

Original Research Article

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 واکاوی الگوهای فضاهای آستانه‌ای در بافت قدیم شهر بابل براساس نظریات الکساندر
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Analysis of Threshold Space Patterns in the Historic Fabric of Babol Based on Alexander's Theories*

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Abstract

Problem statement: Over time, from the mid-Qajar period to the first decade of the Pahlavi era, public and private spaces, the spatial hierarchies between these two, and their forms underwent transformations, leading to the emergence of a hybrid style. One of the spaces that has experienced such transformations is the threshold space. As both a concept and a physical structure, the threshold space can encompass a wide range of meanings connected to customs and culture, imbuing the space with distinctive qualities.

The significance of threshold spaces lies in their accessibility to public spaces, their integration with private spaces, and their role in shaping the quality of the urban environment. Christopher Alexander, in his Nature of Order series, refers to this concept and highlights the importance of thresholds as a sophisticated architectural element.

Research objective: The purpose of this article is to analyze the ground and first floors of residential areas in terms of their relationship with public spaces on the scale of buildings, as well as the connections between neighborhoods and buildings on the scale of streets. The study aims to align these findings with Christopher Alexander's theories on thresholds. Accordingly, this research primarily focuses on threshold spaces and investigates the patterns between these two components based on Alexander's theoretical framework.

Research method: The methodology of this research is qualitative. Data was collected through desk research, interviews, analysis of historical documents (e.g., records, maps, and photographs), personal observation, photography, mapping, and analysis of the current state of threshold spaces. The historical core of Babol city, located in Mazandaran Province, was selected as the case study for this research.

Conclusion: The findings reveal that, during the Qajar era, the hierarchical access to private spaces from urban public spaces, as well as the connections between residential neighborhoods, aligned with Christopher Alexander's theory. Spatial arrangements were appropriate to and consistent with the customs, culture, and needs of the inhabitants, despite the influences of modernity on the architecture of that period.

Keywords: *Public Domain, Private Domain, Threshold, Pattern, Christopher Alexander's theory.*

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Introduction

The spaces in which we live are divided into public and private domains, a fundamental feature of societal organization. These domains often influence mental conditions and experiences, regulate behaviors, and impose a lasting structure on human societies (Madanipour, 2003). The configuration of a city and the quality of urban life are significantly shaped by the distinction between public and private domains, as well as the way transitions between these two unique spaces are facilitated. By creating a flexible and precise boundary between these two realms, the urban environment becomes richer (ibid.). This transitional space, commonly referred to as a threshold, bridges the gap between interior and exterior spaces. Its presence facilitates urban transformations. In architecture, thresholds encompass a wide range of transitional spaces—from a doorway or entry frame between two spatial realms to the transition from an exterior space into a building, from the transition into a residential neighborhood to the passage between alleys in an urban fabric. Thresholds often vary in scale within urban contexts and help ease architectural relationships with the surrounding environment, reducing conflicts.

This paper aims to investigate the ground and first floors of buildings, the interaction between houses and neighborhoods, the continuity of the public and private realms of society, and the connection between these realms through threshold spaces. As Zoller states, “The ground floor significantly determines the perception of a city. It is the public façade of the street, where buildings present themselves to the observer” (Zoller, 2014). In this research, the ground and first floors are examined beyond the physical layers of a building’s façade and include the surrounding open spaces and substructures. Given the importance of the architectural and urban changes during the Qajar era, threshold spaces, as the mediators between public and private spaces, played a crucial role. As there has been minimal historical research on the old fabric of Babol city, this study focuses on examining its threshold spaces.

Babol city is among the oldest urban settlements in the Tabaristan region. Although pre-Islamic sources and classical Greek and Roman geographers did not mention it, remnants of structures still found around the city, as well as its ancient name, Mamatir, suggest that this city, situated along the banks of the Babol River, was a flourishing settlement even in pre-Islamic times (Rezghi & Biki, 2013).

The selection of Babol as the focus of this study is due to the following reasons:

1. The city, formerly known as Barforoush, became a commercial hub, especially during the Safavid period, witnessing prosperity and expansion.
2. During the reign of Fath-Ali Shah Qajar, Babol gained significant importance and established trade relations with Russia through the port of Mashhad Sar (Babolsar) before the October Revolution in Russia. It became one of the key commercial centers of Mazandaran Province.
3. Babol is among the Iranian-Islamic cities that have undergone numerous transformations throughout history, resulting in the near-destruction of some neighborhoods and significant damage to others (Lahmian et al., 2008).

The urban fabric of Babol, shown in Fig. 1 and dating back to approximately the last 100 years, includes some old buildings, transportation networks, and open spaces that collectively form a coherent pattern. The city's initial core includes the current neighborhoods of Astaneh and Panjshanbeh Bazaar. The Threshold spaces have been integrated

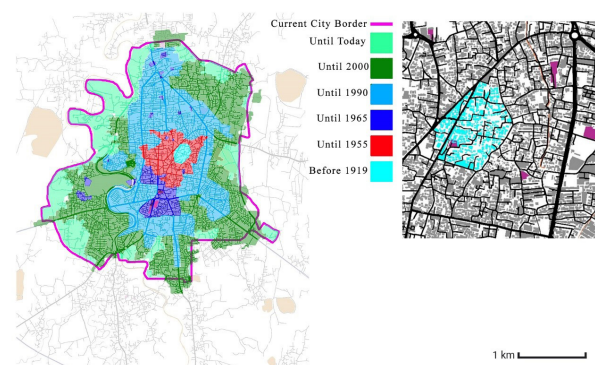


Fig. 1. Map of the evolution and expansion of the city of Babol. Source: Authors.

into parts of the urban fabric, linking residential areas to public spaces. An important point is that the customs and traditions of the "local culture"—as a collection of beliefs, practices, and social norms rooted in the culture and history of a region's people—play a key role in shaping the urban fabric. In historical cities like Babol, these social norms have had a direct impact on spatial organization and the definition of urban functions. "The influence of custom can be found at all scales; the smaller the scale, the more visible its effects. However, in some cases, its influence can also be observed at larger scales" (Hakim, 1994). The ancient fabric of Babol has remained largely unchanged up to the present day, despite various transformations throughout history. This continuity is the result of a synergy between the city's spatial layout and local customs, which has served as one of the main guiding forces in the urban development of Babol. The threshold spaces in this city, traditionally linking residential and public areas, have been designed with the influence of local customs and values. For this reason, there have been no significant changes in these spaces, and in Babol—considered a relatively small city—the influence of custom can be observed in its architecture.

