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The Perspective of the Urban Economy of Boshruyeh in the Qajar Era Based on the Theory of Space Syntax

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Abstract

As a give and take relationship between human and environment, economy has played an essential role in the formation and sustainable development of cities. A city's spatial structure is a refelction of its urban economy and how social actors have acted to create a relationship between the production and distribution of income from the sale of products, inside and outside urban areas. This social behavior in the city space, on the one hand, has caused high productivity and favorable access to physical-social and economic infrastructure (business) in the whole city. On the other, it has fostered a constructive economy in order to improve residents' life quality and the sustainability of the city over time. This paper aimed to analyze the spatial behavior that was the driving force of the economic development of Boshruyeh City in the Qajar era using the theory of space syntax. The research questions were: How did the economic variable ("barak"-weaving industry) affect the distribution and density of the neighborhood patterns in Boshruyeh in the Qajar era? In what way were the access system and the pedestrian pattern governing the spatial organization of Boshruyeh able to ensure the sustainability of the urban economy and the growth of the city in the Qajar era? The present study represents a basic research in terms of purpose and descriptive-analytical in nature and methodology. To collect data, library research was utilized and using findings and documents of cultural heritage, a report on documenting the cultural-historical context of Boshruyeh City was provided. Using the UCL DEPTH MAP software, the descriptive-analytical part was based on the theory of space syntax and the analysis of the city map, emphasizing the metric radius and combining and weighting the two indices of integration and choice in the arrangement method. The results indicated a two-way and significant relationship between the two indicators of integration and spatial choice in the creation of space configuration and movement economy in the city space of Boshruyeh in the Qajar period. In the meantime, the footprint of the human factor in the natural movement of the city, the flow of the barak-weaving industry as the economic variable can be seen in the pattern distribution of the city houses and the pedestrian pattern in the streets as a people-oriented space in the city economy.

Keywords: Economic Perspective, the Qajar Era, Space Syntax Theory.

Article Type: Research Article

Introduction

As place-spatial phenomena, human settlements are always influenced by many natural and human factors and continuously change over time (Firouznia and Rabbani, 2013: 103), and as the most important human settlement, city is the scene of various events and activities. The urban space reflects the economic essence of a city and shows the relationship between the production and distribution of products. Among the factors affecting city's economy are income and employment. Employment is the most obvious indicator for measuring the economic power of a city and the most efficient factor that can link economic factors with the need for urban spaces and as a result, the formation of the city's body (Rafiei, 1990: 22). Undoubtedly, the economic city life is dependent on the capital attraction, the income amount and urban employment. In this way, the spatial consequence of economic growth is the physical development of

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the city's texture and body and the city's ecology[1] in this sense: "the city becomes a place for production, distribution, and consumption of products and in competition with other cities, a place for new markets and industries" (Campbell, 1996: 298). Economic relations and urban social life are based on product surplus (Renfrew 1973), and production (agriculture, animal husbandry, industry, etc.). On the other hand, the surplus of the product in the society leads to the social development (social class) (Harvey 2012). According to David Harvey's theory of product surplus, cities assume the role of product surplus concentration or social surplus in space. In this sense, cities are the physical and body crystallization of the excess concentration pattern in society. He believes that the surplus of the product produced in the society by the labor sector is consumed in the other part of the society (by the elites, businessmen, artisans, and capitalists). In other words, this type of surplus was the main force for the city formation in the early periods of the agricultural revolution, from the Neolithic times to before the industrial revolution. This type of surplus, crystallization, and spatial embodiment of cities has become the social and economic driver of the residential space and social space and the basis for the emergence of unequal and class structure in the urban society (Harvey, 2012: 11–25). The model of product surplus has led to the formation of commercial relations between the residents of the cities; also, the increasing growth of the city's productions and products results in the emergence of inter-city commercial and business relations. The most important achievement of this behavior has been the survival of cities over time. Therefore, in fact, reading the city economy means deciphering the concept of space behind "alliance with a social action" (Lefour, 2016: 183). Urban spaces and the relationships between them are a reference to the existence of the relationship between man and his surrounding environment, formed to satisfy human needs and reflect his motivations for survival. In long term, they affect human behaviors[2], spatial behaviors[3], personal spaces, and human perception of the surrounding environment. Therefore, the city is an image of interaction (two-way relationship between the nature of the system and the behavior of the residents), network (flow of movement and urban movement), node and focal point (meeting point, urban hangout), hierarchy (description of the urban space), levels (neighborhood of uses) and distribution and dissemination (weighting of activities) (Peter Hackett 1973), the spatial and place distribution of buildings for the purpose of trade, which in itself has brought economic dynamism to the city. All of them are the main factor in the development and transformation of cities (Hajinejad and Ahmadi, 2010: 8). In fact, human activity in cities forms the basis for creating different spaces in cities. These spaces also have different effects on cities as the result of different activities (Nasiri Hendeh Khaleh *et al*, 2016: 136). Therefore, the city is a type of economic-financial organization in space, which should be considered as a permanent producer of wealth and economy. The spatial and visible dimension of the city is its economic-financial base, which is considered the dynamism and mobility and personality of the

[1]City ecology is a paradigm that studies the interrelationships between human groups and the city's environmental systems. It includes the factors such as nature, the nature structure, the urban management system, the social conditions of people's behavior, and the social, religious, and ethnic characteristics that govern the atmosphere of cities. Therefore, urban ecology is a theory to explain the spatial structure of the city. One of the most important concepts of this theory in the formation and development of cities is the concept of competition and displacement under four concepts (competition, dominance, succession, and invasion). This has turned into an economic competition in the urban environment. Thus, the competition between ethnic groups with different professions in a region causes the dominance of one group over other groups; the result is that other people leave the region and stabilize and replace this group as the only group in the region, and other groups enter other regions and the cycle repeats. It is repeated from the beginning. For further details, see Shokouei 1986.

