

Geometric Elements of Khans in Mosul City/ Iraq

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Abstract:

In the war between 2014 - 2017, Mosul city witnessed a massive destruction, especially in its old district. After its liberation, many people individually began to rebuild their properties. Without any plans or legislations, the results were random, and the traditional identity started to fade. The commercial use was affected, and the most building type that is proper to study of the commercial use is Khan, hence they represent the larger ratio of the commercial fabric, and their recognizable character and architectural elements. This study attends to explore these architectural element, and their geometric characteristics in Khans of Mosul city, through analyzing three Khans in Mosul city: Khan Al-Gimrik, Khan Al-Qalaween, and Hammo Al-Kaddo. The method of research is to analyze the geometric elements of these Khans, and separating them into two groups: Physical elements, and spatial elements. This aim is applicable by employing every available type of documentation of three Khans that are mostly conserved. Results varied among determined architectural elements, geometric properties of each element, and how that element is participating in the whole architecture of the building of Khan, as a special building type in Mosul city.

Key words:

Khan, Physical elements, Spatial elements, Mosul city, Architecture.

Introduction:

The Khans in Mosul are from the most authentic and oldest in Middle East. The reason behind that claim is Mosul itself, as this city, from its early establishment days, is known as a pivotal commercial city, located on the old world cross roads. These Khans were concentrated in the southern part of the city, near the Ottoman bridge.

In Islamic world, Khans have a pure functional typology. However, those located in Mosul city carried Mosul Architectural style, as they reflected social necessity and locational characteristics such as materials and structural techniques.

Problem:

After its liberation in 2017, local people along with non-beneficial organizations started campaigns of reconstruction in Mosul city. Those efforts were random, not unified, and lacked primary planning. Each organization demanded its own vision that reflected a certain view point, and provide that vision as conditions for companies and individuals who conduct reconstruction.

The vast majority of properties in old Mosul markets belong to private owners. These wanted to reconstruct their buildings as fast as possible to return to their work and gain profits again regardless the heritage architectural value. Old construction methods are much complicated than modern techniques, have a very higher cost, as well as the lack of proper working skills needed to apply old methods. All these reasons cause owners bias toward new cheaper and faster construction techniques. Thus, the local identity of Khans began to fade specifically, and heritage architecture of markets in general.

Background of the study:

In Mosul city, markets in general and Khans specifically, formed a focus point for researchers. However, most of related researches were taken the urban side of the Mosul markets.

In his study: “Analytic study for linear markets in Mosul city”, Kimaqchi (Kimaqchi 1988) analyzed the hierarchy skeleton of the commercial urban fabric in Mosul city. In general, this research

has focused more on the functional land use, more than architectural design of the local markets.

Another research is: “Urban renewal of old Mosul markets” (Al-Dewachi 1989) has viewed the main characteristics of the old commercial center in Mosul city. The research suggested some urban actions, to face the changes emerged as a result from new renewal movement that can affect the urban identity of the commercial area.

The study of Siba Ibrahim (Ibrahim 2008) which titled: “Changes in the architectural identity of urban environment (Analytic study of cultural resistance mechanism of commercial streets in Mosul city)”, has viewed the synthetic and semantic levels of the architectural identity changes in the urban environment. The researcher concludes methods of cultural resistance in local architecture, as a reaction towards identity changes in urban environment.

“Urban scape of Islamic city markets- a comparative study between heritage and modern markets” by (Tohala 2008), is a study that focused on the challenges of modern lifestyle and how they have the ability of changing the identity of urban scape in Islamic city. The researcher chose the commercial part of the urban scape in Islamic city, to check the research hypothesis.

The last study by (Al-Tuhafi, and others 2008) titled: “The Formal Composition of Khans in Islamic Architecture”. This is about the architectural analysis of Khans on the level of their plans. The study concluded that the relations that applied on the plans of Khans were unified in many methods, although the khans were different in terms of their architectural style, period of their building, and geographic locations of them.

These were samples of different types of studies about Khans or commercial use in Islamic world or in old Mosul city in

particular. Most of them were concerned about the problems of preserving identity of commercial use in urban design level, while one took architectural design in the plan analysis of Khans. The Knowledge gap is about the absence of a study that target the geometric elements in the design of Khans, on both physical and spatial components, and that what this research aims to explore.

Goal of the study:

The research aims to analyze the architecture of Khan in Mosul city, by studying its characteristics. This is achievable by exploring its elements and relations combining them, in an efficient method of categorizing and geometric analysis. The final purpose of that procedure is to maintain the identity of Khan in Mosul, preserve it for existing Khans, and employ it for any future design process, especially in the heritage area of Mosul.

