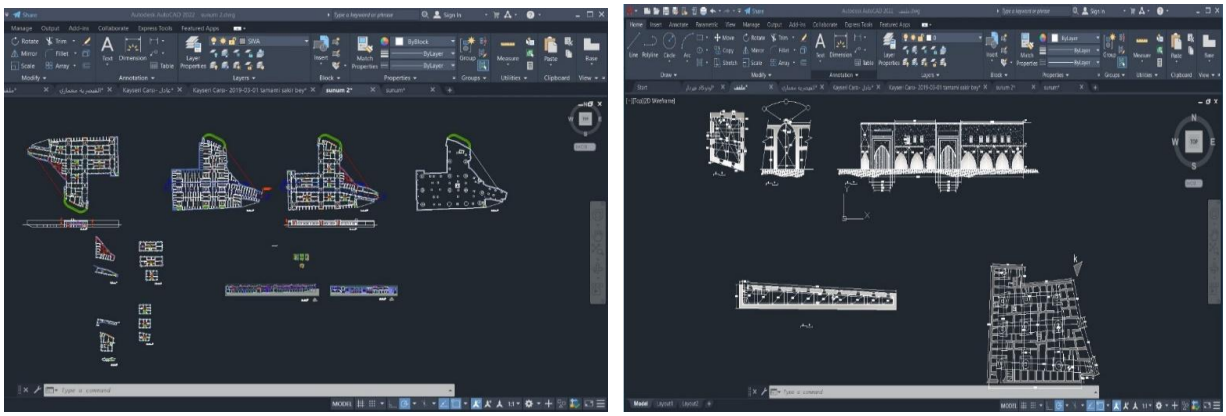
5.0 RESEARCH METHODOLOGY

The study is based on two methods: a descriptive architectural analysis; and a quantitative structural analysis (space syntax) to show how the architectural and spatial organisation features of Kirkuk historical Bazaars were related to its functions and social roles.

5.1 Architectural Descriptive Analysis Methodology

This methodology focuses on the formal and morphological description and analysis of the historical Grand Bazaars in Kirkuk. It relies on original plans documented by the Kirkuk Antiquities Department and on drawings and field analysis using AutoCAD software to describe the morphological structure of each Grand Bazaar (Figure 2). Each Grand Bazaar is considered a closed spatial system with independent organizational characteristics through:

- Documenting the architectural characteristics of each Grand Bazaar (construction period, building techniques and materials, floor plans and floor plans, number of entrances, corridor layout, shop distribution, heights, and architectural details).
- Comparing the Grand Bazaars (Kirkuk Grand Bazaar and Qirdar Grand Bazaar) to identify common features and design differences. - Analyzing the functional relationships within the plans in terms of connection to entrances, corridors, and the distribution of shops Figure 7 (a and b).



(a) Kirkuk Grand Bazaar (b) Qirdar Grand Bazaar

Figure 7. (a and b) Show the AutoCAD software interface used to describe and analyze the architectural features of the Kirkuk and Qirdar Grand Bazaars (Source: Authors).

5.2 Quantitative Analysis of Spatial Organization

The DepthmapX software was used to perform spatial analysis. It is a tool within the Space Syntax methodology, capable of calculating integration, selection, and connectivity indices (Figure 3). The software converts the plan into a grid of axes and calculates the spatial relationships between them to interpret potential traffic patterns, as illustrated below.

- Converting the architectural plans to DXF format within AutoCAD.
- Creating an axial map of the arcades, including corridors, entrances, and shops Figure 8.
- The analysis begins by extracting the following structural indices: Choice, Connectivity, Normalized Choice, Integration (HH), Integration (Tekl), Mean Depth, Entropy, and Relative Entropy. These indices are based on the Space Syntax approach as analytical tools for understanding the spatial structure of historical Caesarean sections and interpreting patterns of movement, functional performance, and social interaction, as shown in Table 2.

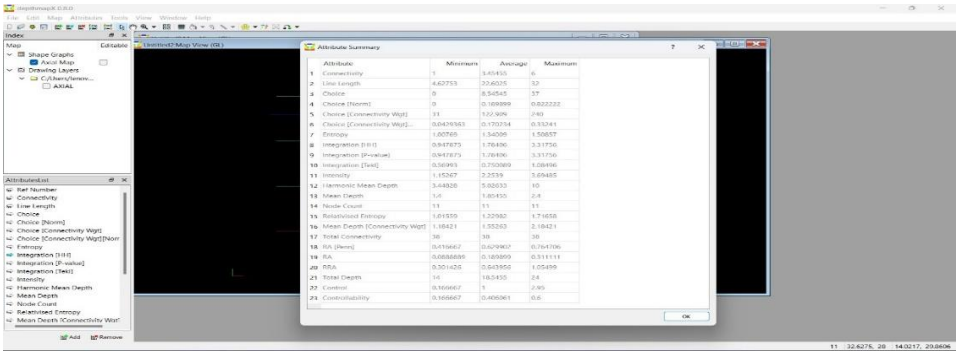


Figure 8. Shows the interface of the Depth map software used in the quantitative spatial organization analysis of cesarean sections (Source: Authors).

Table 2. Space Syntax Indicators and Their Relevance to Historic Grand Bazaar Analysis (Source: Hillier, B., & Hanson, J. (1984))

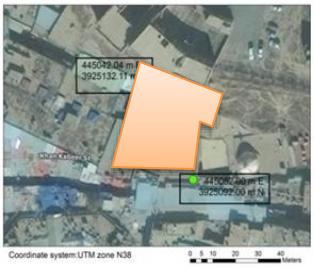
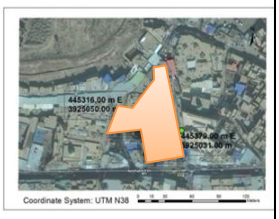
Measure	Definition	Significance in the Analysis of Grand Bazaars
Connectivity	The number of spaces or axial lines directly connected to a given space within the spatial system.	Identifies spatial nodes that facilitate movement distribution and ease of navigation within the Grand Bazaar.
Choice	The extent to which a space lies on the shortest paths between all pairs of spaces, representing its likelihood of being used as a through-route.	Reveals primary movement corridors that often correspond to commercially active and highly accessible spaces.
Normalized Choice	A standardized form of choice that allows comparison between spatial systems of different sizes and complexities.	Enables comparative analysis between different Grand Bazaars or between sub-systems within the same Grand Bazaar.
Integration (HH)	A measure of how close a space is to all other spaces in the system, based on topological depth	Identifies spatial cores that function as central zones of commercial and social activity.
Integration (Tekl)	A normalized and refined version of integration that enhances comparability across spatial systems.	Provides a more accurate assessment of spatial centrality and accessibility within the Grand Bazaar.
Mean Depth	The average number of topological steps required to reach all other spaces from a given space.	Evaluates internal accessibility, where lower values indicate spaces that are easier to reach and more likely to attract movement.
Entropy	A measure of the degree of dispersion or concentration of spatial values within the system.	Indicates whether movement is evenly distributed or concentrated along specific axes within the Grand Bazaar.
Relative Entropy	A normalized entropy value that allows comparison between spatial systems of different sizes.	Enables assessment of spatial balance and movement distribution across different historic Grand Bazaars.