[2]Human behavior is a process under the influence of human characteristics and various environmental factors in order to meet needs; these behaviors themselves lead to the formation of individual and collective mental patterns in society (Hatami, 2016: 162).

[3] Spatial behavior: In order to satisfy his physiological and social needs and in order to play social roles, man needs spaces with suitable limits and conditions, and only when he cannot create the desired conditions, he changes his behavior and adapts himself to the existing conditions. (Motallebi, 2002: 60). In other words, spatial behavior includes behaviors that are performed in a place and affected by the surrounding environment. In fact, in the investigation of spatial behaviors, not only the behavior between humans and the behavior between humans and the environment, but also the mutual effects of humans and the environment are considered. How we use the physical environment around us in establishing social relations is examined in investigating human social behavior in connection with the physical environment (Lotfi and Sajjadzadeh, 2014: 8).

society. The perspective of the cities is derived from the behaviors and economic-financial activities of the urban society (Fakuhi, 2004: 286–287).

Having continued to exist since the Timurid period until today, Boshruyeh is one of the oldest cities in South Khorasan province, and as the particular case studied in this paper the history of its formation as an urban center offers a particularly advantageous subject for speculation. Yet, no systematic investigations have thus far studied the impact of economic policies and its role in the formation of the spatial structure of Boshruyeh and in its dynamism and sustainability over time. The important point about this city has been the existence of natural holdups in local population's livelihood, making the residents turn to the barak-weaving industry for the survival of themselves and the city. Production of barak[1] at city' houses has resulted in a dense urban spatial structure (residential areas) in the Qajar period and the total absence of typical bazaars.

This paper analyzes the spatial behaviors in the layers of the urban fabric of Boshruyeh in the Qajar period using the theory of space syntax and reviews what causes the creation of urban identity, the nature of citizenship, the stability of economic security and behavioral economy[2] in the urban space which has become a stimulus for development and increasing efficiency[3] and the economic balance sheet[4] of this city.

The research questions are as follows: What effect did the economic variable (barak-weaving industry) have on the distribution and density of the neighborhood patterns in Boshruyeh during the Qajar era? How did the access system and the democratic pattern governing the spatial organization of Boshruyeh ensure the sustainability of the urban economy and the city in the Qajar era? The hypothesis raised for the first question is: the barak-weaving industry as a productive economy was able to set the ground for the smartness of the urban space of Boshruyeh in the Qajar period. Therefore, the existence of a barak-weaving niche (go'de barak)[5] on the north porch of the houses with medium and small yards can be considered as a solid proof and a sustainable motivation to increase the employment rate of the residents, a fact that has caused such yards to be the most frequent in the fabric of Boshruyeh. The authors' assumption about the second question is as follows. The absence of a market in Boshruyeh and the barak-weaving industry and the limitation of agricultural and horticultural lands in this city indicate that the economic policy of the city in the Qajar period was based on the absence of intermediaries. This means that Boshruyeh is a manufacturing city in which the citizens have used the principle of democracy in the workplace in order to sell their products. In other words, the system of access and movement of pedestrians in passages and crossings meant not only to handle citizens' movements but also to provide a space for the occurrence of and the presence of people for socio-economic events. In addition, this movement pattern has had an effect on the appearance and arrangement of architectural and urban spaces together in order to achieve a dynamic and productive economy. It is hoped that studying this valuable urban heritage, on the one hand, will furnish an archaeological understanding of this historical-cultural texture (an objective motivated by the dynamics of the structure, socio-economic dignity, the development of its physical qualities and social interactions) and provide solutions necessary for its preservation. And on the other hand, it will explain the values of this cultural heritage in order to reproduce the model of contemporary urban development and protect the social and national identity.

[1]Called Korki (Kurgi or Kurgin) in local parlance, it is a thick and dense weave of goat and camel fur, used to make winter clothes, and have special and unique features such as strength, softness, warmth, and healing properties.

[2]Behavioral economy is a knowledge based on a psychological point of view and is obtained from the connection of economics and psychology (Rahbar *et al*, 2013: 134). It includes two concepts of utility and economic rationality. The concept of utility is the satisfaction of the consumer from the consumption of goods and services (i.e. everything that satisfies human needs and desires). Economic rationality is a process (Faraji, 2011: 79). Based on rational behavior, in fact, choice, decision-making and will are the steps before the occurrence of the action, and it is in the framework of achieving the desired benefit for the members of the society. For more details, see Cartwright 2019.