Methodology:

Research employed case-study strategy, as it takes three Khans for their special characteristics and large size that contained all possible architectural element of Khan in Mosul. Additionally, those are the only remain Khans with authentic properties and character. Moreover, there are complete documentations for the most parts of them, which is pivotal to build any model needed for the study. Next, is to take each Khan, and analyze it to its architectural element, separating them into physical and special elements, and categorizing them more into their types according the observation data collection method. The results expected from this process are the classification for every architectural element of Khan in Mosul city, their possible types, and locations within the building of Khan.

Case study:

Only few Khans in Mosul city kept their original architecture, those are: Al-Gimrik near the old steel bridge, Hammo Al-Kaddo at the market center, Khan Al-Qalaween, Al-Mufti Khan, Al-Salihiah near a public bath with the same name. Thus, experts considered them as an important cultural heritage inheritance for Mosul city.

For this study, researcher choose the first three Khans from the previous names, as they are the only Khans survives the last war, besides, they contain all architectural elements of Khan, and there are complete documentations for them. These are (Figure 1 and Figure 2):

Khan Al-Gimrik: This Khan has been built around 1702 A.D., it located in Mosul market, surrounded by Taht Al-Manara, Al-Kawazeen, and Al-Hadadeen Markets from North and East, Al-Atami market and Qalaween Khan from South, and Souque Al-Hinta mosque from West. It occupies area of 2229 square meters. People can enter Khan Al-Gimrik from two vaulted entrances, as they reached its courtyard. Around the courtyard, there is a two-story construction containing 78 rooms, 45 stores, two stables, three galleries, four Ewans, and seven staircases. Also, its vaulted entrances have 18 shops inside them, in additional to six other shops facing the outside street.

Khan Al-Qalaween: The location of this Khan is in the middle of the commercial area of old Mosul. It has an opening on Al-Atami market, surrounded by Khan Al-Gimrik from North and East, and Souque Al-Hinta mosque and Al-Sawad Khan from West. The Khan has an area of 646.8 square meters. Its entrance defined by a vaulted corridor that contains 13 rooms, seven from them are stores in the ground floor, which are open toward its courtyard.

The underground consists of five basements with common middle entrance, while the sixth basement has its own side entrance. Six staircases lead to six Ewans form the elevating way to the upper floor. Five of these staircases continue up to seven penthouses, while the last one lead directly to the roof.

Hammo Al-Kaddo: It has been built in 1882 A.D., within the area of Bab-Al-Sarai Neighborhood. Its plot area of 3792.35 square meters contains courtyard in the middle of it. A structure of two floors surrounds the courtyard from its four sides. There is a basement under the Northern part of the Khan. The ground floor contains 45 rooms, 19 store, 31 shops, and three vaulted entrances. A staircase represents the way to level up to the first floor, which contains 52 rooms, four stores, five Ewans, and another staircase that leads to the roof. There are ruins of walls on the roof that might be a summer open café (Thannon 1982).



