

THE SPATIAL CONFIGURATION OF TRADITIONAL URBAN CORE OF ZAKHO CITY

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ABSTRACT

The conventional urban core is commonly described as an organic entity. The urban environment holds inherent adaptability and responsiveness to the dynamic influences of social, cultural, and economic factors, which impact its various components and elements of urban design. This phenomenon leads to alterations in the spatial arrangement of the urban environment, resulting in the creation of distinct spatial structures that correspond to specific time periods. The objective of this study is to gain insight into the spatial configuration of the built environment in traditional urban cores, with a focus on understanding how these configurations relate to culture-specific human preferences regarding spatial organization. The research question aims to determine the spatial syntactic characteristics of the traditionally developed built environment. The urban core will be delineated by a set of configuration parameters that establish its spatial organization, typology, and organic structure based on user preferences. The study will utilize the Space Syntax methodology and urban centrality indexes (UNA) in ArcGIS by utilizing the existing urban core plans in order to accomplish the research objectives. The outcomes of the analysis will ascertain the various spatial arrangements and subsequently extrapolate the rationales and influential factors behind these arrangements.

KEYWORDS: *Spatial configuration; Built environment; Space Syntax; Urban core; Zakho*

1. INTRODUCTION

The urban built environment is a complex system comprised of a web of interconnected spaces that has a significant impact on how people live, work, and play. By "spatial configuration", as Hillier (1985) stated, we mean how these areas have been systematically organized and arranged, with the goal of recognizing the important role that these factors play in shaping people's actions and perceptions in urban settings. It necessitates looking at the entire system rather than just one component at a time (Hillier, 1985, Hillier, 2007). Cultural and social factors, as well as how people

interact with built environments, shape their designs over time. Hall's (1966) investigation into how people's perceptions of space differ across cultures led him to identify context, space, and time as the three most important factors in understanding how people from different backgrounds interact with one another. That is why it is critical to understand the interactions between a place's architecture and its people's cultural practices (Hasgül, 2015). Scholarly research on the built environments of Kurdistan Region cities, particularly their historic downtowns, is limited. The ultimate goal of this research is to improve the understanding of how spatial arrangements affect human behavior by

creating urban environments that are not only aesthetically pleasing but also useful and sensitive to the needs of different people. This understanding is achieved through the use of the space syntactic technique and urban centrality to investigate the relationship between spatial patterns and culture, thereby appreciating the spatial configuration in relation to human preference in the constructed setting. This necessitates a closer look at how the physical arrangement of an urban space is influenced by the cultural backgrounds of its users. The overarching goal of the study is to learn more about human cultural preferences and spatial behavior in order to better understand how urban environments are built and how they relate to human experiences.

2. THE THEORY OF SPATIAL CONFIGURATION

The spatial configuration is crucial for creating a supportive built environment that considers the nature of activities, users, and cultural values. Understanding the patterns of

space usage and social activities is essential for meaningful space design and planning. Kevin Lynch's concept of the legibility of cities is fundamental to understanding urban space configuration. The term "legibility" refers to the ease with which the parts of a city can be recognized and organized into a coherent pattern. Lynch (1960) argues

that legibility is essential when thinking about urban environments in terms of size, time, and complexity. The ideas of space configuration presented by Hillier and Hanson (1984) emphasize that the ordering of space in buildings is not just about physical arrangements but also about the ordering of relations between people, forming a social relational system. This theory highlights the social logic of space, indicating that the physical environment not only has its own organization but also structures social

activities within it. To give meaning to a space, it is crucial to understand the patterns of use and social activities (Hillier and Hanson, 1984). Figure 1 shows three different spatial configurations in the same-shaped space (Hillier, 2007).

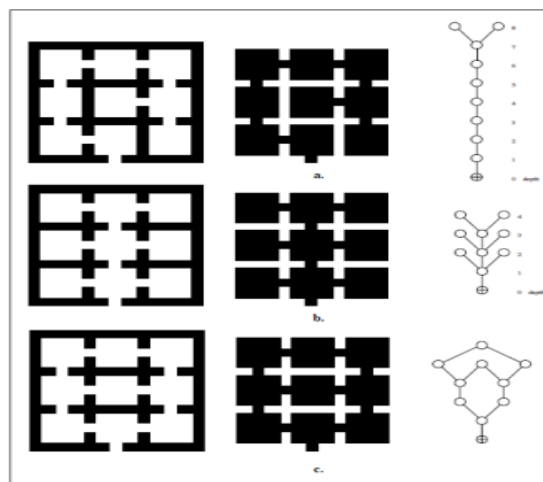


Fig.(1):- Different spatial configurations in the same-shaped space (Hillier, 2007)