[3]Efficiency is a concept that evaluates the cost of resources spent in the process of achieving a goal. Thus, the comparison of the obtained outputs with the consumed inputs determines the level of efficiency. In order to measure the cost efficiency of providing human resources, the cost of using equipment, maintenance of facilities, and the rate of return on investment and the like are considered (Rezaeian, 2007: 261).

[4]Balance sheet is the financial statement that specifies the amount of assets, liabilities and financial capital.

[5]It was a niche-like depression in the wall of the winter porch of the houses in Boshruyeh, used for weaving barak fabrics by the residents.

History of Research

The history of the pertinent studies can be reviewed from two perspectives. The first is the field of urban economy. Economics is the study of resource allocation, and since all economic phenomena occur within a geographical space, urban economy studies the allocation of resources in urban distances. Other branches of economics ignore the aspects of spatial relations (distance) in people's decision-making. But, the urban economy does not only consider the aspects of spatial relations but also takes into consideration the underlying motivations for the establishment of the companies that cause the emergence and development of cities[1]. In other words, the starting point of urban economics as a scientific discipline might be found in a theoretical expression in William Alonso's book Land Location and Use (Hadi Zonuz, 2009: 6). The monocentric[2] (nuclear) city conceptualized by Alonso (1964) was the first conceptual model of urban spatial structure that has been widely used to analyze the spatial organization of cities. The hypothesis of the monocentric city model is based on the ideas of Alonso (1964), Richard Muth (1969) and Edward Mills (1979) who worked on the density gradient program of urban areas (Lin *et al,* 2012: 2). This theory is at odds with neoclassical economics[3] , because it takes into account the spatial relations between people and companies (store, market, etc.). On the other hand, the origin of the urban economy goes back to the theory of location selection[4], by von Thünen, Christaller, and Losch, which they used to "explain the structure and function of the economy of the land" (Latifi, 2009: 104) . The theory "has been addressed to the distribution of cities and the relationship between cities and the shopping areas between them" as follows (Hosseinzadeh Dalir, 2001: 61). Therefore, this theory can be considered as the beginning of spatial economy analysis[5]. In addition, at the end of the 20th century, the development of spatial analysis

[1]For further details, see Safaeipour 2019.

[2]Monocentric city theory: This model considers city as a circular area with a central commercial area where all businesses are located (Alonso, 1964: 12), whose residents commute to the central commercial area in which they produce some goods. Housing production is the only production activity that occurs outside the central business sector (Brueckner, 1979: 444).

[3]Neoclassical economics is one of the branches of economics and includes the branch of marginalist economics and neoclassical economics. Since their analytical focus was mainly on ultimate principles (such as ultimate utility, ultimate production, and etc.), they were called marginalists or ultimateists. On the other hand, because their theories and analyzes in many cases led to the same implications and results as classical economists, they were called neoclassical. Neoclassical economics is an approach to economics in which the production, consumption and valuation (pricing) of goods and services is observed based on the supply and demand model. According to this line of thinking, the value of a good or service is determined by the assumed maximization of utility by income-constrained individuals and profits by the firms that face production costs and employ available information and factors of production. This approach is often justified by appealing to the theory of rational behavior (Campus, 1987: 323).

[4]Location theories: With the development of industries and economic and social consequences, location theories were presented in order to increase the productivity of industrial activities and reduce the negative effects and economic losses (Shamsaei Zafarghandi, 2015: 245). Von Thünen's location theory has a direct relationship between the land use pattern and the population of agricultural goods and their production cost, and one of the important factors determining the cost of producing different goods is the distance from the production site to the sales center (Papeli Yazdi and Rajabi Sanajerdi, 2002: 181). Christalie's location theory describes and explains the spatial organization of settlements and its influence basin. In this theory, the two factors of "the threshold of goods and services and the limited market of selling goods and services", and "the transportation cost" are central (Nematallahi *et al*, 2018: 8). This theory is mostly used in relation to the commercial activities and hierarchical policies of cities and villages and processes, such as market, and transportation of goods (Papeli Yazdi and Rajabi Sanajerdi, 2002: 185). August Lösch's location theory, called the theory of the economic space of cities, was expressed in the expansion and modification of Crystaller's theory. Lösch believed that there is a relationship between the price curve and the demand curve, and this relationship expresses the field of action and the radiance of the urban market that can supply products to its downstream units. Therefore, the action field of the city market in relation to other nearby markets can be shown in different forms and the attraction field of two location centers can be shown as two circles far from each other. Also, the law of the least effort is also suggested by Lösch. Based on this principle, when the issue of motion is stated, people tend to choose the position that takes the least effort and can be measured by measures of cost, energy and time. For example, the principle of the least effort is for people to shop at the nearest mall. Lösch evaluated his location theory according to demand and presented it in location equations (Papeli Yazdi and Rajabi Sanajerdi, 2002: 196).