Figure 1: Three selected Khans as a Case Study

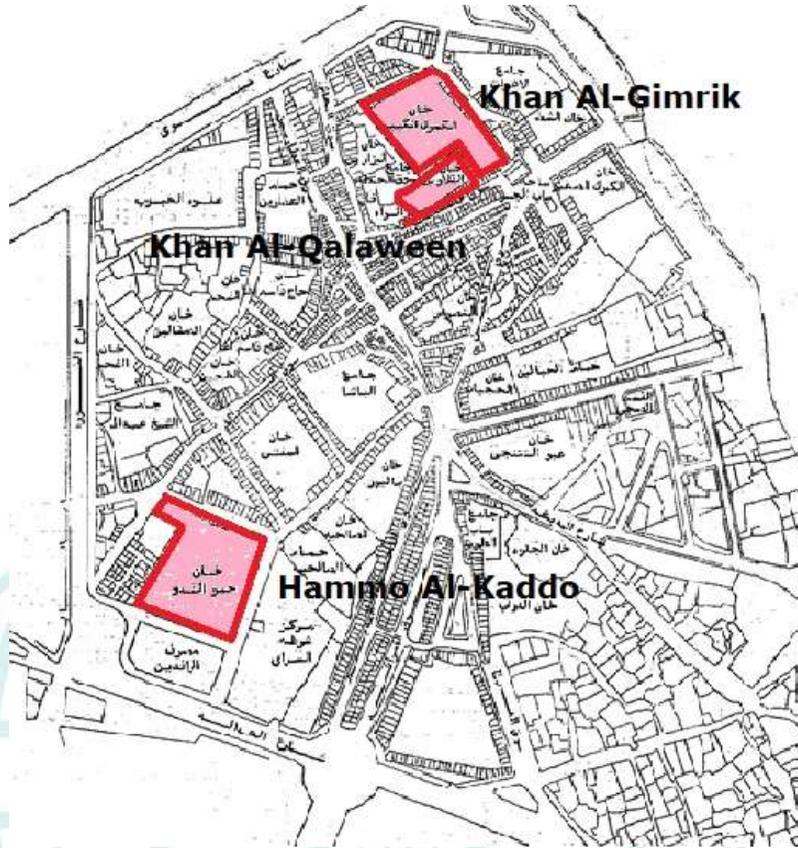


Figure 2: Three selected Khans locations in the commercial are of old Mosul

Architectural Elements of Khans in Mosul city:

The previous Khans have variety of architectural elements. For categorizing purposes, researcher separates these elements into physical and spatial elements.

Physical elements of Khans in Mosul city:

The elements that represent the physical structure of the Khan buildings, and building materials are forming them. These are:

Qantara: This element forms the entrance of Khan, as its location comes directly after the gate. The main form of it is vault that

contains shops on each side of it, decorated from inside, has rows of upper window openings to serve natural light and ventilation, as it expands for a long distance.

Columns: Vertical structural elements, made with local marble stone, and decorated with variety types of ornaments. There are different shapes of it (depending of the horizontal section of its main body), circular, square, or octagonal. Three main parts forms each column; its base, body, and crown. Columns in Khans varied in their height (1.5 to 4 meters), and proportion (Thin to thick) according to their location in the building, and the weight they carry.

The Arches: The basic function of these elements is weight distribution and transporting to the columns and walls. Builders used local marble stone to form the curved parts of them, and decorating these parts with organic shape ornaments. Limestone and plaster filled the voids between arches.

Staircases: These elements are pivotal for vertical communication among different levels of the Khan. Staircase positions in the Khan have to be obvious and directly seen from users, since the floors have separated functions. The ground floor contains storing and commercial activities, while upper floors are mainly sleeping rooms. The volume of the staircase can be considered as a spatial element also.

Walls: They are the main structural elements of the Khan. Walls are thick according to their functions and the local building materials they contain. Regarding their locations, some of them are penetrated with openings for doors, windows, or other types of partitions.

Spatial elements of Khans in Mosul city:

The main spaces in the Khan are the spatial elements of its architecture. They are created by the surroundings of physical elements. The following are the special elements of Khans:

Entrance: It is the space under Qantara. Entrance begins from the outside gate of the Khan and ends to the inner courtyard. Entrances of Khan are large relative to their side shops, as they are passages for goods and animals carrying them.

Courtyard: This element is the basic physical character of Khan. It has a pivotal position surrounded by the whole mass of Khan. Courtyard is the common space between inside and outside environment, as it opens directly to the sky. Thus, it is the main source of natural lighting and ventilation. Moreover, this element is vital because it links all spaces and components of Khan together.

Ewan: One of the most recognizable elements of Mosul architecture is its Ewan. This semi-open space faces the courtyard directly, and distributes movement to its side rooms. It has a substantial height that prolonged to the upper floor. Ornaments and decorated joints are carved on the Ewan sides, and its ceiling is usually pointed or semi-circled.

Gallery: This element is one of the most distinguished elements of Mosul buildings. It is basically a long semi-open pathway separates the courtyard from the side facing rooms. The elements forming the gallery are vaulted ceiling, arches, columns, and side rooms. Gallery plays an environmental role as it provides shading and cover protects from rain water.

Analysis and Results:

Researcher prepared a main table to classify the basic elements of the three Khans and their main properties (Table 1). For further understanding of the architectural elements, other four tables are set to classify architectural elements in details, these are: Structure details (Table 2), openings details (Table 3), interior details of the walls (Table 4), and exterior walls (towards the courtyard) details (Table 5).