There are patterns for creating threshold spaces. This article will examine specific patterns such as Street Windows and Main Gates, taken from Christopher Alexander's book "The Language of Patterns", in the ancient context of Babol. Understanding this pattern will play an important role in helping public life today. In this article, a pattern refers to anything that has a recurring effect on the context. According to Alexander and his colleagues, each pattern describes a problem that occurs repeatedly in our environment (Alexander, 1987). In addition, this study examines the link between thresholds and social structure, and the role of custom and culture on threshold spaces to assess the extent to which the characteristics of existing examples conform to Christopher Alexander's theories, an issue that has been less thoroughly investigated.

Literature Review

Numerous studies in Iran have examined threshold spaces in historical urban fabrics. These studies have focused on the architectural features of the Qajar and early Pahlavi periods and the changes that occurred in public and private spaces.

Research has shown that threshold spaces in traditional Yazd architecture, such as corridors, entrances, and central courtyards, play a fundamental role in defining private and public boundaries. Studies on the flexibility of traditional residential spaces in Yazd indicate that these spaces, in addition to fostering social interactions, can adapt to contemporary needs (Shahpasandzadeh & Mondehari, 2024). Moreover, the spatial program of traditional Yazd houses, due to their diverse structure and cultural sustainability, is adaptable to modern requirements. These studies emphasize that the quality of threshold spaces has largely been preserved in the face of modernity, and these spaces remain key elements in Yazd's architectural identity (Khaki Ghasr, 2019).

A study conducted by Haghparast et al. (2019) investigated the architecture of open spaces in historic houses in Isfahan, including courtyards and mahtabi (semi-open spaces). This research demonstrates that courtyards and mahtabi have played a crucial role as semi-open spaces in maintaining social interactions and neighborhood cohesion within Isfahan's historical fabric. The study's findings indicate that despite changes brought by modernity, these spaces continue to serve as essential elements in preserving the social and spatial identity of traditional Isfahani houses.

In Shiraz, a study by Ghaedsharafi et al. (2014) explored the entrances of traditional houses and their role in shaping threshold spaces. This research highlights that entrances and central courtyards in these houses played a key role in sustaining social and cultural interactions within Shiraz's old neighborhoods. Particularly during the Qajar and early Pahlavi periods, the design of these spaces emphasized the separation and demarcation of public and private realms, which not only safeguarded privacy but also strengthened social interactions

among residents. Additionally, other studies have addressed architectural transformations during the Pahlavi period, noting that with the introduction of modern architecture, many traditional threshold space patterns underwent significant changes. While many traditional features such as porches and covered entrances were preserved, the influence of Western architecture on these spaces remains undeniable (Ghasemi et al., 2023).

In the study on the principles and spatial patterns of traditional houses in Kashan, it is noted that threshold spaces such as Hashti (vestibules), corridors, and porches functioned as spatial joints, playing a significant role in organizing spatial connections and delineating boundaries. These spaces not only facilitated transitions but also enhanced interactions between residents and their surroundings (Farnad et al., 2021). In another study on threshold spaces in Islamic cities, the author analyzed the influence of customs and religion in shaping these spaces. The article demonstrates that the spatial structure of Islamic cities, particularly during the Qajar period, was heavily influenced by Islamic social and cultural values, exhibiting similar spatial patterns across different cities. This research underscores that these patterns—such as courtyards and porches—not only held religious significance but also played a prominent role in the social organization of urban spaces (Mousavi et al., 2021).

In a study, Heydari et al. (2017) analyzed the spatial structure of traditional Iranian houses in the cities of Yazd, Kashan, and Isfahan. This study demonstrated how Alexander's proposed patterns, particularly concepts such as "threshold spaces" and "spatial connections," have been adapted to traditional Iranian architecture.

These studies have examined the architectural changes brought by modernity while preserving traditional patterns. However, the key aspects addressed in this research are as follows:

- **An analytical approach based on christopher Alexander's theory**

While previous studies have primarily provided

descriptive and qualitative analyses of threshold spaces, this research specifically employs Christopher Alexander's theories as an analytical framework. This approach enables us to identify and analyze specific patterns of threshold spaces within the historical fabric of Babol.

- **Focus on the ground floor and first floor of buildings**

This study specifically examines the openings on the ground and first floors and the way these spaces interact with public and private domains at the building scale. In contrast, many previous studies have analyzed threshold spaces in a broader and more general manner.

- **Case study of Babol**

This research focuses on the threshold spaces in the historical fabric of Babol. The selection of Babol is based on its unique historical and cultural characteristics and its architectural differences compared to other cities such as Yazd, Isfahan, and Shiraz, making it a strong point of investigation.

Findings from previous studies indicate that threshold spaces in the architecture of the Qajar and early Pahlavi periods, despite the influences of modernity, have continued to play a crucial role in defining private and public boundaries and maintaining social cohesion in Iran's historical neighborhoods. Research conducted in Yazd, Isfahan, and Shiraz has clearly demonstrated how these spaces have facilitated neighborhood interactions and social relationships.