[5]Spatial Economics is the study of how space (distance) affects economic behavior. In other words, the theory of spatial economy deals with the spatial arrangement of economic activities according to the geographical distribution of data and institutions and changes in cost and price (Johnstin *et al.* 1998: 576). For further details, see Manafi Azar and Jalalian 2015).

models and methods, such as space syntax (space layout), opened a new arena in the field of urban studies and research, which began to describe the morphology of cities based on the dynamics of urban space configuration. This model credits the spatial order governing the city to the socio-economic characteristics of the city space. Adopting a syntactic[1] approach to urban spaces, Hillier and Julian Hanson in their volume The Social Logic of Space written in 1984 presented maps of the economic, social and ideological relations between residents of such spaces (Hillier and Hanson 1998). Here, they proposed the theory of "natural movement" and "movement economy" (Narvaez *et al,* 2012: 295), and the movement pattern is the most important factor in the formation of urban network space configuration, considered as the foundation of human perception of the urban space. In the meantime, various factors have been involved in creating these attributes, including the distribution of uses (activities attracting movement) and residential areas (activities not related to movement), which are less important in creating the configuration of the space (Hillier *et al*, 1993: 30).

The second perspective concerns the studies that so have far been conducted on the city of Boshruyeh, and have been published as theses, dissertations. These mostly contain the architectural and urban planning data that are outlined in Table 1.

Table. 1: *An outline of the available literature*

Researcher	Title	Comments
Zabihi and Shaker Ardakani 2012	A hypothesis on the historical evolution of the city by investigating the topography of the courtyards of the buildings using the GIS, a case study of Boshruyeh City	The researchers studied the morphology of the city, based on the typology and chronology of the architectural works, especially the dimensions of the courtyards, as well as the progress and delay of the buildings' construction, and the factors involved in the formation of the internal system of the city and the relationships that govern it are caused by the economic, social and cultural, taking advantage of favorable climatic and geographic conditions, regulating environmental conditions, orientation of buildings in the Qibla direction, creating functional continuity in buildings, placing buildings in lands with special and sloping topography have considered the presence of fences.
Sharifi Kazemi *et al*. 2015	Understanding the physical structure and function of the Qajar period castles in Boshruyeh City	Researchers have identified the agricultural boom as the cause of economic growth, increase in population and wealth in the region. In order to protect their property and capital, the residents have started to build and use the defensive architecture model and build castles and guard forts. Despite of the use of eco-friendly materials, the physical space of the castles was not in accordance with the model of castles in other regions of Iran. The reason was the lack of help from the central government in their construction and the payment of costs and construction by the residents of the region (public ownership). Yet, the spatial structure of the castles is strong and capable of protection.

[1]Syntax is the science of semiotics and semantics. In general, the word syntax in literature means the order of words in a sentence. The closeness of the lexical root of the word syntax to the syntactic aspect of semiotics indicates the subject's closeness to literary principles, linguistics and semiotics (Memamarian, 2002: 75).

Madahi and Memarian 2019	Reading the Link of Spatial Organization of House and Lifestyle in Vernacular Architecture (Case Study: Boshruyeh)	Using the indicators of connection, integration, control, depth and selection in the theory of space syntax and the use of questionnaires, they have investigated the pattern of houses in the city from the Safavid period to today, and the results of the comparisons and analyzes show that in the Safavid, Qajar and early Pahlavi period, patterns and ways of organizing spaces had continuity. But at the end of the Pahlavi period, the spatial configuration of houses underwent changes. Researchers have considered these changes as a result of changes in the lifestyle and the emergence of new needs of the residents of the houses.
Madahi *et al*. 2017	A Formal Analysis of Houses in Vernacular Architecture of Khorasan; Case Study: Boshruyeh City in Pre-Pahlavi Period	The historical houses of Boshruyeh have been divided according to the spatial types and have achieved a pattern and diagram of the connection between the space, which is more or less constant in the houses of the city. In addition, to check the influence of culture on this spatial pattern, researchers have used questionnaires and interviews. The results showed that the native culture and local climate were the most important factors in the formation of the fabric and the spatial organization of the houses in the city. Until the Pahlavi period, the houses had a single pattern in terms of mass and space placement system, and the yard as the main organization of spaces has given identity to the fabric of Boshruyeh City
Kavian and Gholami 2015	Factory or work and home; Investigating the concept of work and production in the formation of historical Iranian houses in Boshruyeh	Looking at livelihood and culture, they have examined the spatial organization of the city's houses. The existence of a barak-weaving niche in the porch of the small houses and its absence in the large houses indicates the existence of differences in the occupational and family system in the houses of this city, which has caused the houses to be the production units and at these houses, labor and life is mixed.
Soleimani Robati 2010	Studying the remaining architectural works from the Islamic era in Boshruyeh County	The researcher studied the pattern of architecture and urban development, the materials and decorations related to them, and also examined the age of the architectural works and the subsistence of the cities of the county in chronological order.
Mahdavi Khah 2012	Reviving the historical texture of Boshruyeh city Mian Deh neighborhood	The researcher has described and measured the neighborhood of Mian Deh. For example, he has reviewed factors such as building quality, usage, ownership, renovation, access, traffic volume on the roads, and then he has provided solutions to revive this historical context.