6.0 THE PRACTICAL PART COMPRISES TWO MAIN LEVELS:

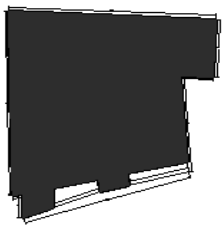
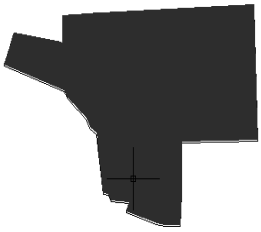
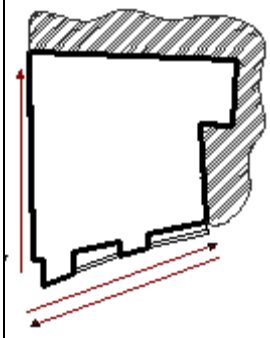
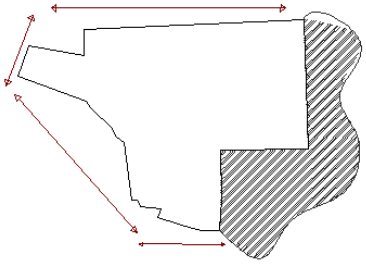
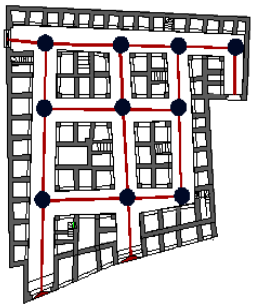
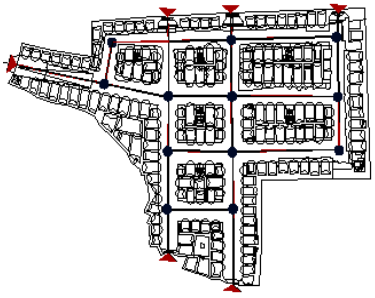
6.1 Architectural Description of the Kirkuk Grand Bazaars

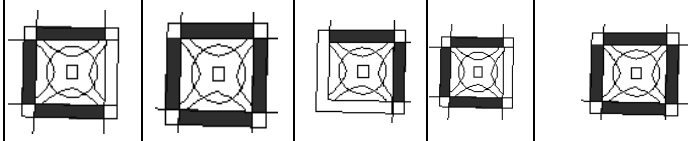
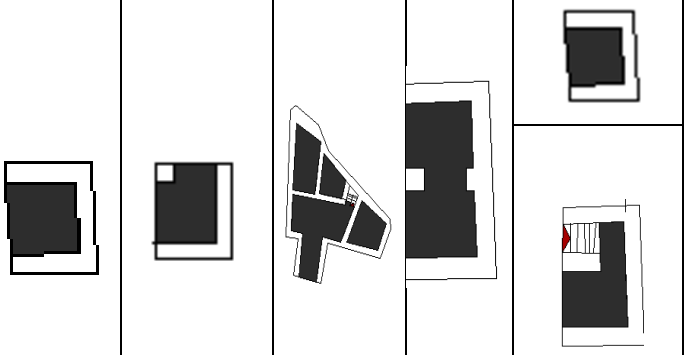
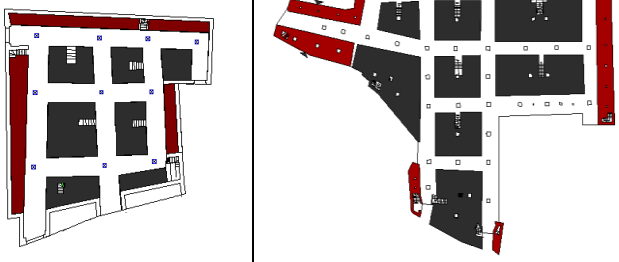
This section relies on architectural description and analysis based on documented plans held by the Kirkuk Antiquities Department. The formal and morphological composition of the Grand Bazaars (Kirkuk and Qirdar) is analyzed on three levels: general characteristics, architectural characteristics, and finally, the characteristics of architectural details. AutoCAD software is used to document and compare distinctive design features, as shown in Table 3.

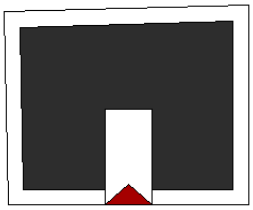
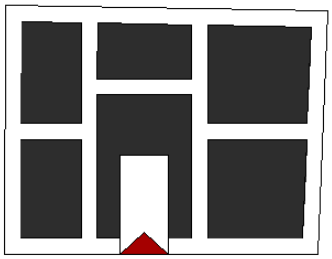
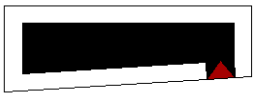
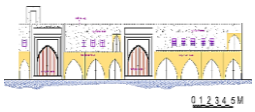
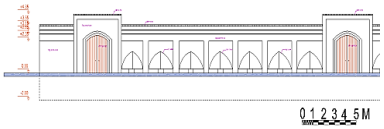
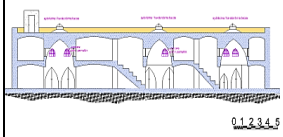
Table 3. shows the description and analysis of the architectural features of both Kirkuk and Qirdar Grand Bazaars (Source: Authors)

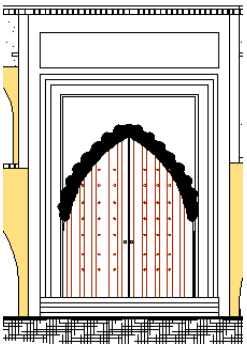
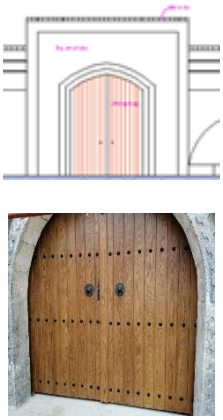
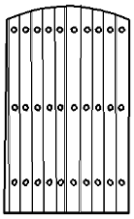
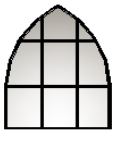
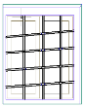
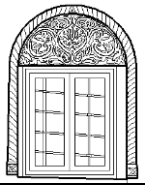
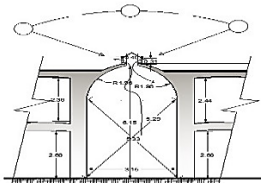
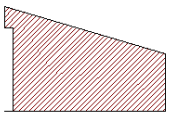
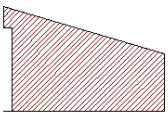
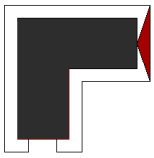
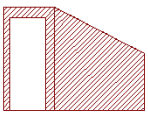
1.General characteristics			
Analytical description	**Qirdar Grand Bazaar**	**Kirkuk Grand Bazaar**	
Kirkuk Grand Bazaar was built in the Grand Bazaar, beneath the famous Kirkuk Citadel, opposite the Citadel Khan to the north and the Naqsha Minaret Mosque to the east. Qirdar Grand Bazaar is located below the Citadel, in the Grand Bazaar. It is also situated to the east, next to the Qirdar Mosque.			**Location**
In the Kirkuk Grand Bazaar, stone, cut stone, and wood were the primary building materials. Stone was used as a mortar layer between the floors, while toothed stone cornices were used for the cornices. Qirdar Grand Bazaar was built using stone, cut stone, and wood, which were the primary building materials. Stone was used as a mortar layer between the floors, while toothed stone cornices were used for the cornices.	 		**building materials**