However, this study, by utilizing Christopher Alexander's theory and focusing on a more detailed analysis of threshold spaces in the historical fabric of Babol, has achieved a deeper understanding of the impact of these spaces on urban environmental quality and social interactions. The use of a multiple qualitative methodology has also enhanced the accuracy and comprehensiveness of the research findings, distinguishing the methodological and theoretical approach of this study from previous research. By conducting a more precise examination of ground and first-floor openings and their relationship with public and private domains, this study has not

only identified specific patterns of threshold spaces but also analyzed their influence on the social and cultural relationships of Babol's residents.

Methodology

This research is based on a methodological approach inspired by Christopher Alexander's 1977 theory of Pattern Language. The goal of this article is to examine the concept of the ground and first floors in residential areas and the relationships between urban neighborhoods from two different perspectives: public and private spaces. The study focuses on the link between these two perspectives and challenges their impact on spatial and social levels.

Various qualitative methods were used to collect and analyze data. In this regard, architecture was not examined as an independent work, but as its relationship with the city, or in other words, as urban architecture. The data for this research were collected through the following sources:

Literature review: Review of scientific texts and books related to Alexander's theories and the threshold space.
Study of historical documents: Review of maps, documents, and archival images related to the ancient texture of the city of Babol.

Field observation and photography: Observation and recording images of threshold spaces in old neighborhoods for qualitative analysis.

Spatial analysis: Drawing multilayer maps and conducting spatial analyses to understand communication and physical patterns.

In this study, two scales have been considered to examine threshold spaces:

Building scale: Includes the examination of spatial relationships at a micro-scale, such as the location of buildings and their physical characteristics (height of windows relative to street level, proximity of buildings, etc.). The tools used included drawing multilayer maps and photography.

Street scale: Includes the analysis of factors such as street width and communication patterns of neighborhood residents. The tools used at this scale include archival studies and spatial analyses.

These methods, in a complementary manner, have enabled a more comprehensive analysis of the impact of threshold spaces on social and spatial relationships in the ancient context of Babol.

Research Foundation

• Christopher Alexander's theory of patterns

Alexander and his colleagues observed numerous medieval cities they deemed attractive and cohesive and subsequently published 253 patterns in a book titled "A Pattern Language". A pattern provides a solution to a recurring problem in a specific context, such as the need for an entrance to transition into another space. In his book, Alexander established a unique framework for presenting his patterns. Each pattern consists of seven sections: First, an image of a prototype of the pattern; second, an explanation of the pattern, context, and its role in complementing larger patterns; third, a statement of the problem explaining the main challenge; fourth, the primary paragraph derived from research on the problem and its necessity, potentially showcasing different approaches to creating a pattern; fifth, a guideline in the form of a statement; sixth, a solution represented as a diagram; and seventh, a paragraph accompanied by several smaller patterns contributing to the main pattern. Additionally, the patterns are organized hierarchically from the largest to the smallest (city, building, construction). Larger patterns require medium-sized patterns, and medium-sized patterns require smaller ones to complete them. Hence, the patterns are not isolated but are reinforced by others to achieve cohesion and complementarity.

Alexander views patterns as a language for both designers and non-designers, allowing communities to express themselves within a space and revitalize cities and buildings. "Buildings can be constructed by stringing patterns together. A building constructed in this way is an abundance of patterns that are neither dense nor unified. However, patterns can also be arranged to overlap significantly within the same physical space: in this case, the building is highly dense, with many meanings created in a small space, and through this density, it gains depth"

(Alexander, 1987). Accordingly, each pattern relates to many others and the overall language, forming the basis for a lively city. One of the patterns Alexander discusses in “A Pattern Language” concerns the element of “windows” in buildings. Alexander’s theory of “Street Windows” emphasizes the following points:

1. Lack of security in alleys without windows
2. Creating a connection between the flow of life in the alley and the interior of the house
3. Better views through windows on higher levels
4. The need for privacy in ground-floor windows

Another pattern, “Main Gateways” is regarded by Alexander as a threshold essential for defining the identity of different territories. Gateways should be identifiable at both micro and macro scales. Many urban areas possess mental boundaries in the minds of residents. These boundaries often signify the end of one activity or space and the beginning of another. Alexander argues that the quality of any part of a city, whether large or small, that residents identify as a domain can be enhanced and clarified by marking its entrances with gateways at border points (ibid.).

• Threshold spaces

Threshold space is a term used to describe a variety of transition situations from various perspectives. Therefore, it develops a myriad of different meanings. This space is not limited to the building shell with entrances and windows and encompasses more concepts. It connects the inside to the outside and is one of the essential features of any specific arrangement in architecture. A number of architectural theorists have paid attention to the concept of threshold from different perspectives, through whose opinions we can understand the importance of the issue of threshold in this field. Below is an excerpt from these definitions.

In ethnography, Van Gennep has carried out one of the first studies on cultural rituals, he describes the moment of transition in the ritual in which the individual is released from one state and enters another (Van Gennep, 1960). Turner also suggests that thresholds are “neither here nor there; but between the

positions that law, custom, tradition, and ritual have determined” (Turner, 1977).

Christian Norberg-Shulz, who looks at the universe and its phenomena from a phenomenological perspective, mentions the concept of place when talking about the center and the inside of things. And when he thinks about the threshold and the border of things, he refers to the connection of that “inside” with the outside of things. Schulz examines the threshold through a detailed explanation of the concept of “path” in examples about directionality, the explanation of territory, and the intensification of place, and considers the topological relationship of the outside and inside as the fundamental aspect of the “existential space” of a place, which this connection is at the threshold, that is, a transitional area (Norberg-Shulz, 2012). Arnheim, in his two books entitled *The Dynamics of Architectural Forms* and *The Power of the Center*, refers to the concepts He discusses “guidance in architecture,” “movement in architecture”, “passageways,” and “the question of transition.” He believes that by connecting the outside and inside with a physical object in openings, he may seemingly consider that object an obstacle to movement; but this can be full of meanings for its users. He also considers the creation of holiness through symbolism within transitional areas (transitional boundaries) to be vital but vulnerable (Arnheim, 2003). In his book titled *Conflict and Complexity in Architecture*, Venturi speaks of the connection between the outside and the inside, the implicit conflict between them, and their hidden agreement, this connection goes so far as to lay the foundations of his theory of “both this and that” instead of “this or that” (Venturi, 1977).