In the realm of human aspects and spatial configuration, numerous researchers have investigated the perception of people and their role in space organization. Kevin Lynch, for instance, focused on understanding how people

perceive and form mental images of their surroundings to grasp the structure of a city and the activities occurring within it. Lynch emphasized the significance of legibility and clear images of places as a framework for

comprehending the city's structure and activities (Lynch, 1960). Rapoport. (1980) advocated for a scientific approach to studying the built environment, with a specific focus on understanding the culture-specific human aspects. He argued that different cultural groups have their own set of rules for spatial organization, and socio-cultural factors, such as user preferences, continuously change with time, place, and people. Studying built environments helps us grasp the interaction between the space we build and the resulting impact on human experiences (Rapoport., 1980). According to Kim (1999), integration and connectivity are physical properties of space that can be used to determine whether a space is integrated or segregated. Kim (1999) defines a structured grid as a pattern where integration and intelligibility are arranged in a specific way, prioritizing certain lines and areas for better integration and intelligibility. However, human involvement in a space is not limited to physical interactions but extends to internal experiences and perceptions. These experiences, in turn, lead to the formation of cultural living patterns, influencing both human behavior and the spatial configuration. To have a comprehensive understanding, it is essential to analyze both the patterns of space and the culture specific to a particular context. By considering these factors together, we can better comprehend how the built environment shapes human experiences and cultural practices, creating a dynamic and complex interplay between people and their surroundings. Urban spatial structures, stated by Shen and Karimi (2018), are crucial for understanding morphology evolution and land use aggregation through form-function interactions.

3. GRAPH THEORIES AND URBAN CENTRALITY

Urban centrality is defined in Space Syntax theory as the degree of accessibility and

connectedness of a location inside an urban area. It measures how well-connected and integrated an area or location is within the larger urban street network. Centrality is a core term in Space Syntax analysis and is essential for comprehending urban shape and organization. The concept of urban centrality is based on the premise that certain areas of a city are more central and significant than others due to their location and connectedness within the street network. More central locations tend to attract more pedestrian movement, vehicular traffic, and economic activity, making them essential nodes in the urban system. Reach, Gravity, Betweenness, Closeness, and Straightness are some of the metrics used in the Urban Network Analysis (UNA). Reach centrality indicates the flow of people between nodes, whereas Gravity centrality shows an urban node's attraction based on its activity attributes. The degree to which a location is on the shortest paths between other locations in the urban network is measured by centrality. Locations with a higher centrality or "betweenness" serve as important connectors or bridges between different parts of the city. Closeness centrality is the measure of how close a site is to all other locations in the urban network in terms of network distance. Finally, Closeness refers to locations that are more central and easily accessible from other regions of the city. As a result, space integration, as measured by UNA, shows how well an area fits into the larger spatial arrangement of the city. It denotes a location's total significance in terms of its position and connectivity within the urban system.

4. RESEARCH METHODOLOGIES

The investigation of spatial configuration of traditional urban cores in Zakho involves the urban area that has been identified as the historical core of Zakho city (Figure 2). It seeks to understand the system of spaces in terms of its configuration properties and can help identify

user preferences *about movement and cultural norms* related to space arrangement (Hillier, 2007). The study aims to increase the understanding of how cultural norms affect human preferences for spatial organization by examining the placement of significant urban activity locations. Various configuration and interpretive parameters are considered to

understand the spatial arrangement. Furthermore, the research uses urban centrality indexes (Sevtsuk and Mekonnen, 2012) and Urban Network Analysis (UNA), in ArcGIS is utilize the existing urban core plans. To carry on, the researchers developed a methodological framework (see Figure 3).