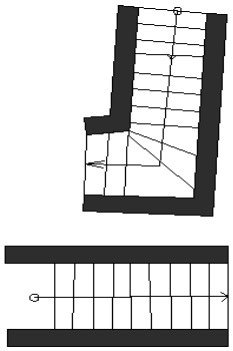
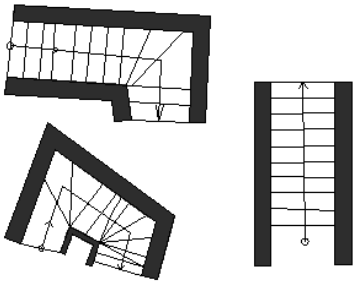
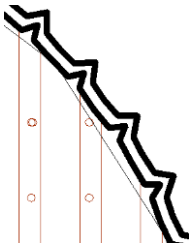
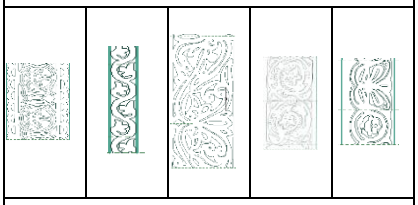
Kirkuk Grand Bazaar has 60 cm thick supporting walls, and its vaulted upper covering consists of arches suspended downwards at regular intervals. These arches form a star-shaped vault at the intersection of the internal corridors. Qirdar Grand Bazaar also has 60 cm thick supporting walls, and its vaulted upper covering consists of arches suspended downwards at regular intervals. These arches form a star-shaped vault at the intersection of the internal corridors.			**Construction technology**

2.Architectural characteristics of horizontal and vertical plans and facades			
Analytical description	**Qirdar Grand Bazaar**	**Kirkuk Grand Bazaar**	
Kirkuk Grand Bazaar: The building features an irregular plan and covers an area of 2625 square meters. *Qirdar Grand Bazaar: The building features a regular plan and covers an area of 850 square meters.			**Building area**
Kirkuk Grand Bazaar; its area is 850 square meters. It has an irregular horizontal plan. It extends along three sides of the Bazaar, except for the southern side, which is adjacent to a caravanserai. Qirdar Grand Bazaar; the market plan is somewhat regular. There are roads along its western and southern sides. It is adjacent to the citadel on the northern side and the Qirdar Mosque on the eastern side.			**The building's form and its relationship to the surrounding area**
Kirkuk Grand Bazaar is characterized by its intersecting grid-like passageways, which conform to the irregular horizontal plan. These passageways converge at 13 distributed points, each covered by a vault containing skylights. These points intersect at two, three, or four axes at the corners. Qirdar Grand Bazaar is distinguished by its grid-like circulation pattern,			**Ground floor and movement pattern**

linked by arches covered by vaulted ceilings. These points intersect at two, three, or four axes at the corners. Thus, the vaulted arches have a quadrilateral, trilateral, or bi-axis base, depending on the arch's position relative to the intersection of the four-way, trilateral, or bidirectional passageways.		
Kirkuk Grand Bazaar is characterized by its small to medium-sized shops, some of which may contain more than one space. These shops overlook internal passageways and arcades, while the external shops open onto the main thoroughfare of the Grand Bazaar .Qirdar Grand Bazaar is characterized by its relatively small to medium-sized shops, which are regularly shaped and open onto internal passageways. The external shops, however, open onto the main thoroughfare.		**shops**
Kirkuk Grand Bazaar is characterized by its small to medium-sized shops, some of which may contain more than one space. These shops overlook internal passageways and arcades, while the external shops open onto the main thoroughfare of the Grand Bazaar. Qirdar Grand Bazaar is characterized by its relatively small to medium-sized shops, which are regularly shaped and open onto internal passageways. The external shops, however, open onto the main thoroughfare.		**First floor characteristics**
Kirkuk Grand Bazaar has 11 domes on its roof, each with a central ventilation opening. Qirdar Grand Bazaar has 9 ventilation openings in the center of its roof.		**Building - surface characteristics**

Kirkuk Grand Bazaar contains rest halls with four, five, six, or eight rooms. These rooms overlook the central area. These spaces were used as accommodations for merchants and are still used today as warehouses for goods. Qirdar Grand Bazaar consists of a single square or rectangular room with one or two columns, used as a rest room or warehouse. There are seven such rooms.			**Rest areas**
Both the Kirkuk and Qirdar Grand Bazaars have mostly strip-shaped stores located on the first floor, like a long corridor with a door in the middle or on the side.			**warehouses**
Kirkuk Grand Bazaar has three facades with an outer row of shops, where architectural elements are repeated, and the entrances are defined by their height above the facade line. The Qirdar Grand Bazaar has two facades, connected by a row of shops and windows, and the entrances are defined by their high height, in addition to a balcony on the front facade.			**Architectural characteristics of facades**
Kirkuk Grand Bazaar: The Bazaar rises two meters above ground level and descends eight steps. Its ceiling height is 5.90 meters. It features 13 domes. There are also 89 large arches on the ground floor and smaller arches in the first-floor prayer halls. Qirdar Grand Bazaar: The Bazaar rises 80 centimeters above ground level and is accessible via four steps. Its ceiling height is 5.45 meters. It features nine domes. It also has 21 large arches on the ground floor and smaller arches in the first-floor prayer halls.			**Architectural characteristics of sections**