Christopher Alexander, who has always sought to achieve desirable architecture, argues that “when people are on the street, they adapt to a kind of ‘street behavior.’ When they enter a house, they naturally tend to change this street behavior and adapt completely to the more intimate spirit that is appropriate for a house. But they do not seem to succeed in doing this unless there is a transition from one to the other that helps

them to abandon street behavior. In the transition, the tension, distances, and privacy that are appropriate for street behavior must be eliminated before the person can reach complete peace” (Alexander, 1987). He also refers to concepts in the field of architecture in his series of books *The Nature of Order*, one of which is the complex concept of boundary and threshold. His view of boundary, center, and the principle of gradation and inseparability in phenomena can clarify the importance of the issue of threshold from his point of view. He refers to the gradual transformation of one center into another through “soft edges”. Accordingly, the importance of creating an intermediate space that allows for a gradual movement and change between the two hemispheres, so that the person does not experience doubts and hesitations, is determined (Alexander, 2004).

Hertzberger uses the term “threshold” to talk about the transition of space and believes that “the threshold provides the key to the transition and communication between areas with different territorial claims and, as a place, creates special conditions for meeting and dialogue between different sectors” (Hertzberger, 2005). Threshold spaces are formed by combining the threshold with spatial elements. These elements can be connected by one or more joints and create a unique spatial perception. Threshold spaces are the introduction to the main space or functional spaces, they can be outside the intended space, between two spaces as an intermediate space or an interior space. This research will study the threshold space of transition into the residential neighborhood and the relationship between the house and the alley in the historical context of the city of Babol.

• **The relationship between Threshold and Iranian urban development during the Qajar era**

In the discussion of urban planning, cities located within the borders of Islamic countries are called Islamic cities. Issues such as privacy, hierarchy, etc., which are derived from the religion of Islam, are among the main characteristics of these cities. In the structure of an Islamic city, various factors

such as environmental, climatic, economic, social, and cultural factors that differ from region to region usually have an effect and play a role in the formation of distinctive characteristics in each city. These factors can also be seen in the remains of the Qajar era in the city of Babol, and therefore understanding the organization of the threshold spaces of this city is important. In the field of spatial composition, Islamic cities have gone through different conditions. The structure of some cities has been centralized, such as the city of Baghdad in Iraq, which was responsible for planning and controlling buildings with the government. Others, such as the city of Mashhad, were not centralized and had organic and sudden growth. Orientalist Van Groenebaum has noted that Islamic cities are divided into two different types. The first category is spontaneous cities that grew randomly. The second category is pre-planned cities. Babol is considered to be part of the first category based on the history of its formation, the initial core of the city was formed based on the existence of a bazaar.

The Islamic architectural style is not based on similarities, but on common customs and patterns of productivity that indicate internal dependencies. Certain things such as climatic conditions and social factors are common among them, among which social factors are based on Islam and custom, and as a result, different solutions have been developed in different regions and cultures. At the same time, while different solutions have been created for designing threshold space, there are similar features in Islamic cities that distinguish them from other civilizations in the field of urban configuration and the understanding and use of transitional spaces. It is said that every city built during the Islamic era followed the principles of all other Islamic cities in terms of planning and design (Momeni, 2018).

The architecture of the Qajar era had an exemplary response to the living conditions of the social and natural environment. Balconies show a good example of adaptation to the social conditions prevailing in that historical era. Despite the influence of the West

and the creation of extroversion in Qajar houses, architects limited the view from the outside to the inside of the house by placing lattice railings on the terrace or windows facing the alley. As can be seen in Fig. 2, in the historical house of Nima Yushij, which is located in the village of Yush, a part of Mazandaran province and belongs to the Qajar era, a terrace facing the alley was built that, while creating a connection between the residents of the house and pedestrians, created privacy in accordance with the culture and customs of that time with the help of a latticed wooden shelter.

It is important to note that in an Islamic city, the concept of sacred spaces refers not only to the mosque, which is a religious building but also to houses that have some degree of holiness. This is due to the religion of Islam, which is reflected in people's belief and understanding of the separation between the two sexes. Looking at the structure of Islamic cities, it can be inferred that they often follow an organic growth pattern and are made up of different layers that take the individual from the public places of the "mosque and the surrounding bazaar" gradually and through the semi-public and semi-private layer to the more private "residential area" (Behzadfar & Rezvani, 2015). During the Qajar era, the neighborhood had a traffic artery that connected it to the main centers of the city such as the bazaar, gates, and government centers. The main elements of



Fig. 2. The balcony of Nima Youshij's house in Yoush, Mazandaran, a source of privacy, light, and air. Source: <https://www.visitiran.ir/attraction/Nima-Yushij-House>

the neighborhood such as the neighborhood square, bazaar, mosque, tekkyeh, bathhouse, water tank, and refrigerator were usually located on this main axis; Therefore, the threshold of entry from the public to the residential part of the neighborhood through the street has a hierarchy that indicates the influence of custom, culture, and Islam on urban planning during the Qajar era (Ahari, 2015).

Fig. 3 shows the old texture of the city of Babol during the Qajar era, which indicates the separation of private and public uses at the neighborhood level. The type of separation of the residential neighborhood around the tomb of Imamzadeh Zain al-Abedin and the commercial area of the Hasirforoushan is one of the best-remaining examples from the Qajar era in the city of Babol.

In small neighborhoods, all these elements gathered around the neighborhood square and defined the neighborhood's centrality. It should be noted that the neighborhood was defined not only by its center but also by its boundary. This boundary was such a precise and tangible concept that it is accurately reflected in Qajar-era maps of major Iranian cities. In some places, such as the Babol Hasirforoushans' Quarter, shown in Fig. 4, a covered entrance was defined as a threshold space for the neighborhood, which helped to protect the private sphere from the public.