Saeedipour 2013	Review of traditional architecture of Boshruyeh	The architectural researcher of this city considered it a manifestation of the architecture of Khorasan, Yazd, and Kerman and considered its origin to be the migration of architects and residents from the mentioned cities. In addition, this researcher considered the issue of water and arable land to be the most important factor in the formation of this city, which caused the gathering of people from the surrounding cities and villages, an observation that he considered to be one of the reasons for the emergence of different customs and the expansion and development of Boshruyeh City.
Heshmati 2016	A residential complex with the aim of improving the life quality of the residents using the traditional native architectural model of Boshruyeh City	In order to provide suitable ideograms and theoretical foundations for the design of today's houses, the spaces of historical houses from the Timurid and Safavid periods were examined. Culture, values, lifestyle and activity system were considered to be the influencing factors on the spatial pattern of city's houses. Using the scheme of the central courtyard and the garden, the four-row plan, Sabat and considering the observance of hierarchy were considered as good solutions for designing suitable housing for today's life.
Salimi 2016	Analyzing the non-fulfillment of development plans in the dilapidated fabric and providing solutions and design in line with their realization (case study of the southern zone of the approved area of the dilapidated fabric of the historical city of Boshruyeh)	The researcher has investigated the inefficient structure of Boshruyeh City and the factors influencing the creation of this structure, and then a solution and plan were provided for the modernization of this worn-out structure.
Memariani 2017	Climatic reading of building exponential shells in native-traditional houses in order to provide models for today's housing using parametric architecture, a case example: the area of worn-out texture of Boshruyeh city	In order to interact between the energy behavior in the building wall and provide thermal comfort for the residents with the aim of increasing architectural quality of the new houses in Boshruyeh, two factors of radiation angles and the direction of radiation on the external shell of Boshruyeh 's vernacular architecture have been set as criteria, and the houses of the city are classified into 4 groups based on the location of the mass and yard, and then, using digital architecture and parametric-algorithmic design, investigated the amount of changes in the openings compared to the walls and porches to determine the best state with the highest level of comfort. The results show the importance and role of the porch in increasing thermal comfort and maintaining balance in the houses of Boshruyeh city.

Research Method

In this descriptive-analytical research, a part of the theoretical information was collected through library study using the findings and documents of the local cultural heritage office, the report of the documentation of the cultural-historical fabric of Boshruyeh City. The descriptive-analytical part was based on the theory of space syntax, using two quantitative guidelines (mathematical relationship of space syntax indicators) and qualitative map pattern of space syntax existing in it, to the description and development of the common methodology in the spatial configuration of Boshruyeh City which reflects the urban economy and the structure of the city space in the Qajar era. In the meantime, to show the model of the relationship between the variables and data analysis, the UCL Depth Map software and analysis of the segment map of the city, emphasizing the metric radius and combining and normal weighting of two integration[1] and choice indices, have been used.

The Operational Model of the Research

In the first step, in order to obtain the map of Boshruyeh city, first, the city map was drawn in AutoCAD based on the aerial photo of the city in 1959 AD.

In the second step, in order to represent the spatial network governing the city of Boshruyeh in the Qajar era using the space layout approach, first the axial map of the city based on its AutoCAD file was prepared in the UCL Depth MAP. This map explains the structure of urban open spaces and emphasizes the way of human movement rather than the occupation of space by humans.

In the third stage, converting the axial map of the city into multi-segment maps and analyzing these maps in the software based on the integration and choice indices, as well as the combination and weighting of these indices in order to analyze the relationship between the space configuration and its relationship with the urban spatial structure that responds to the socio-economic behaviors based on human habits in the city, have been discussed.

Theoretical Foundations

Space Syntax Theory

Space syntax is a paradigm based on the spatial configuration analysis in formalism in the direction of understanding the architectural form in line with the reading of the potential power of the form, which is the contact point between the mass and space, and represents the quality and essence of space and is responsible for controlling and accepting the performance of architectural phenomena. On the other hand, the space syntax is a theory in the direction of reading the invisible systems in the spatial structure of the city, which are the factors of the spatial social logic and in the form of the contextualism perspective, in the direction of understanding the city and the relationship between human institutions and society interpreting the city as the context of physical, historical, social and cultural events of the people living in a society. Space syntax is a model for rereading and deciphering the intertextual relationships in the countless layers of form and meaning of architectural works in the city context, which similar to a word inside a text and continuously with other words, causes the emergence of a new text regarding the previous text. This means that the city is a discourse resulting from connected and adjacent architectural spaces and the composition of new spaces and social relations between spaces. These connections reflect the hidden biological pattern of the form which is the same as the social relations of the space and the body of a building. They are the same as the typology of the space, organized by the visual and movement behavior of the residents and users of the spaces. The use of the space syntax method became popular in the Bartlett School in England in the early seventies and was first proposed by Bill Hillier, Julian Hansin and Steadman (Narvaez *et al*, 2012:297). Born in 1984 in Hillier and Hanson's Social Logic of Space, it aimed to change the belief that knowledge must be produced first in scientific and academic disciplines and then used in applied sciences (Hillier and Hanson, 1998). This theory considers the main structure of the city to be a directional movement system of human movement in space (Jamshidi and Mokhtarzadeh, 2011: 79), which requires the existence of a two-way relationship between the