3. Architectural characteristics of details			
Analytical description	**Qirdar Grand Bazaar**	**Kirkuk Grand Bazaar**	
The entrance doors of the Kirkuk Grand Bazaar are typically huge, framed in ornamental stone, and feature a pointed archway at the top. These doors are composed of wood and adorned with seven circular iron ornaments. Shop doors are usually narrower, with a pointed archway and varying widths. Qirdar Grand Bazaar also includes a pointed archway at the top, which is made of wood with circular iron ornamentation. Shop doors are usually narrower, with a pointed archway and varying widths.		 	**The doors**
Kirkuk Grand Bazaar has ventilation apertures of 70 x 70 cm, some of which face outward and others inward. The outside and interior facade windows measure 60 x 80 cm, and decorative windows may be seen from inside the rest spaces. Qirdar Grand Bazaar also has ventilation apertures, some facing outside and others facing inward, measuring 70 x 70 cm. The outer facade windows vary in shape and size from the internal facade windows..	     		**Windcatchers and windows**
The "baytunah" is a transitional space between the first floor and the roof in Kirkuk Grand Bazaar. The Grand Bazaar consists of three baytunahs with curving, enclosed roofs. This structure is accessed via two staircases on the first floor, which serve as storage areas or resting places. The other corridor is accessible by a stairway on the eastern side, near the shops.Qirdar Grand Bazaar: The "baytunah," or transitional space between the first floor and the roof, has a curving, enclosed roof. This building is entered via a stairway on the first floor, which serves as a storage facility and a resting spot.	 	 	  **Locations of the stairs leading to the roof of the building**

Kirkuk Grand Bazaar has steps ranging from 20 to 30 cm in width. The steps are flat, arranged in L-shapes and U-shapes. There are 6 steps in front of the entrance, 12 in front of the rest area, and 3 on the roof. Qirdar Grand Bazaar has steps 20 cm wide at the entrance and 30-45 cm wide inside. They are straight and arranged in an L-shape. There are 2 steps in front of the entrance, 8 in front of the rest area, and 1 on the roof.			**Characteristics of vertical motion**
Kirkuk Grand Bazaar: Most of the decorations in the Grand Bazaar are geometric and floral motifs carved in stone within the frames of the doors and windows. Qirdar Grand Bazaar: There are geometric muqarnas decorations surrounding the frames of the doors, carved in stone.		doors decorations  Windows decorations 	**Decorations and patterns**

An analysis of the architectural characteristics of the Kirkuk and Qirdar Grand Bazaars reveals three levels of features: general characteristics, architectural characteristics, and architectural details. This analysis shows a set of common features reflecting the Ottoman character of the covered markets in northern Iraq. Both Grand Bazaars are organized on a semi-regular plan around well-defined axes with intersecting internal passages. You find shops facing each other on both sides of these passageways, and while they all generally elongate or converge upon a principal internal axis. Both Grand Bazaars are constructed from such traditional ingredients as stone, brick and fired clay materials for masonry as well as some arches and half-domes at the entrance. In addition, they also have humble shop fronts with low and long openings, hence are adapted to the exhibition needs.

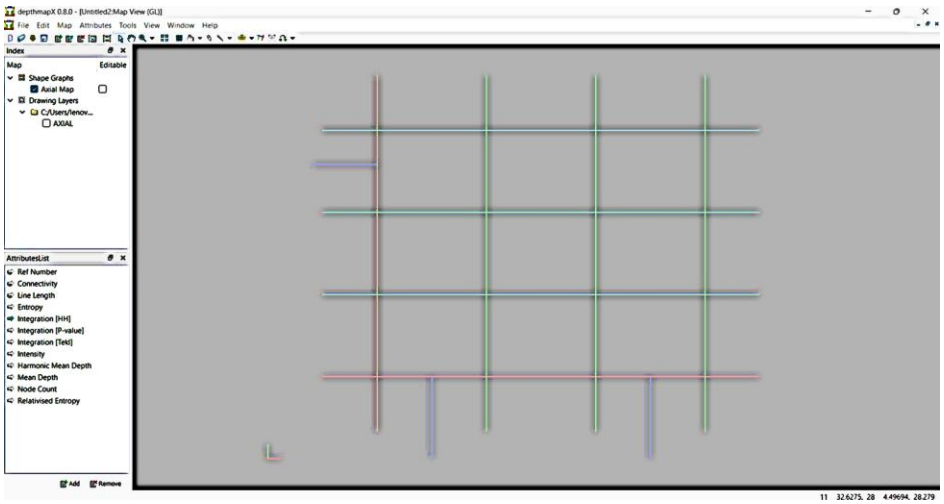
But the probe suggests they are markedly different. The Kirkuk Grand Bazaar has a more complex and larger plan which with more gateways most of them are connected to the main circulation axis of the Grand Bazaar again reflecting its primary economic function. While the Qirdar Bazaar has a smaller, more regular layout and only four entrances, one of which connects to the adjacent mosque, giving it a more local function than the larger Kirkuk Bazaar, the Kirkuk Bazaar also has more variety in the width of its passageways and shop distribution in contrast, the Qirdar Bazaar is distinguished by the consistency and uniformity of its retail units. The distinctions are further accentuated by changes in roofing types; the Kirkuk Bazaar has more diversified vaulted or longitudinal vaulting, whilst the Qirdar Bazaar has primarily simpler longitudinal vaulting. The Kirkuk Bazaar has more projecting facades facing the street, whilst the Qirdar Bazaar is more enclosed and in keeping with its urban surroundings.

6.2 Spatial organization characteristics of cesarean sections

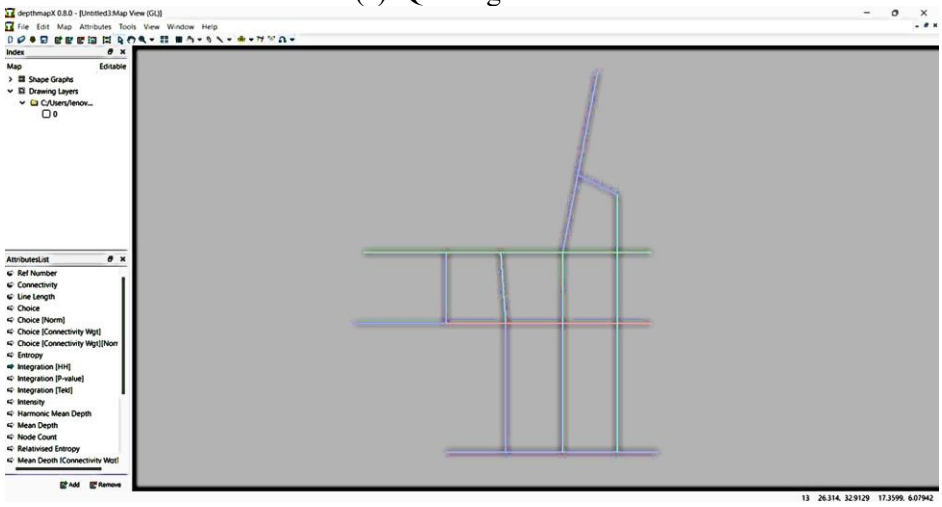
This section analyzes the spatial organization characteristics (integration, connectivity, and choice) of the Kirkuk and Qirdar metropolitan area by measuring the minimum, average, and maximum values for each of the following:

Connectivity (measuring the number of direct connections to a line and expressing the degree of local spatial interconnection); Choice (measuring the probability of traffic passing through a line (Route Flow) and identifying the most frequently used routes); Choice (Norm) (a standardized version of Choice used to compare networks or minimize the effect of network size); Integration (HH) (measuring the accessibility of a line from the rest of the network and indicating traffic flow); Integration (Tekl) (measuring integration from a normative perspective and used to predict user density and traffic); Mean Depth (measuring the average number of steps to reach the rest of the network and expressing the "depth" or "openness" of the space); Entropy (measuring the regularity or randomness of the distribution of spaces and the relationships between them); and Relativized Entropy (an indicator showing the regularity of the network relative to its internal structure and expressing the level of complexity, as illustrated in figure 9 (a, b), figure 10, figure 11, table 4 and table 5 .