In the map of the neighborhoods of Babol during the Qajar era, the border usually passed behind residential buildings, and it was very important for the residents to know which neighborhood they belonged to. This indicates the important role of the neighborhood in life and social interactions. The houses are either very close to each other or, when there is a courtyard structure, they are built wall to wall, and the courtyard plays the role of the center or core of the residential unit, which protects the outside territory and is used for social purposes (Lahmian et al., 2008).

In the Islamic city, threshold spaces are used to define three spaces: the central courtyard, the entrance space to the alley or surrounding area, and in some cases, the interior space such as the hallway leading to the



Fig. 3. Separation of the residential area around the tomb of Imamzadeh Zain al-Abidin and the commercial area in Babol's Hasirforoushan Square . Source: <https://11nq.com/cnXuc>



Fig. 4. Entrance to the Babol Hasirforoushans' Quarter, 1310. Source: <https://babol-city.blogfa.com/post/30>

reception. In the ancient context of Babol, threshold spaces include all three of these. These spaces have had different uses in expressing the threshold. In understanding the threshold space, the analysis of the streets is important for understanding the organization and its relationship with the surrounding environment. “The study of local context emphasizes the importance of culture in the study of the street environment” (Rapoport, 2013). In this study, threshold space refers to the space between the house and the street that will be studied.

In Islamic society, the ownership of threshold space was private, public, or semi-public, depending on the type of street and its location in the city, and could have been different in residential or commercial areas with the right of use of pedestrians or neighbors. According to Nooraddin, as a result of the above, some basic rights were developed to organize this space, including the right to pass, the right to pause and sit, the right to maintain privacy, and the right to build (Nooraddin, 1998, 68). Accordingly, it can be

said that during the Qajar era, the threshold space of the house and the street was a private and semi-public threshold space that was used for socializing with neighbors, waiting, seeing, and so on. Babol, as an Islamic city, has the aforementioned urban structure seen in it during the Qajar era, which we will discuss.

Research Area

Babol, which is referred to in historical sources as Mamatir, Mamtir, and Mamatiran, and later as Barforoush, grew and expanded rapidly during the Islamic era due to its commercial prosperity and urban structure, and during the Safavid era until the early Qajar period, it gained great importance among the cities of Mazandaran due to its favorable geographical location and special economic and commercial conditions. Its economic development led to the formation of neighborhoods and the expansion of various urban spaces. Barfurosh enjoyed good expansion during the Qajar era and was able to become a government center. In the late Qajar era, when it became the center of Mazandaran province and also the center of trade in this region, its name was changed from Barfurosh to Babol Rezghi & Biki (2013). Given that the initial structure of the city of Babol was formed during the Qajar era and has remained without major changes to this day, it can be a good example for studying urban structure in terms of utilizing the threshold space. The rapid growth of the city of Babol, due to economic exchange between the center and the ports, gradually changed the structure of the city from organic to linear, and it experienced the greatest change and transformation during the Qajar era (Seyedian & Roshan, 2014). By examining the maps and historical texts of the Qajar era, as well as the maps left from this era, we find that the main artery of the city of Babol started from Hamzeh-Kola Square and ended at Bahr-e-Iram after passing through various neighborhoods. Along this route, the organic and linear texture of the city, which expanded from north to south due to its location in low and humid areas, has led to the emergence of threshold spaces at the entrance to residential

neighborhoods as well as commercial spaces in the bazaars (Amirshakari et al., 2013). An examination of this context shows that threshold spaces in this city are divided into three general categories:

1. Commercial threshold spaces in bazaars and commercial streets (by reducing the dimensions of the passages).
2. Semi-public threshold spaces at the entrance to residential neighborhoods (by reducing the dimensions of the passages and sometimes with the help of arches over the passages).
3. Private threshold spaces at the entrance to residential houses (hallways and doorways) (Fig. 5).

From the studies conducted, we find that during the Qajar era, the threshold space in the city of Babol played an important role in the formation and organization of urban structures and neighborhoods. These spaces, which are also referred to as transitional spaces, included the entrance spaces of neighborhoods, markets, and residential houses, which played a significant role in shaping the social and cultural life of the people of this era. A correct understanding of these spaces and their analysis can contribute significantly to the preservation and revival of the historical fabric of the city of Babol, as well as the urban reconstruction in accordance with Islamic culture and identity.

• Street scale

According to Christopher Alexander, at different levels in the structure of the city, there are identifiable units. Identifiable neighborhoods, clusters of houses and work areas; and a number of smaller building complexes around some transit and review territory. All of them receive their identity clearly from the fact that there is a specific gateway to enter them. It is this gateway that helps to constitute each unit as a threshold. Any part of a city - large or small - that is identified for its inhabitants as a domain can be strengthened and further clarified if the routes into it are marked by gates at boundary points (Alexander, 1987). In the past, streets were built according to the requirements of movement and were developed for the movement of pedestrians as

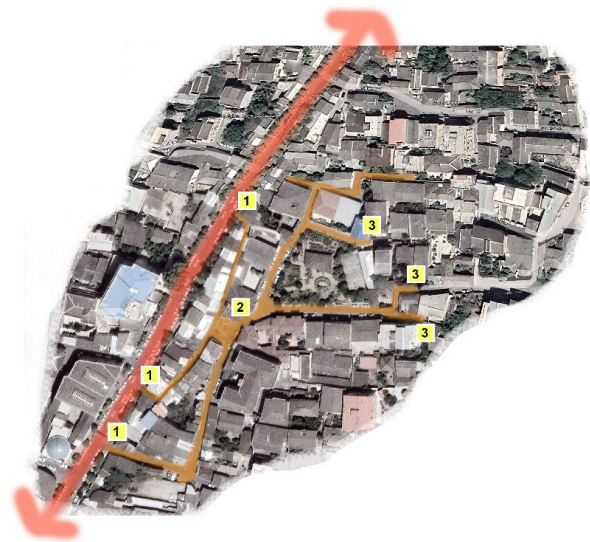


Fig. 5. An example of the types of threshold spaces in the old fabric of Babol (Panjshanbe Bazaar neighborhood). Source: Authors.