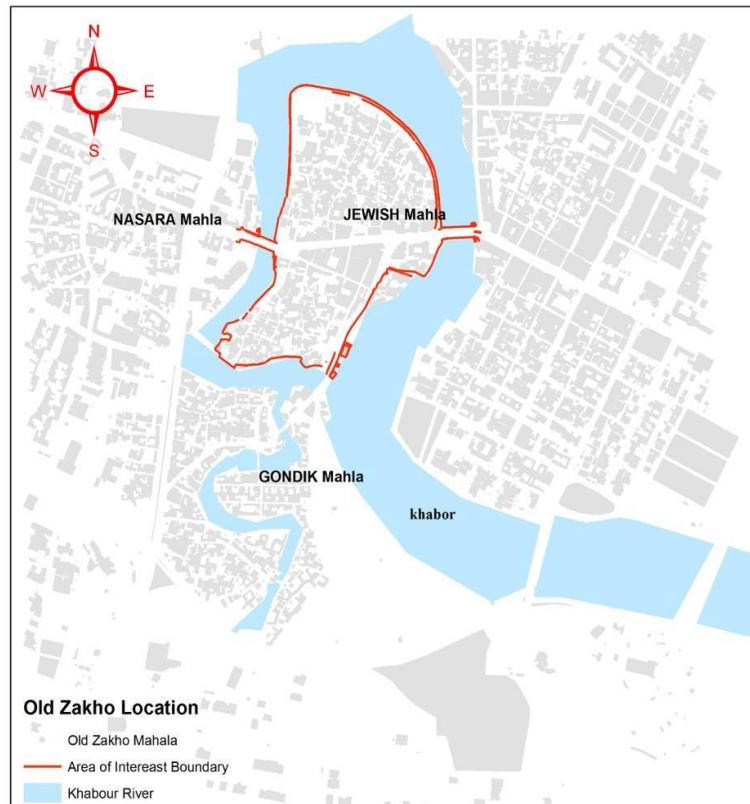


Fig.(2):-The traditional urban core of Zakho, Source (Raswol and Khorsheed, 2017)

The investigation is carried out by utilizing the built-up, street layout (network), and land use (to exhibit the activities location and current use). This was accomplished by graphically depicting the land use, street network, and built-up area based on Zakho Masterplan using ArcGIS Desktop™ 10.8, followed by carrying out a visual analysis. The result of this stage determines the urban pattern that formulates the case study area. The second stage of the study is carried out by UNA to check the configuration of the urban traditional center, utilizing graph theory introduced by (Sevtsuk and Mekonnen, 2012).

The primary distinction between the strategies put forth by Hillier and Hanson (1984) and Sevtsuk and Mekonnen (2012) is the consideration of building allocation in relation to the network. In the latter approach, buildings are assigned weights based on factors such as, density, urban activities

or number of floors. Conversely, the former approach solely focuses on the physical characteristics of the network. as such this study, assigned weight to the building based on land use, wherever commercial and service activities have huge effect on networks.