Table 1: Basic Architectural Elements of Khans and Their Main Properties

Main Elements	Values	Details	Hammo Al-Kaddo	Al-Qalaween	Al-Gimrik	
Entrances	Main Entrance		√	√	√	
	Secondary Entrance	One Entrance			√	
		Two Entrances		√		
		No Entrances			√	
Qantara	Within Entrance		√		√	
	Within Galleries			√		
Courtyard	Regular Shape		√		√	
	Irregular Shape			√		
	Roof Height variety			√	√	
	Ewan Higher than Courtyard			√	√	
	Multiple Heights of Ewans to Courtyard		√			
Rooms	Separate Rooms			√	√	
	Suits		√		√	
Galleries	On one side of Courtyard			√		
	No Galleries		√		√	
Staircases			√	√	√	
Stables	Contains Stable		√		√	
	No Stable			√		
Basements	No Basement				√	
	Under Courtyard			√		

	Under Structure	√	√	
Stores	With rooms			√
	Separated	√	√	
Shops	Exterior	√		√
	Interior		√	√
Cafés	Contain Café	√		√
	No Café		√	

Table 2: Structural Details of Khans in Mosul City

Elements	Values	Details	Hammo Al-Kaddo	Al-Qalaween	Al-Gimrik
Type of Structure	Bearing Walls		√	√	√
	Skeleton				√
Elements of the Structural System	Walls		√	√	√
	Columns		√		√
	Arches	Pointed			√
		Flat	√	√	
		Semi-Circle	√	√	
Curved				√	
Building Materials	Plaster in Arches		√		√
	Marble in Columns and Arches		√		√
	Limestone, Wood, and Steel in Doors and Windows		√	√	√
	Steel Sections in Ceilings			√	

Table 3: Openings Details of Khans in Mosul City

Elements	Values	Hammo Al-Kaddo	Al-Qalaween	Al-Gimrik
Main Entrance	Frame of Ornamented Marble			√
	Frame of Limestone with geometric and organic ornaments		√	

Ewan	Marble frame with ornaments and calligraphy	√		√
	Marble frame		√	√
	No Frame	√		
Rooms Entrances	Marble frame		√	√
	No Frame	√		
Windows	Marble frame with steel protection			√
	No Frame		√	
Arches	Plaster Ornaments	√		√
	No Ornaments	√		
	Frame of Marble with geometric and organic ornaments		√	√
	Marble Frame	√		
	Plaster Arches			√
	Limestone Arches	√		

Table 4: Interior Details of the Walls of Khans in Mosul City

Elements	Values	Hammo Al-Kaddo	Al-Qalaween	Al-Gimrik
Niche Form				√
Recess in corners and walls	Marble Frames		√	
Muqarnas			√	√
Variety of Plaster Details		√		
Ornamented Cornice				√
Marble base				√
Plaster rows		√	√	
Columns' Crowns				√
Plaster Frames			√	
Marble finishing for walls			√	

Table 5: Exterior Walls Details (Towards Courtyard) of Khans in Mosul City

Elements	Hammo Al-Kaddo	Al-Qalaween	Al-Gimrik
Plaster Finishing			√
Marble or Plaster Niches		√	√
Plain Marble	√		
Variety of Plaster Details	√		√
Plaster Frames			√
Marble Finishing of Walls	√		√

Conclusions:

Results of the analysis revealed main points of conclusions, these are:

- In the traditional architecture of Mosul city, Khans are pure functional building. The main composition of it is formed from central courtyard opened to the sky, surrounded by connected rooms in the ground floor. Some Khans consist of more than one floor, the ground floor rooms are used as shops or stores, while the upper floor is usually facilitated as a hotel.
- All Khans in Mosul city have the same basic components of: Vaulted entrance, courtyard, basement, Ewan, separated rooms, staircases, and stores. Thus, preserve these elements maintains the architectural identity of Khan in Mosul city.
- Some other elements like suits, cafés, stables, and galleries are found in some Khans and missing from others. Hence, their existence is not affecting the architectural identity of Khan, and they can be considered as non-fundamental architectural elements.

- The main characteristics of Khan in Mosul architecture are: There are main and secondary entrances. Rooms are separated or in the form of suits. Galleries are facing one side of the courtyard or not existed at all. Shops found in the ground floor opened towards the courtyard or can be on the outside directly to the street. Stores are separated or connected to the shops. Basement is under the whole building or under part of the structure with ceiling higher than the courtyard floor.
- Although Khans in Mosul city have the same basic architectural elements, the different types of detailing of these elements, and the multiple usage of building materials give them the variety character.
- Any future attempt of building, renovating, or conserving Khans in Mosul city, have to consider these architectural elements to preserve the heritage identity of traditional architecture of old Mosul.

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