Figure 9. (a and b) Show the interface of the Depth map software used in the spatial organization analysis of Qirdar and kirkuk Grandbazzars (Source: Authors).



(a) Qirdar grand bazaar



(b) Kirkuk grand bazaar.

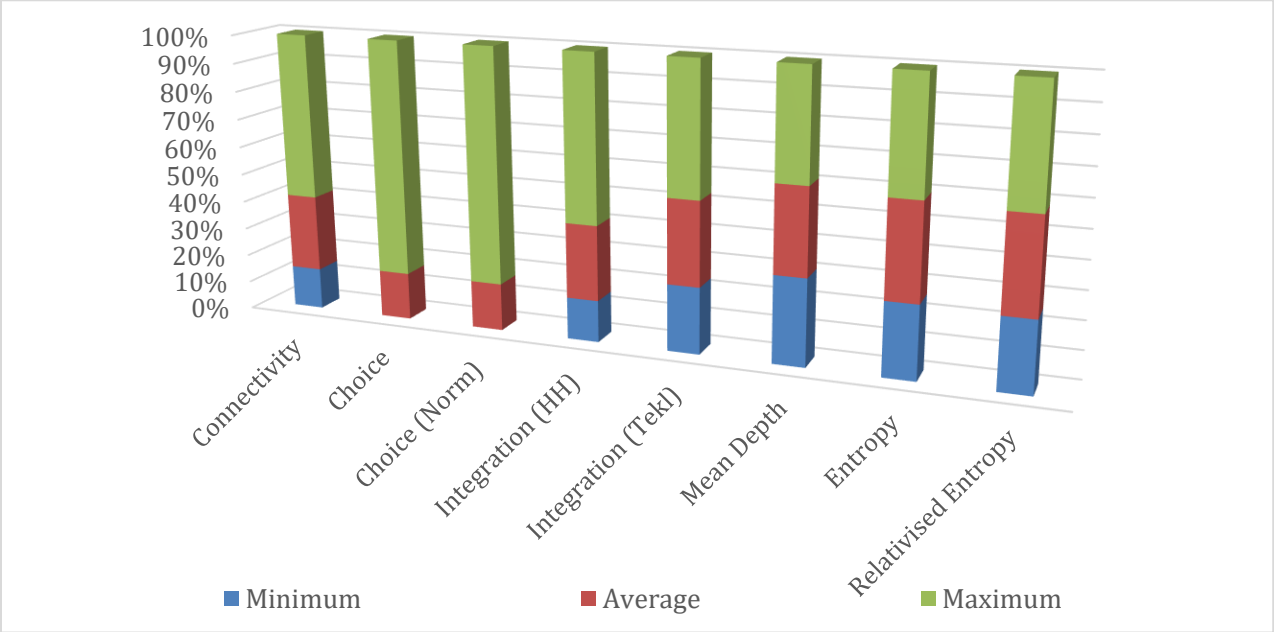


Figure 10. Spatial organization characteristics of Kirkuk Grand Bazaar.

Table 4. Shows the spatial organization characteristics of the Kirkuk Grand Bazaar. (Source: Authors)

Maximum	Average	Minimum	Index
8	3.692	2	Connectivity
50	10	0	Choice
0.758	0.152	0	Choice (Norm)
4.546	2.042	1.136	Integration (HH)
1.230	0.779	0.615	Integration (Tekl)
2.333	1.833	1.833	Mean Depth
1.491	1.247	0.954	Entropy
1.650	1.332	1.001	Relativized Entropy

The Connectivity values in Kirkuk Grand Bazaar range between (2–8) with an average of (3.69), indicating a moderately connected spatial network that allows movement to be distributed across corridors without excessive local dominance, while a limited number of highly connected axes correspond to main corridors and entrances. The Choice values show a wide range (0–50) with a mean of (10), reflecting clear differentiation in movement potential, where certain axes function as primary through-routes while others remain marginal, suggesting a moderately hierarchical movement structure. This pattern is further supported by relatively low Normalized Choice values (0–0.75), indicating that movement centrality is driven by spatial configuration rather than network size.

The Integration (HH) values range from (1.136) to (4.546) with a mean of (2.042), revealing the presence of highly integrated spaces that act as natural movement attractors, while Integration (Tekl) values (0.615–1.230) suggest an overall architectural regularity capable of accommodating daily movement without pronounced congestion. The relatively low Mean Depth values (1.83–2.33) indicate short topological distances and ease of access across the network. Meanwhile, the moderate Entropy and Relative Entropy values (0.95–1.65) reflect a balanced distribution of spatial relations with a limited degree of complexity, consistent with the historically layered development of the Grand Bazaar.

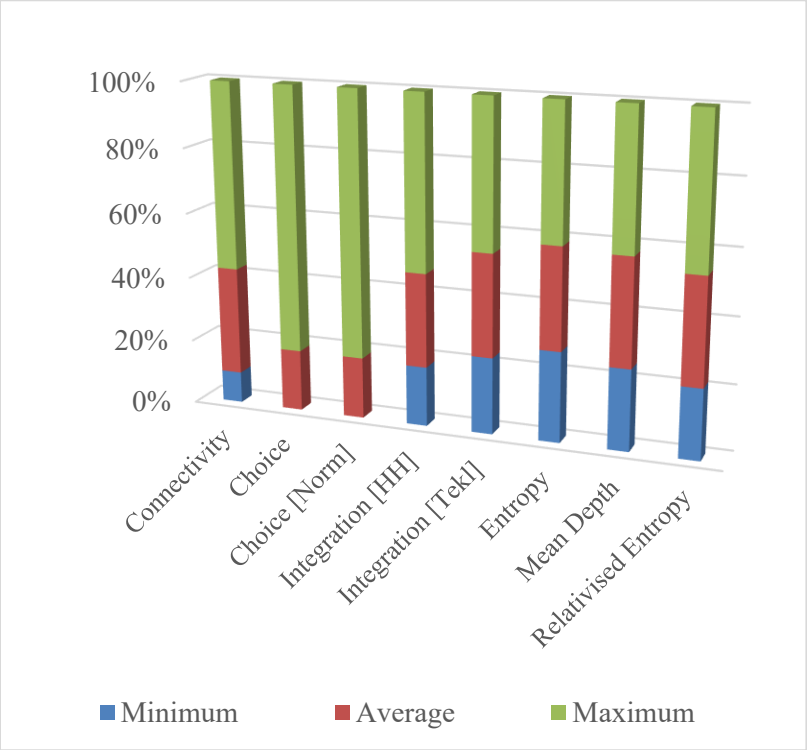


Figure 11. Spatial organization characteristics of Qirdar Grand Bazaar.