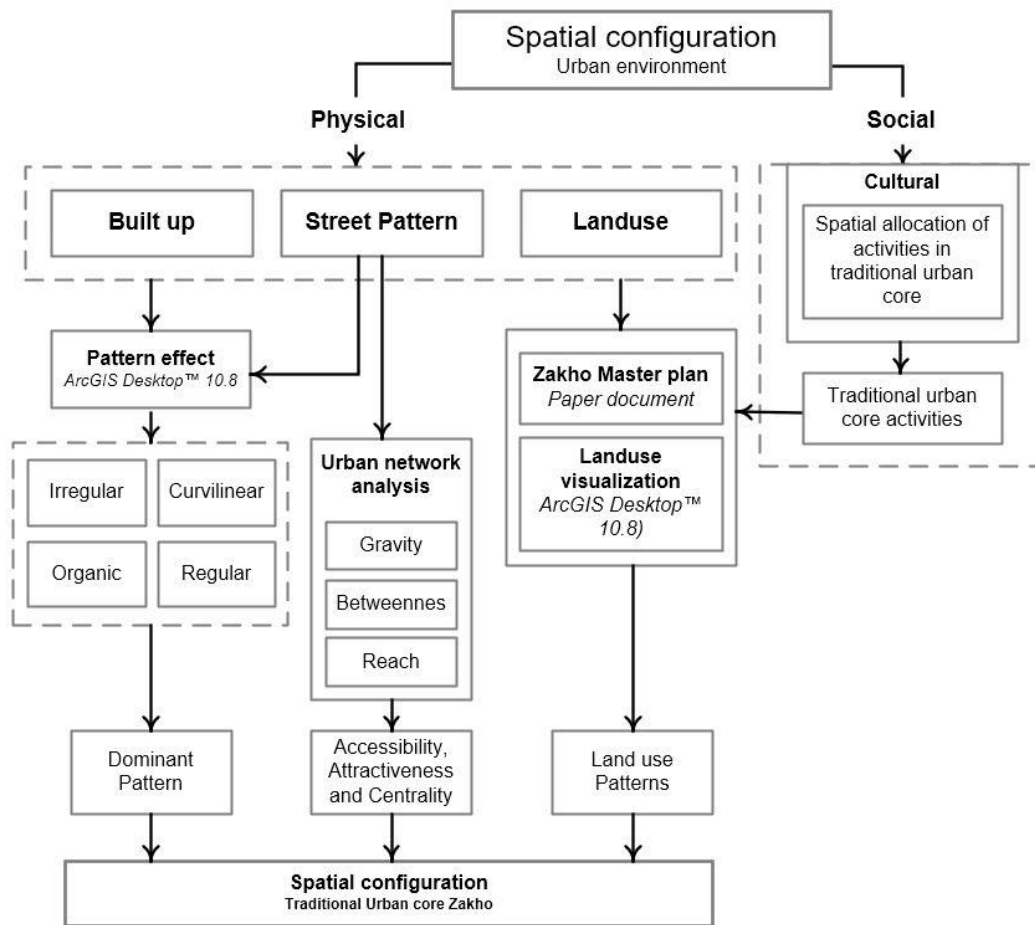


Fig.(3):- Research farmwork

5. CASE STUDY AREA

The urban core of Zakho City has undergone significant changes as a result of rapid urbanization in recent decades. This region was traditionally distinguished by organic spatial organization and irregular geometric patterns. The historic core of Zakho is located on an island in the Khabur River, which currently flows through the city. Since 1887, Zakho has grown tremendously. According to the 2012 statistical directory, the population is 350 thousand. Zakho's traditional urban core is divided into two parts: the historic center and the surrounding residential area. The spatial structure can be identified as an organic form. This structure evolved over time, from ancient Assyria to the Greek and Islamic periods (see Figure 2). The traditional urban core is the densest part of the city and is located in the

center of the city. The components of the urban core are primarily residential, commercial, social, and cultural activities, resulting in a mixed land use pattern. To maintain cultural privacy, most main streets have dead ends and narrow secondary paths.

6. RESULTS DISCUSSION

The analysis of the configuration of traditional urban cores in Zakho requires characterizing the urban area as a system of distinct areas and activities. City morphology determines where activities take place. The spatial configuration and structure of an urban area affect its visual permeability and human mobility. The original urban core of Zakho is mostly irregular-organic, representing the urban fabric from ancient

Assyria through the Greek and Islamic periods, according to an analysis of the system of Built up-

streets (see Figure 4).