[1]Integration is one of the direct variables of space syntax theory. This word has been translated in European languages. It means involvement and participation in society, while the term (integration) is used in Persian literature in the sense of one's tribe (Dehkhoda 1998) and two or more people who are related to each other (Omid 1996). Therefore, according to the meaning of "integration" in the syntax of space, the terms "cohesion, interdependence" has the most semantic affinity with this word

urban space and the social and cultural patterns governing the city space (Hillier and Hanson 1998). The theory of space syntax has been able to predict the amount of pedestrian traffic in urban spaces using the concept of the integration radius. On the other hand, the integration degree of a node is related to the use amount of that node or the pedestrian crossing in that node; this is a criterion to measure the amount of "movement potential" at city level (Hillier and Pen 2003). In other words, the existence of a direct relationship between the two concepts of connection and movement potential means that the space is desirable for the users of the space. Along with the movement potential, Hillier proposes the concept of "natural movement" and interprets the spatial configuration based on pedestrian movement in the city. According to Hillier, the most important factor in guiding pedestrians in the city is spatial configuration, and other factors such as spatial attractions and land use are less important. On the one hand, in the spatial configuration, the pattern guides the movement in the city and spatial attractions and uses are located in the city based on this movement. On the other, spatial configuration can affect both movement and spatial attractions, while it cannot be affected by them. But, movement and space attractions can affect each other (Hillier *et al*, 1993: 31). The concept of the "economy of movement" is mentioned to supplement the theory of natural movement and expresses the effect of the flow of movement on the pattern of syntax and contiguity of uses next to each other; after the formation of the use patterns in the urban network, the movement flow causes the intensification of natural movement in the city. This increased rate of pedestrian movement will organize the urban pattern (Hillier and Hanson 1998). In order to understand the relationship between space and activity in the city, we divide the city into two parts: the theory of space syntax in urban studies and the body or physical city which includes a set of artificial environments and open spaces and the social city consisting of all activities, classified socially and based on the perspective of urban studies. One is the context and the other is the background. Hillier and Vaughan visualize the city as an essence and consider the social essence of the city as the motivation for the creation of the body of urban spaces. On the other hand, you also confirm the existence of a two-way relationship between both parts of the city, making the idea of "the city as an essence" understandable (Vaughan , 2007: 2). Therefore, based on the three theories of natural movement, movement economy, and the city as a unit, the three concepts of spatial structure (spatial configuration), the movement patterns, and distribution of units are interdependent (Alper, 2009: 21). Movement is a factor for the presence of community members together (Marcus and Legeby 2012: 2), formed by the spatial structure. The spatial structure also affects the land use pattern (Alper, 2009: 21). It should be noted that space syntax is not a software but an analytical method, and that the analysis of this technique is done in the software. A well-known software used for this analysis is the Depth Map. Thus, as a multimedia platform, the software shows urban and architectural spaces in the form of convex and axial spaces, dividing networks of passages and visual movement channels (Isovist) and then processing it based on graph theory. The output received from this program is graphic and numerical data that analyzes different spatial values with a special algorithm. In this way, the intersection of both lines with each other indicates high spatial connectivity and access, and shows the specific role of each space in expanding the spatial structure of the city; also, convex maps show the reduction of spatial complexity and the close connection of spaces and visual maps of space dynamics. On the other hand, in order to infer and represent the spatial structure that responds to the social behaviors based on human habits, the method of modeling correlations between variables can be used in this software.

Space Syntax Variables

Axial Map Analysis: Among the analytical methods, axial map analyses are widely accepted in urban system studies. Urban and architectural systems are obtained by extracting a network of axial lines from among all the convex spaces of the system. The axial line is like a string of rosaries that brings all the visible spaces (convex space) into a perceptual order in one direction (Abbaszadegan, 2003: 68). It is usually used for axial analysis and is used instead of convex analysis, because it is a description of movement instead of how humans occupy space (Hillier *et al*, 1993: 28).

Multi-Segment Maps: In general, the analysis of a grid system of spaces depends on calculating the relationship of each component with all other components of the network. Therefore, in an axis

map, it is necessary to evaluate the relationship (distance) of each axis with all other axes of the system. Here, there is a problem. In the early calculations on the pivot map, distance was calculated as the number of times the pedestrian had to change his/her axis along the route. In this way, it is not clear which parts of an axis are used the most and there was also a lot of evidence that our perception of distance is highly adapted to topological and geometric factors. That is, people use a geometric (angular) system to determine their path. In large urban scales, instead of choosing the shortest path, every person tries to minimize the deviation angle of his path to his destination. To solve this problem, a new version of the linear analysis method was invented. In this method, each axis is divided into the sections between intersections. These segments are considered as graph nodes and their connecting points are considered as graph connections. This technique is well-equipped in predicting how people move in the street network. Using different definitions of distance, like the shortest path (metric), minimum angle change (geometric) and minimum path change (topological) in the radii with the same definitions of distance, the relationship between each part is measured with other parts. As a result, one can have various interpretations of an urban network (Vaughan, 2007: 8). This analysis emphasizes the radius metric (the physical grid distance that takes into account the turns that may be calculated for each street component) (Al-Seyed *et al*, 2014:170). This radius means that the pedestrian will cover this distance in a few minutes and what is the flow of movement in this direction.