Table 5. Shows the spatial organization characteristics of the Qirdar Grand Bazaar (Source: Authors)

Maximum	Average	Minimum	Index
6	3.45455	1	Connectivity
37	8.54545	0	Choice
0.822222	0.189899	0	Choice (Norm
3.31756	1.78406	1.13657	Integration HH)
1.08496	0.750089	0.56093	Integration (Tekl)
1.50857	1.134009	1.00769	Entropy
2.4	1.85455	1.4	Mean Depth
2.171658	1.52982	1.01559	Relativised Entropy

Number of genuinely integrated spaces act as movement cores. The Entropy (1.00–1.50) and Relativised Entropy (1.01–2.17) values reflect an overall balanced distribution of spatial relations, while allowing for some degree of irregularity in specific areas, a condition typical of historically evolved market structures. Finally, the low Mean Depth values (1.4–2.4) confirm short topological distances and a compact, tightly configured corridor network that facilitates internal accessibility.

7.0 ANALYSING AND DISCUSSING THE RESULTS

This section presents the most significant indications derived from the application of the theoretical framework on the selected case studies, namely Kirkuk Grand Bazaar (A) and Qirdar Grand Bazaar (B), based on a binary (0–1) evaluation of architectural and spatial attributes.

7.1 Results of General and Architectural Characteristics (A.1.1–A.1.7)

The overall verification ratio of architectural characteristics reached a high level, as a considerable number of indicators related to location within the historic market, use of local materials, traditional construction techniques, roofing systems, and natural lighting and ventilation

achieved full verification (100%) in both Grand Bazaar. In contrast, several indicators associated with built-up area variation, degree of adjacency, façade multiplicity, and certain architectural details showed partial or no verification, reflecting morphological differences between the two case studies and their adaptation to specific urban conditions.

7.2 Results of Horizontal and Vertical Spatial Layouts (A.1.2–A.1.4)

Regarding the shop space indicators, the results reveal a regular distribution of shops along both sides of the movement corridors in both Kirkuk and Qirdar Grand Bazaar, indicating continuity of commercial activity and the achievement of high levels of connectivity along the main movement axes. With respect to the spatial configuration of shop units, the analysis shows that Kirkuk Grand Bazaar contains multi-space shops, where the front retail unit is connected to additional internal spaces arranged in a tree-like or sequential configuration. This spatial arrangement reflects a high degree of spatial flexibility and adaptability to commercial functions that require larger areas and multiple internal spaces. In contrast, Qirdar Grand Bazaar is predominantly characterized by single-space shop units directly facing the corridors, indicating a more linear and compact commercial layout Table 6 and figure 12.

Table 6. Analysis of architectural characteristics of Grand Bazaars: Kirkuk Grand Bazaar (A) and Qirdar Grand Bazaar (B), using a theoretical checklist (Source: Authors)

Symbol	A.1.1.1	A.1.1.2	A.1.1.3	A.1.1.4	A.1.1.5	A.1.1.6	A.1.1.7	A.1.1.8	A.1.1.9	A.1.2.1	A.1.2.2	A.1.2.3	A.1.2.4	A.1.2.5	A.1.2.6	A.1.2.7	A.1.2.8	A.1.2.9	A.1.2.10	A.1.2.11	A.1.2.12	A.1.2.13	A.1.2.14	A.1.3.1	A.1.3.2	A.1.4.1	A.1.4.2	A.1.4.3	A.1.4.4	A.1.4.5	A.1.5.1	A.1.5.2	A.1.6.1	A.1.6.2	A.1.6.3	A.1.6.4	A.1.6.5	A.1.7.1	A.1.7.2
A	1	1	1	1	0	0	0	1	0	0	1	0	1	1	1	0	1	0	0	1	1	1	0	1	0	1	1	0	1	0	1	1	1	0	1	0	1	0	1
B	1	1	1	0	1	0	1	0	0	1	0	0	1	1	1	0	0	1	1	0	1	1	0	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	1
Total	2	2	2	1	1	0	1	1	0	1	1	0	2	2	2	0	1	1	1	1	2	2	0	2	1	2	2	1	1	0	2	1	2	1	2	1	2	0	2
Rate %	100%	100%	100%	50%	50%	0%	50%	50%	0%	50%	50%	0%	100%	100%	100%	0%	50%	50%	50%	50%	100%	100%	0%	100%	50%	100%	100%	50%	50%	0%	100%	50%	100%	50%	100%	50%	100%	0%	100%