well as animals. The width of a street was determined by the passage of two animals with loads. The streets followed a specific hierarchy from public to semi-public and then private, which can be considered a four-way system such as:

1. Wide passages from the city entrances to the central core.
2. Primary streets between the main neighborhoods of the city connected residential areas to the city center.
3. Tertiary streets provided connections between neighborhoods and were mainly used by people living in that area (Massoud, 2024).
4. Gated alleys that are not public and belong to adjacent buildings. In Islamic cities, unlike Roman or medieval cities, dead-end alleys were used for privacy and private purposes. A gated alley was located at the entrance of two or more houses in a single environment, such as a dead-end alley or vestibule connected to a passage, and the space at the beginning of this alley or vestibule was designed and decorated as the entrance space of the houses and was connected to the edge of the road with the help of a door; this enclosed and closed space was called a gated alley (Salami & Jozpiri, 2015).

The mentioned items are summarized in Fig. 6.

The ancient texture of the city of Babol, as the sample

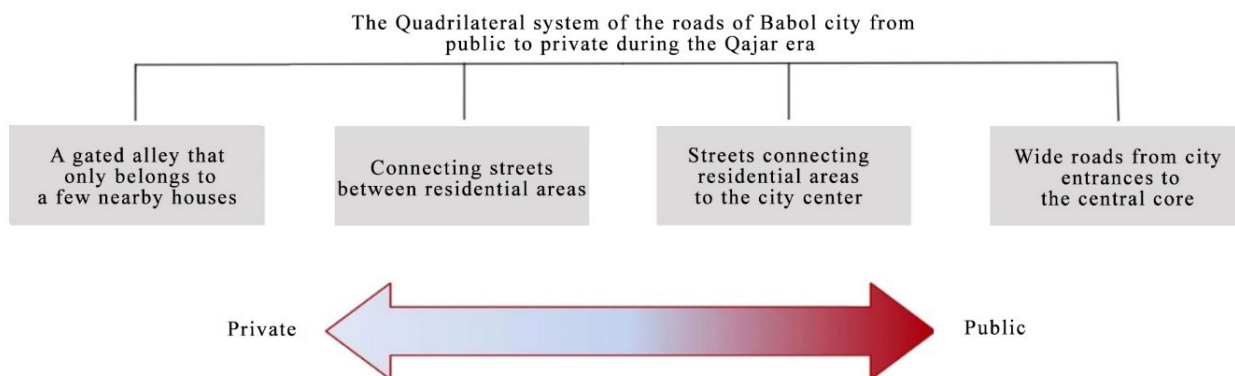


Fig. 6. Hierarchy of passages in ancient Babol from public to private. Source: Authors.

studied in this research, was a city that was considered one of the most important and influential cities of the region in all historical periods and had the four-sided system mentioned above. Various sources do not mention the name of the entrance gate or the exact area of the city of Babol; however, Naser al-Din Shah Qajar wrote in his travelogue in 1245 after visiting Barforoush (Babol) that: “After Deh Amirkola, we passed Hamzeh Kola, which is the beginning of Barforoush. There were well-groomed clay houses, many orange trees, the alleys were good, but there was no pavement...” And in another place, he spoke of the area of the former Bahre-Eram, which had a lake and an island in the middle of it, as if these two formed the northern and southern borders of Babol, and the distance between these two borders was the same wide passage from the entrance to the city to the central core. Therefore, it can be seen that during the Qajar era, there was no specific element as a threshold for entering the city of Babol.

Discussion

Initially, the city of Babol was formed around the Imamzadeh of Qasim; but the expansion and development of the city was centered around its covered market, and the city’s neighborhoods were also formed around this strong structure. The texture that is woven around the initial core or historical texture of the city dates back to the years before 1300. The most important stage in the formation of this texture dates back to the late Qajar era. The

oldest neighborhoods of the city, including Bisar Takiyeh, Pir Alam, Panjshanbeh Bazaar, Jame Mosque, Ojabon, and Efarid Darben, were mainly formed based on guild and religious characteristics. The neighborhoods themselves had a center, which was actually a square with an uncertain geometric shape that was connected to the main market of the city by a path, which was the same as the original streets between the main neighborhoods of the city. The threshold element was not seen in detail in this structure either.

The old fabric of Babol consists of several neighborhoods and sub-neighborhoods, where the current city center of Babol is located, and each of them has all the requirements of social life, such as a local mosque, a school, various caravanserais, along with a bazaar and baths. The spatial organization of the old fabric of Babol is based on the connection between the centers of the neighborhoods and the city center through main and secondary passages. The main passages that connect the neighborhoods and their centers have an irregular and organic shape and, like checkered and perpendicular networks, do not follow a specific geometric system (Amirshkari et al., 2013). Imamzadeh Zain al-Abidin Square is connected to Hasir Foroushan Square by a very beautiful connection. Despite the proximity of these two squares and their connection by only one entrance in the corner, the spirit of these two public spaces is completely different. The square of the carpet sellers, marked by a tekye called the tekye of

Hasirforoushan, is a commercial and relatively busy space, while the square of the Imamzadeh of Zain al-Abedin is surrounded by residential houses and a mosque. The street between the neighborhood of the carpet sellers and the neighborhood of the Imamzadeh of Zain al-Abedin in Babol, shown in Fig. 7, is the same third-level street referred to above for connecting the neighborhoods. As can be seen in this image, the threshold of entry to these neighborhoods is shown from two different angles, a covered space between two tekye buildings and a historic house. According to Alexander, any boundary in the city that is of human importance, such as the boundary of a residential complex or a neighborhood, should be marked by large gates that are the crossing points of the main passageways (Alexander, 1987). Therefore, Alexander's theory is completely consistent with the sample examined as the tertiary streets of ancient Babol.