Integration: Integration is the main concept of space syntax which is developed based on space layout. The integration value of each line (space) is the average number of intermediate lines (spaces) from which it is possible to reach all the spaces of the city. In other words, that is the average number of changes of direction from which reaching all the spaces of the city is possible. Therefore, in the space syntax, integration has a relational concept and is not a metrical distance concept (Abbaszadegan *et al*, 2013: 50). The integration degree of a node is related to the use amount of that node or the pedestrian crossing amount in that node, to the extent that this criterion is known as the movement potential (Ramazani and Dadgar, 2017: 44).

Choice: It is a general measure of the flow amount in a space. In fact, a space has a high amount of choice when a large number of the shortest connecting paths pass through that space. The choice value for a node is high when the shortest paths between any two nodes in the system pass through the desired node. In other words, if the probability of using a space in traveling the shortest routes between any two possible spaces in the entire urban system is high, the choice value of this space is higher. The spaces whose choice value is high are usually the spaces that are likely to be used more to reach the most interconnected spaces (Hashemi Yazdi, 2012: 62).

The Formula of Combining Two Integration and Choice Indices in Multi-Segment Maps

(Value (T1024Integration Rxxx metric"))*(log (Value (T1024 Choice Rxxx metric")) +2))

Normal Weighting Formula of Two Integration and Choice Indices in Multi-Segment Maps

T1024 Choice [T1024 Integration Wgt] Rxxx metric

Study Area

Geographical Location of Boshruyeh City

Boshruyeh is a county of South Khorasan Province. The county is bordered by Bajestan city to the north and northeast, Ferdous to the east, Sarayan to the southeast, Tabas to the south (Dihok district), Central District of Tabas to the west, Dastgardan District of Tabas to the northwest. , and includes two urban centers (Boshruyeh and Eresk) and four rural districts (Ali Jamal, Karand, Raqqa, Eresk). From a geographical point of view, the county consists of two areas of heterogeneous biological pattern.

The first is the mountainous part with a small and narrow area, including the Shotori mountain range, which includes narrow plains and intermountain valleys. The second is a wide area of deserts and sand dunes in the north, south and east, which respectively include the Namak Desert, Lut Desert and hillocks, which are located in the form of huge volcanic formations in southern and eastern Boshruyeh. Boshruyeh City is located at 33°52'N and 57°27'E in a namesake plain and is hemmed in by Kavir-e Namak (the Great Salt Desert) to the north and Dasht-e-Lut (Lut Desert) to the south (Figure. 1).

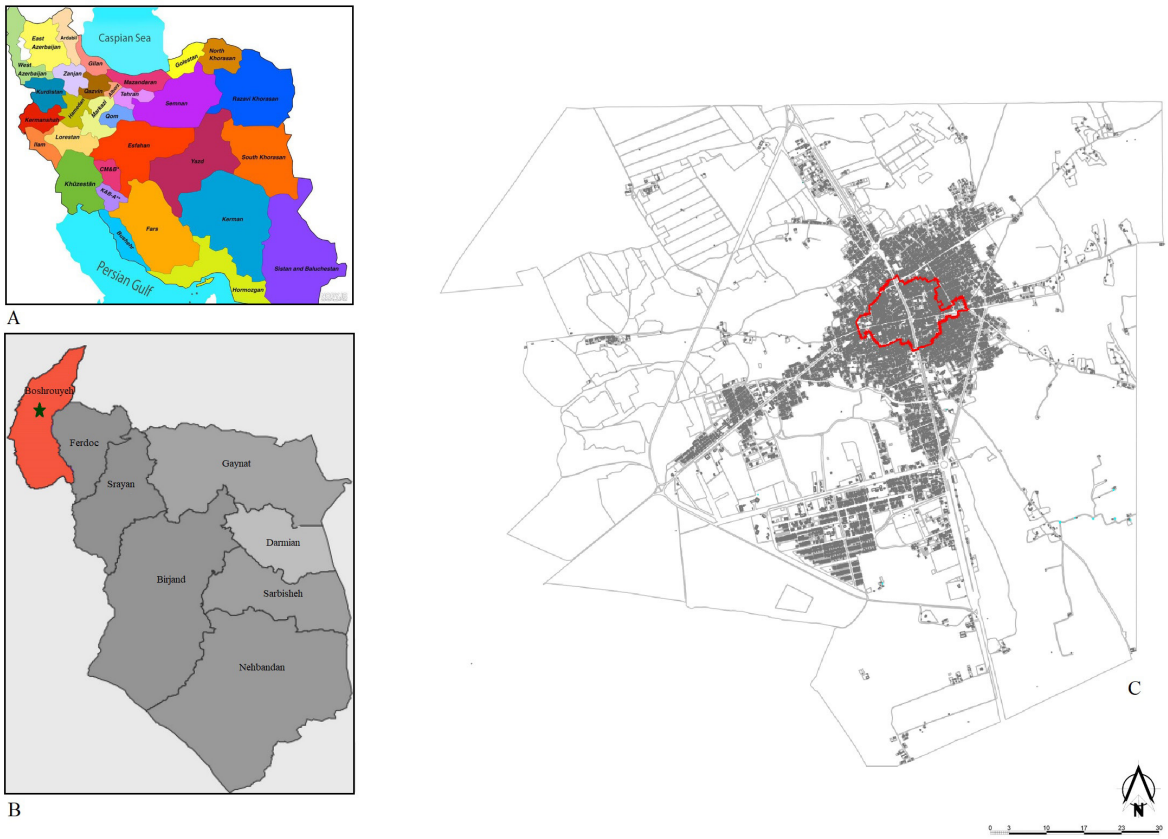


Figure. 1: *(A). The location of South Khorasan Province, (B). Boshruyeh city, (C). Boshruyeh Town (After: South Khorasan Cultural Heritage, Tourism, and handicrafts Directorate)*