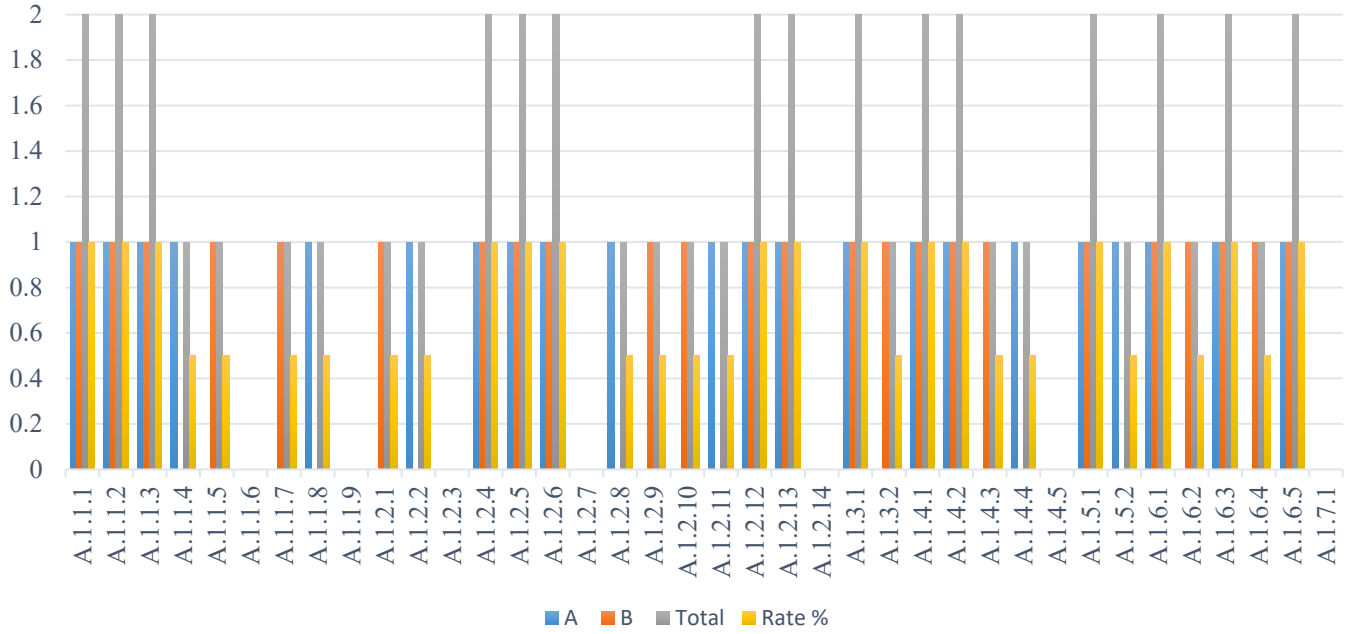


Figure 12. Analysis of architectural characteristics of Grand Bazaars Kirkuk & Qirdar.

7.3 Results of Spatial Configuration Characteristics (Space Syntax – A.2)

The percentage of verification of spatial configuration indicators is relatively high, reflecting the effectiveness of the spatial structure of the studied Grand Bazaar. The Connectivity indicators (A.2.1.2) achieved verification in both Kirkuk and Qirdar Grand Bazaar (100%), indicating a moderate and balanced level of local connectivity that supports movement distribution along the main corridors. In contrast, the indicators of high and low connectivity levels (A.2.1.1, A.2.1.3) were not achieved, suggesting the absence of extreme spatial dominance or isolation within the internal network.

Regarding Integration, the results show variation between the two cases, as the high integration indicator (A.2.2.1) was achieved in Kirkuk Grand Bazaar, while medium integration (A.2.2.2) was verified in Qirdar Grand Bazaar, reflecting differences in spatial centrality and accessibility between the two markets. The low integration indicator (A.2.2.3) was not achieved in either case in figure 13 and table 7.

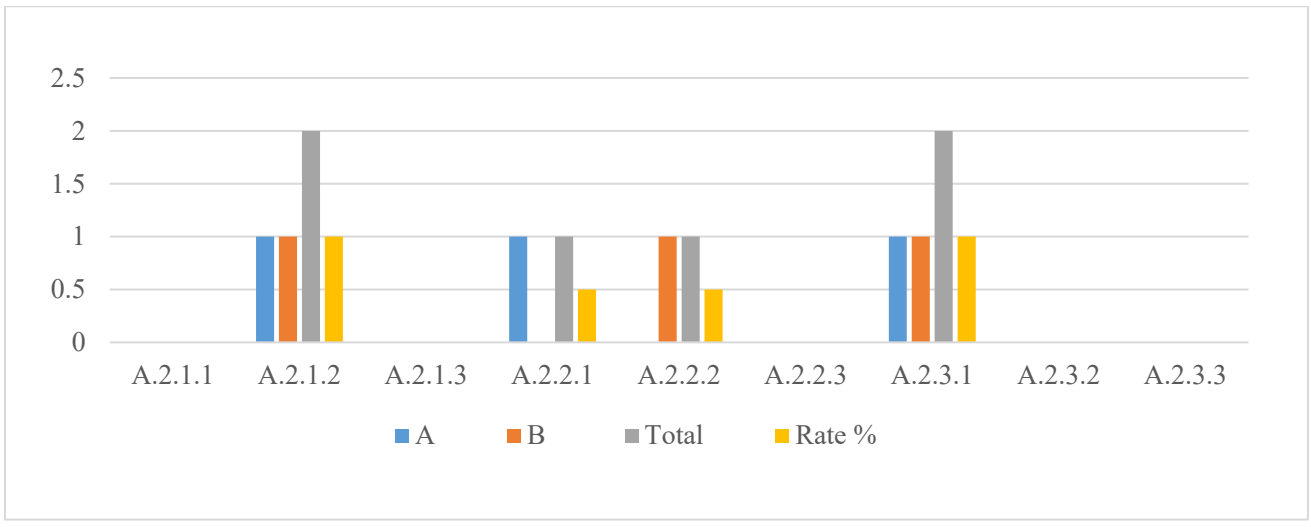


Figure 13. Analysis of spatial configuration characteristics of Grand Bazaars, Kirkuk & Qirdar.

Table 7. Analysis of Spatial Configuration Characteristics of Grand Bazaars: Kirkuk Grand Bazaar (A) and Qirdar Grand Bazaar (B), using a theoretical checklist (Source: Authors).

Symbol	A.2.1.1	A.2.1.2	A.2.1.3	A.2.2.1	A.2.2.2	A.2.2.3	A.2.3.1	A.2.3.2	A.2.3.3
A	0	1	0	1	0	0	1	0	0
B	0	1	0	0	1	0	1	0	0
Total	0	2	0	1	1	0	2	0	0
Rate %	0%	100%	0%	50%	50%	0%	100%	0%	0%

As for Choice indicators, the results reveal that the high choice level (A.2.3.1) was achieved in both Grand Bazaar (100%), confirming the presence of well-defined movement axes that function as primary through-routes for commercial activity. Conversely, the medium and low choice indicators (A.2.3.2, A.2.3.3) were not verified, indicating a clear hierarchy of movement paths within the spatial system.

Overall, the results demonstrate that the majority of architectural and spatial indicators were verified to varying degrees, supporting the argument that the persistence of historic Grand Bazaars is strongly linked to their architectural clarity and efficient spatial organization.

8.0 CONCLUSIONS

The theoretical framework of this research demonstrates that historic Grand Bazaars represent an integrated commercial–architectural typology in which architectural characteristics and spatial configuration jointly shape functional efficiency and long-term continuity. Elements such as plan clarity, regular shop distribution, graded access, roofing and natural lighting systems, together with spatial properties of connectivity and integration, contribute to the organization of movement and social interaction within historic markets. The theoretical review further indicates that the persistence of Grand Bazaars is not solely attributed to their historical value, but rather to their inherent spatial logic and adaptability to changing commercial functions, supporting the use of spatial analysis tools as an appropriate scientific approach for their evaluation within historic urban contexts.

Comparing the architectural characteristics of both Kirkuk and Qirdar Grand Bazaars identify the complementary traits that contributed to their viability as commercial nodes in the ancient city. These elements of design consisted the use of local materials such as brick, stone and plaster for finishes, adoption of climate responsive architecture principles to ensure a visitor-comfort factor and natural ventilation and lighting systems. Standard and miniature skylights, and screened domes or semi-arches brought constant sunlight and air inside without competition from the commercial spaces.