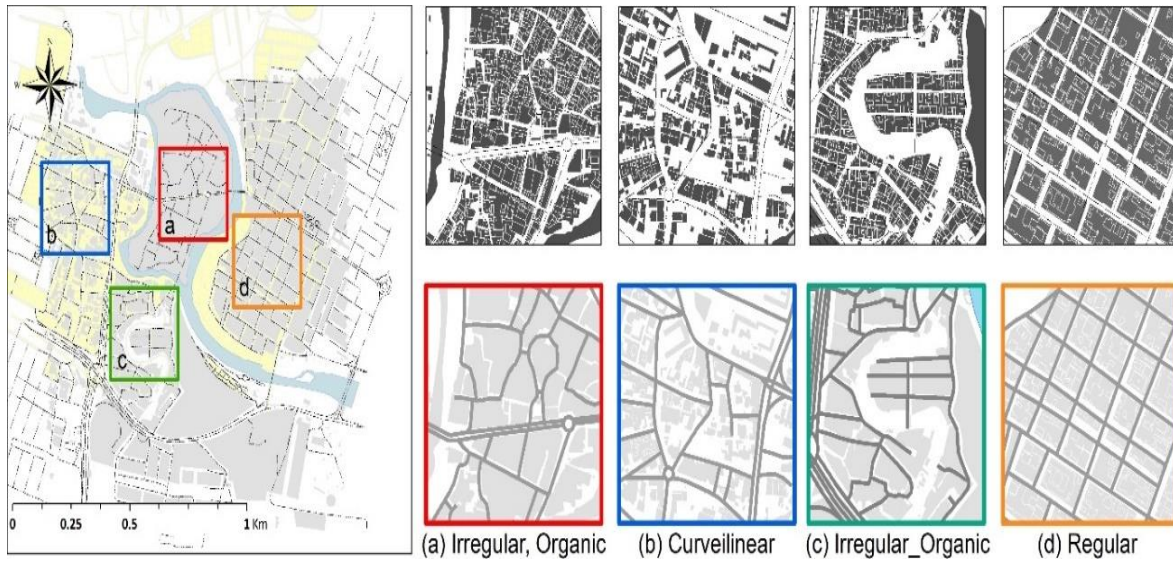


Fig.(4):- The spatial typological morphology of the study area

The traditional urban core is mainly irregular-organic reflecting the urban fabric from ancient Assyria to the Greek and Islamic periods. This type of fabric was developed based on the concept of maintaining cultural privacy; the main streets are primarily dead ends and narrow minor trails. The second stage of development is the irregular residential, built-up footprint, roads and sidewalks, mixed land use, heritage and worship.

organic (Figure 4 a, c), which represents the expansion of the residential area, followed by the regular grid expansion (Figure 4 d, b).

Regarding land use (see Figure 5) and the land use percentage (see Table 1), which shows that the highest percentage of land use is consecutively

residential, built-up footprint, roads and sidewalks, mixed land use, heritage and worship.

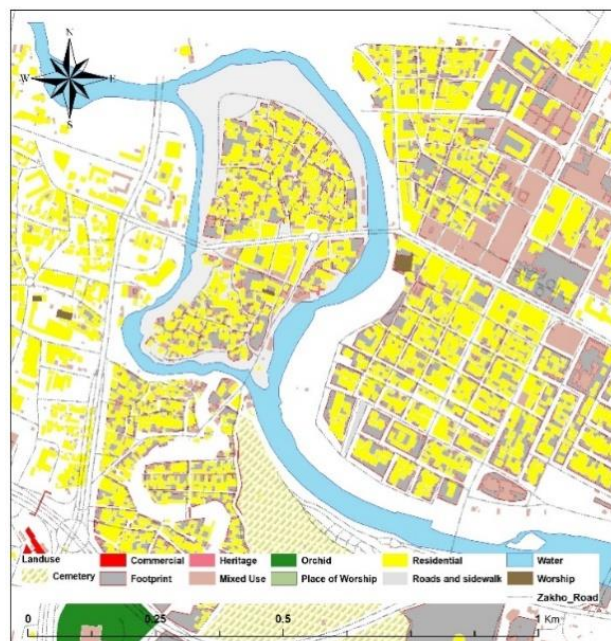


Fig.(5):- The Land Use of Zakho Urban Core.

Table(1):- The land usage and parentage of each type in Zakho's traditional urban core

Land usage	area percentage of the traditional urban old
Built-up footprint, Roads and	28.9
Heritage	0.4
Mixed Use	10.2
Worship	0.2
Residential	60.3

However, the UNA analysis, assuming all people's behavior might be similar, shows that Gravity measurement (see Table 4), which shows the area attraction based on the configuration, shows that the area is not attractive for people (see Table 4), where the lack of maintenance and area revitalization can contribute highly to that. On examination of the Betweenness measurement, it

shows that the area has low centrality in terms of its location. Nevertheless, the Reach index showed that the area is highly accessible, which shows that accessibility is essential in the traditional urban cores, where the spatial configuration of the urban activities and nodes are ease to access considering the culture specific human preferences in the study area