In the old neighborhoods of Babol, residential routes generally reach dead ends, and each dead end has several entrances. Sometimes there was a common door for these houses at the beginning of the dead ends, which have all been removed today. In fact, during this period, a threshold was considered for the streets leading to the residential houses of Babol. These street thresholds, which were created in the form of a doorway in the neighborhoods, were visible at different scales based on the neighborhood and alley. For example, Fig. 8 shows a dead-end alley



Fig. 7. Connection between Hasirforoushan Square(2) and Imamzadeh Zein al-Abidin(1) Square. Source: Authors.

in the Miankat neighborhood of Babol, where the threshold of the dead-end alley is built in the shape of a vestibule. According to Alexander, the gates should be like a solid element, visible and accessible from all directions, and should be placed like a hole facing the house, so that the access path passes through it (ibid.). This theory can be seen in the structure of the dead-end alley entrance below.

Current observations indicate that there are a very limited number of these thresholds in the ancient context of Babol; however, based on the documentation obtained based on interviews with knowledgeable people, there were other examples of this threshold space in this city that have been destroyed. The above examples in the city of Babol indicate the implementation of these four hierarchical systems in the streets during the Qajar era. According to what was said, in Babol, the threshold space on the scale of the street had a different design based on the type of use of that space, which indicates the boundary between different regions. The type of design of these threshold spaces was formed based on custom, culture, and environment. Also, the correspondence of Christopher Alexander's theories on the threshold with the four systems mentioned above has been examined.

• Street scale

The window is one of the important elements in the building. Windows helps us to observe the outside world and to communicate with the street or square through the exchange of smells and sounds. "A windowless street is blind and frightening, and it is as uncomfortable as being in a house limited to windowless walls facing the public street" (Alexander, 1987). Windows facing the street are threshold patterns that provide a unique experience by connecting the life inside the house to the outside world. In the historical context of the city of Babol, windows facing the alley or street, which are called "Abeshke" in small size, are considered one of the distinctive exterior features of those houses and have been admired by many travelers and explorers who have visited this city (Fig. 9). The formation of



Fig. 8. The entrance to Hassanjan Saedi Alley in Babol. Source: Authors.

these windows facing the street in the urban context occurred during the Qajar era.

People’s belief in the Islamic religion and, consequently, the belief in privacy has caused the visual view from outside the house to the inside to be lost, creating an intermediate space between the urban fabric and the house. Three elements whose design can cause visual encroachment from the urban fabric to the house include the entrance doors, windows, balconies, and verandas of houses. Before the Qajar era, there was no connection between the alley and the house except for the entrance door, and the placement of the entrance doors of houses should be consistent

with the principles of privacy of life, and the doors of neighboring units facing or close to each other should not be opened to prevent the person facing the door from looking into the opposite or adjacent house (Alimohammadi et al., 2015) (Fig. 10).

It is important to position the windows of houses in such a way that they do not overlook other people’s houses, even if it is necessary to receive natural light and air ventilation from that side. In the case of constructing windows that were located in the body of the wall of the passageways, they should be raised above the ground level in such a way as to eliminate the possibility of pedestrians seeing inside. To prevent invasion of privacy regarding the height of buildings, Islamic city planners recommended that all houses in the urban context be built at the same height and in a coordinated manner. This issue was observed in many Islamic cities in such a way that the buildings of the city were all at the same height and there was not much difference in height between the different buildings of the city (Bemanian et al., 2010). The main use of street windows was for air ventilation, penetration of light without direct sunlight, and creating privacy for women so that they could look into the alley without strangers noticing their presence. According to Alexander, where buildings are located along busy streets, windows with seating should be built to allow a view of the street. It is best to place windows in bedrooms or at a point on a passage or staircase where people constantly pass.



Fig. 9. Window facing the alley in Qajar houses in Babol. Source: Authors archive.



Fig. 10. Not placing the doors of houses facing each other to maintain privacy in an alley from the Qajar era in Babol. Source: Authors archive.

On the first floor, these windows should be placed high enough to maintain privacy (Alexander, 1987). For this reason, in the late Qajar period, when terraces facing the alley became popular, a suitable solution to the problem of social and climatic interaction was found by building lattice fences with a compact design. Fig. 11 is an example of a Qajar house in Babol, which, according to Alexander, creates privacy on the ground and first floors. As can be seen in the image, the windows are designed in such a way that a passerby can't see inside from the alley, due to the high height of the window relative to the ground level and the wooden lattice fences.

Since the Qajar houses of Babol were built in one or two stories, sometimes windows facing the alley can be seen in both stories. The number of street windows in each house varied depending on the location of the facade. Facades facing the main street or open spaces such as the square had the most windows due to the need for ventilation and good visibility. In addition,

the number of windows varied from house to house depending on the size of the facade and the number of stories. The size and height of the windows also varied according to the available interior spaces. In larger rooms, the architect used larger windows and vice versa. In addition, the windows facing the street had less decoration than the windows facing the courtyard, which were usually decorated with Orsi, and their main purpose was ventilation.

According to interviews conducted by the author with former residents of historic houses in Babol, it is said that women who lived in houses with large windows that did not open onto the wide street communicated with each other through those windows. Fig. 12 shows two Qajar houses in Babol that have large windows and terraces facing the alley, which, according to Alexander's theory, create a connection between the flow of life inside the house and the street.