A comparison of the horizontal plans of Kirkuk's Grand Bazaars reveals that they stem from the concept of enclosed commercial spaces based on intersecting passageways. The Kirkuk Grand Bazaar features a network of interconnected passageways with numerous entrances directly linked to the main commercial street, giving it a pivotal role in the daily activity of the market. In contrast, the Qirdar Grand Bazaar has a more geometric layout based on linear, square-shaped passageways surrounded by closely packed small shops, reflecting an architectural style that facilitates pedestrian traffic coming from the mosque and adjacent buildings. Historical analysis highlights that Kirkuk's Grand Bazaars were an integral part of the commercial fabric of the old city, their entrances connected to craft markets and serving specialized economic functions that solidified their position as prominent centers of internal trade.

The Mean Depth and Entropy value reveals that the Kirkuk Grand Bazaar is organized in a simple internal structure based on a clear separation between entrances and central main, secondary axis enhancing movement clarity inside this space. Other integration and selection factors The standard spacings of the gridlines have confirmed that natural movement is possible in the traditional plan of the Grand Bazaars, allowing for commercial activity to organize over time, emphasizing the role of historical planning as a human economic place.

The spatial signatures of the Qirdar Grand Bazaar also find a semi-centralized layout; links with strong Choice show patterns of "kinetic nodes" that harbor most natural through traffic and predominantly concern main corridors sited at busiest gateways. The relatively high degree of integration also denotes movement and access, which stimulate commercial activity since shops situated along the most integrated axes draw activities of higher worth.

Low Mean Depth and weak Entropy values of the interior space of the Qirdar Grand Bazaar indicate that it balances between openness and privateness, similar to traditional Ottoman Grand Bazaars which gradually orient the movements into the building centre. These clues converge to indicate that the structure's design allow movement patterns among its pathways to emerge organically as decisively, allowing stores lining the main axes, thusly formed based upon linkages and harmony between them and one another, maintain their vigour over time.

It also seems that the Kirkuk and Qirdar Grand bazaars are not just agglomerations of shops and streets but articulated configurations shaped for urban purposes in which form is used to bring commercial life further: duration by ensuring the interaction between architecture and commerce. The differences in integration, upon selection and in connectivity reveal a deliberate organizational pattern that was designed to function as an attractive central passageway but also as secondary paths for less intense use.

9.0 REFERENCES

Alimi, A. (2021). Comparative study of the hierarchy of entry in the mosques of Tabriz Grand Bazaar and Qaysari Bazaar of Isfahan. Haft Hesar Journal of Environmental Studies, 9(34), 17-38.

Alobaydi, A. F., Alobaydi, D., & Abdullah, S. F. (2025). Assessing the Influence of Urban Street Network on Land Use Distribution in Historic Urban Cores. Iraqi Journal of Architecture & Planning, 24(2).

Al-Qaisi, A. A., & Faraj, Z. F. (2019). Spatial organization of traditional markets in Iraqi historic cities: A case study of Kirkuk. Journal of Architecture and Planning, 31(3), 112–129.

Awad, J. A. (1989). Islamic souqs (bazaars) in the urban context: The souq of Nablus. Kansas State University, Manhattan, KS.

Ching, F.D.K. (2014) Architecture: Form, space and order. 4th edn. Hoboken: John Wiley & Sons.

Demirel, E., & Goudarzi, S. M. (2023). Prospective Aspect of Topography: The Example of the Grand Bazaar (Kapalı Çarşı) in Istanbul. ICONARP International Journal of Architecture and Planning, 11(1), 229-248.

Ebrahimi, A., Mahdavinejad, M., & Moghadam, Z. (2013). Impacts of urban passages on formation of Iranian bazaars: Case study of the historic bazaar of Tabriz. ArchNet-IJAR: International Journal of Architectural Research, 7(3), 126–140.

Encyclopaedia Iranica. (2007). Isfahan XII. Bazaar: Plan and function. Encyclopaedia Iranica.

Hakim, B. S. (2017). Arabic-Islamic cities: Building and planning principles. Routledge.

Hasan, G., Mahmood, Y., & Salman, A. S. (2025). Sustainable Heritage Tourism and Its Role in Achieving Urban Development in Historical Sites (The Historical City Center of Erbil as A Case Study). Iraqi Journal of Architecture & Planning, 24(2).

Haseeb, Q. S., Yunus, S. M., & Aziz, A. I. (2023). Sustainability-based hybridization interventions, the urban fabric of Erbil Citadel-Iraq–As a case study. Alexandria Engineering Journal, 75, 615-625.

Hillier, B., & Hanson, J. (1984). The social logic of space. Cambridge University Press.

Hillier, B. (2007). Space is the machine: A configurational theory of architecture. Space Syntax.

Hmood, K. F. (2017). Traditional markets in Islamic architecture: successful past experiences. Structural Studies, Repairs and Maintenance of Heritage Architecture XV, www. witpress. com, WIT Transactions on The Built Environment, 171, 263.

Kahachi, H. A. H., Ehsan, M., & Abreu, M. (2025). Revitalizing Heritage: Challenges and Opportunities for Sustainable Urban Development in Old Cities. Iraqi Journal of Architecture & Planning, 24(2).

Kan, Ü., & Altun, M. (2018). Spatial analysis of Ottoman bazaars: Understanding commercial logic through spatial configuration. Journal of Architecture and Urban Studies, 45(3), 215–230.

Kasmo, A. M. (2023). Morphological diversity of covered bazaars in Islamic cities: Forms, functions and socio-spatial logic. Journal of Urban Morphology, 27(1), 41–58.

Rapoport, A. (1969). House Form and Culture.

Shehab, M. A., & Faraj, R. S. (2024). Contextual Preservation and Contemporary Facilitation of Qaisaria in Iraqi Kurdistan Region. Journal of Studies in Science and Engineering, 4(2), 190-212.

Taghizadehvahed, N. (2015). A comparative study of covered shopping spaces: Covered bazaars, arcades, shopping malls (Master's thesis, Middle East Technical University (Turkey).

Torkamani, M. H., Shahbazi, Y., & Belali Oskoyi, A. (2023). Explaining resilience model of historical bazaars using artificial neural network.

United Nations Educational, Scientific and Cultural Organization. (2022). UNESCO global report 2022: Reshaping policies for creativity: Addressing culture as a global public good.

Van Nes, A., & Yamu, C. (2017). Space Syntax: A method to measure urban space related to social, economic and cognitive factors. In The virtual and the real in planning and urban design (pp. 136-150). Routledge.

Yamu, C., van Nes, A., & Garau, C. (2021). The virtual and the real in planning and urban design: Perspectives, practices and applications. Routledge.

Yunus, S. M. (2020). Restoration techniques for the heritage building/Kirkuk Qishla as a case study. Journal of Architecture and Urbanism, 44(1), 11-19.

Edgü, E. (2012). Traditional shopping: A syntactic comparison of commercial spaces in Iran and Turkey. In Proceedings of the Eighth International Space Syntax Symposium. Santiago de Chile.