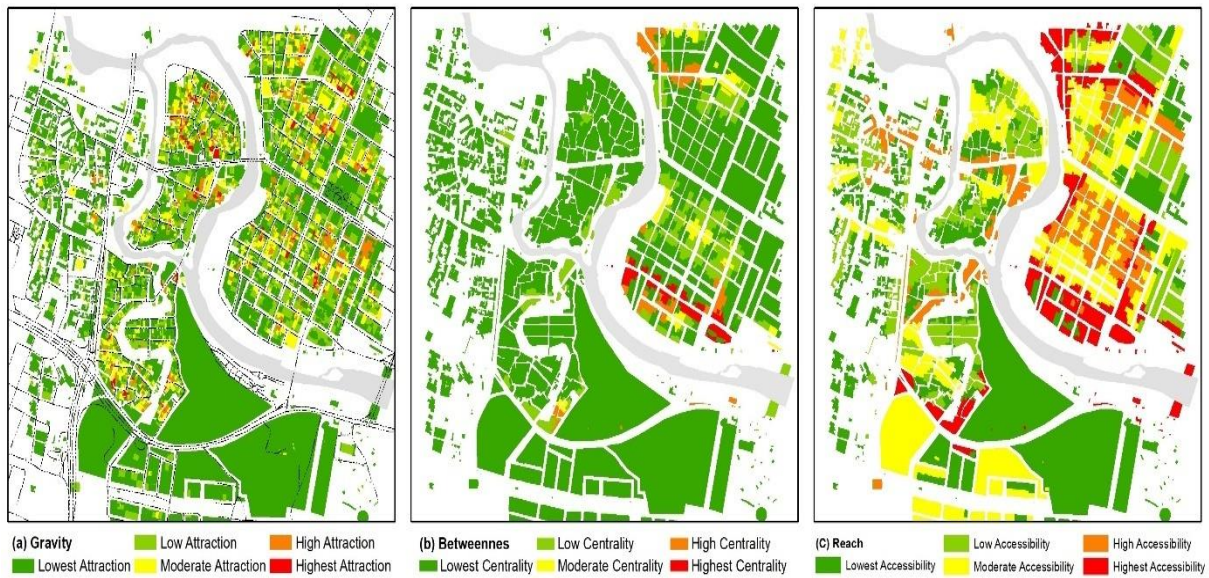


Fig.(6):- UNA index results, for Gravity, Betweenness and Reach

Table(2):-Reach Index showing the degree of accessibility in zakho traditional urban core.

Reach	Minimum	Maximum	Zakho old core	Reach Index %
Lowest Accessibility	0	173	Lowest Accessibility	13.8
Low Accessibility	173	387	Low Accessibility	22.71
Moderate Accessibility	387	724	Moderate Accessibility	28.38
High Accessibility	724	1302	High Accessibility	19.04
Highest Accessibility	1302	3196	Highest Accessibility	16.07

Table(3):- Betweenness Index showing the degree of Centrality in zakho traditional urban core.

Centrality	Minimum	Maximum	Zakho old core	Betweenness Index %
Lowest Centrality	0	71886	Lowest Centrality	96
Low Centrality	71886.1	239415	Low Centrality	4
Moderate Centrality	239415.1	499122	Moderate Centrality	0
High Centrality	499122.1	1028492	High Centrality	0
Highest Centrality	1028492.1	1527615	Highest Centrality	0

Table(4):- Gravity Index showing the degree of attraction in zakho traditional urban core.

Attraction	Minimum	Maximum	Zakho old core	Gravity Index %
Lowest attraction	0	2.35	Lowest attraction	30
low attraction	2.36	5.64	Low attraction	27.74
Moderate attraction	5.641	9.58	Moderate attraction	22.92
High attraction	9.581	15.23	High attraction	5.29
Highest attraction	15.231	30.57	Highest attraction	14.05

7. CONCLUSION

The traditional urban core of Zakho is constantly evolving in response to culturally particular human preferences. The study looks at the layout of Zakho's traditional urban center by using the Space Syntax method and the ArcGIS urban centrality indices (UNA) to find out how people in different cultures would like different spaces to be set up. The built-up street system analysis of the urban core reveals that the origin of the urban core is irregular and organic. This urban fabric was designed to preserve cultural privacy; the main streets are primarily dead ends with narrow secondary trails. The residential area is expanded, followed by regular grid growth. The results show mixed land uses, including heritage and worship, indicating that the region is deemed residential with a high percentage of mixed use. This indicates that the spatial structure in Zakho's traditional urban core is the result of cultural selection over time based on human preferences. Culture specific human preferences for space layout determine the placement of key religious, social, or commercial urban activity nodes within the overall spatial configuration. Variations in the urban centrality parameter (UNA) are shown by the investigation. The reach index indicates that

the location is extremely accessible, implying that accessibility is essential in traditional urban cores; due to the narrow paths, mix land use and pedestrian oriented spaces. Nevertheless, in terms of gravity, the urban core is less appealing to individuals. The measurement of betweenness reveals that the area has less betweenness. To summarize, the traditional urban center has lost cultural significance as a result of fast urbanization, lack of services, and lack of maintainability. In this regard, the study encourages the municipality and other stakeholders to develop a clear strategy for increasing the appeal of the traditional urban core and preserving the city history.

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