According to Alexander, street-facing windows on the first and second floors are more successful because they have a better "view" of the street at a higher position—the connection and dominance from the street to the interior of the house are lost. Street-facing windows at ground level are less usable. If they are far from the street, they do not have a special view of the street, even despite their height above street level. Assigning a specific feature to each window, such as the location of each window, on the other hand, makes residents use it more. Decorating street windows from the outside and assigning them cheerful and bright colors creates an attraction for passersby on the street. Fig. 13 shows the presence of multiple windows on the first floor in a building from the Qajar era, which is in accordance with Alexander's theory.

In Alexander's "alley window" model, one of the issues mentioned is the lack of security in windowless alleys. Fig. 14 shows an alley in the Miankat neighborhood of Babol where the houses in it do not have windows facing the alley, which creates a feeling of insecurity among pedestrians.

During the Qajar era, the threshold between the house and the street underwent significant changes with the creation of windows and terraces, creating significant

developments in the public life of the people. In this study, by conducting field research in the historical context of the city of Babol, several patterns were identified in the scales of the building and the street. Some of these patterns, as mentioned in the book “The Language of Patterns” by Christopher Alexander, have been introduced with the same title or with a different name based on the local name. In addition, a new pattern specific to the city of Babol and other coastal cities on the Caspian Sea has been identified. One of them is the “Street Window” pattern, which is called “Abesheke” or “Eshke” in Tabari if it is small. This pattern is placed on the scale of the building and is considered one of the important features of Qajar architecture in the historical context of the city of Babol. This study also examined the “Main Gates” pattern. The study of Qajar houses in Babol shows that the two aforementioned patterns of Alexander are consistent with the architecture of Qajar houses of that era.

Regarding the adaptation of Alexander’s theories to the architecture of Babol, one can discuss the cultural interaction and the influence of architectural styles on customs and social values. Alexander believes that architectural patterns not only have a functional aspect but also should be designed in a way that is consistent with the cultural and customary spirit and identity of the society. In the city of Babol, as he points out in this research, customs and culture have played an important role in shaping urban spaces. This concept is completely consistent with Alexander’s theories, which emphasize the connection between architecture and the social environment. For example, Alexander emphasizes in his theories the importance of “border” spaces and “thresholds” as points that both separate and connect public and private spaces. In Babol’s architecture, threshold spaces such as Street Windows or verandas facing the alley play an important role in maintaining privacy and at the same time social interaction. On the other hand, the “Street Window” pattern that Alexander introduced as a connection between the house and the surrounding environment

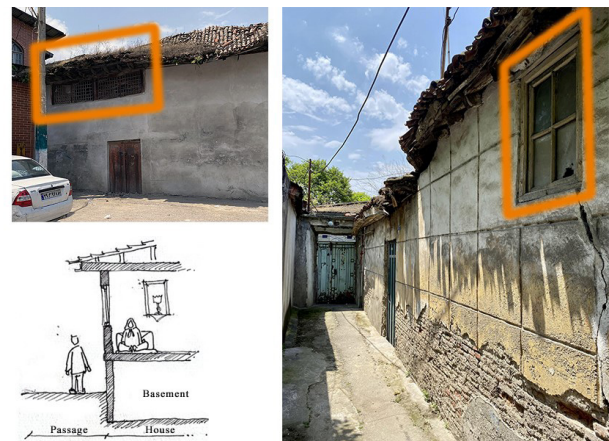


Fig. 11. Window facing the alley in houses from the Qajar era, Babol. Source: Authors.



Fig. 12. A projecting terrace facing the alley in houses belonging to the mid and late Qajar period in Babol. Photo: Authors archive.



Fig. 13. Osia’s House in Babol from the late Qajar era with windows on the first floor facing the neighborhood square. Photo: Authors archive.

is also evident in Babol’s architecture. Windows that, on the one hand, maintain the privacy of the residents and, on the other hand, provide the possibility of monitoring the outside space and



Fig. 14. Alley without windows (Hasanjan Saeedi Alley in Babol). Photo: Authors archive.

creating interaction with the local community are examples of this adaptation (Table 1).

Therefore, it can be said that the architecture of Babol during the Qajar era, by using threshold spaces and observing cultural and social principles, in a way reflected Alexander’s theories in its structure and by creating a link between public and private spaces, exhibited a unique identity that converged with Alexander’s theories.

Conclusion

The present study examines the patterns of threshold spaces in the historical context of the city of Babol and its adaptation to Christopher Alexander’s theories. The results of this study show that threshold spaces, especially during the Qajar era, played a key role in the connection between public and private spaces. In addition to playing a functional role, these spaces were able to adapt to local culture and customs and respond to the needs of residents. Studies indicate that the spatial hierarchy of access from public to private space in the Qajar architecture of Babol is consistent with the patterns proposed in Alexander’s theories, such as the “Street Window” and “Main Gates”. The study showed that in addition to preserving the privacy of residents, these patterns also provided the possibility of social interaction and played an important role in the quality of urban life. Despite the effects of modernity on Qajar architecture, threshold patterns have been able to preserve the cultural and social characteristics of the city of Babol. Similarly, threshold spaces as an effective element in architectural design can also be considered in contemporary architecture to strengthen interactions between public and private spaces and improve the quality of the urban environment.

This research shows that Christopher Alexander’s patterns, despite climatic and cultural differences, can adapt to the historical contexts of Iran, especially the city of Babol, and can be used as a framework for analyzing and designing architectural spaces.

Table 1. Matching Christopher Alexander’s architectural patterns with the Qajar architecture of Babol. Source: Authors.

No.	Architectural Pattern (Christopher Alexander)	Adapted features in the Qajar architecture of Babol	Description
1	Street Window	Small windows with the local name “Abeshke” or “Eshke”	Creating a connection between the interior space and the street, maintaining privacy with special window design
2	Main Gates	Large doorways and entrances in neighborhoods and houses in Babol	Defining the boundary between semi-public and public areas with specific gates
3	Street Terraces	Wooden lattice terraces facing the street	Creating interaction between pedestrians and residents while maintaining privacy
4	Passages	Dead-end and covered alleys	Clear separation between public and private spaces, creating a sense of security

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