Boshruyeh City in Historical Sources

Historical and archeological evidence credit the earliest settlement in the Boshruyeh plain to the village of Raqqa[1]. Ahsan al-Taqasim fi Ma'rifat al-Aghalim (Mogadasi, 1982: 437), Surat al-Arz[2] (Ibn Hoqal 1966: 31), and Nasir Khusraw's travel account (Qobadiani Marvzi, 1962: 141) are the oldest sources that make references to the settlement of Raqqa in the fourth century AH, while they do not mention the name Boshruyeh. While there is not much knowledge about the historical origin of Boshruyeh, the historical and geographical sources of the middle Islamic centuries provide useful information about the state of the city. Assumptions of the books I am Timur the world Conqueror (Brion, 1981: 49–78) and the geography of Hafez-e Abru (Heravi, 1970: 28–36) suggest that Boshruyeh was not a particularly important city during the Timurid period, but rather it was a newly established and small population center that emerged from the annexation of the residents of the regional villages, and the subsistence of the city was based on the barak-weaving industry. Also, in order

[1]One of the historical villages of Boshruyeh City in South Khorasan province which is located 17 km from the center of Boshruyeh city and 15 km from Ersak district.

[2]In the book Surat al-Arz, there is no name of Raqqa Village; but, there is only one map under the name of Raqqa, which shows the communication route between Qahestan state in the Ilkhanid era and the provinces and oases around it (Ibn Hoqal, 1966: 25). Based on the above map, Raqqa was located on the important transportation and trade routes such as Silk Road, Khorasan Road (Janghariyeh) and India's trade route. This shows that the studied area from the strategic view point had the necessary potential for business in different historical periods and the reason for the relocation of Raqqa village to the current location of Boshruyeh city was due to other reasons. Due to being on the communication route of Great Khorasan in the Timurid era (Le Strange 1985) and the Safavid era (Savory 1984; Chardin 1985), as well as the religious policy of the Safavids, the spread of Shia culture, (the development of religious places such as Imam Reza's shrine), Boshruyeh City was the reason for the construction of caravanserais and guide poles on the way to Khorasan, leading to the development of the roads and economic prosperity (pilgrims). In the Qajar era (Abbott 2010), citing political issues and the division of Iran into three regions, roads assumed a role beyond trade and commerce

to procure water for drinking and irrigation, the people had to resort to underground water resources of the Boshruyeh desert. It should be mentioned that the main well, the Kariz of Boshruyeh, is located in the mountainous areas. However, the outlets of aqueducts are located both on the low slopes of the plain and in the mountainous areas. On the other hand, the route of the aqueducts and water mills of Boshruyeh almost coincide. Riaz al-Ulama va Hayaz al-Fozala (Isfahani, 1983: 237–239), includes biographies of scholars, especially those of Mulla Abdullah Tony Boshravi and his brother Mulla Ahmad, who living in the Safavid period were from Boshruyeh. The frequency of the name of the city in the travelogues of the 11th and 12th centuries of the Islamic calendar bears testimony to its prosperity and stability across the region. The summary of the works like Geographical research about Iran (Gabriel, 1969: 197), a travelogue to Khorasan Province and northwestern Afghanistan (McGregor, 1987: 133–137), the travelogue of Mirza Khanlarkhan Etesam al-Molk (Khanler khan 1972: 265–266), Tarikh al-Haqayeq (Masoom Ali , Shah, 1966: 716–717) and Under the Burning Sun of Iran (Needmeyer, 1984: 121–127) speak of the hardworking population of the city, who despite the lack of land and water necessary for farming, subsisted on barak-weaving.

The Physical Features of the Historical Fabric of Boshruyeh in the Qajar Era

In the literature on the analysis of urban spaces, the term urban form can be taken a synonym for the body of the city. Lynch considers the urban form as a static reality that has a dynamic state for subsequent changes in any situation. Form and function are closely related to each other but the relationship between these two is not direct and has an intermediary called human. The form of the city needs to adapt to the activities in space and time. He considers the factors influencing the city form to be internal functions the degree of dispersion of people and the existing relationships between them (Lynch, 1988: 15). The form does not only imply emphasizing its aesthetic meaning, i.e. the external manifestation of a phenomenon, but the elements of the city form can be material or non-material, and the city form includes not only the appearance or fabric of a space, but also its activities and uses (Trieb, 1974: 69). Based on the documents at hand (aerial photo of 1956 AD), the factors involved in the formation of the physical condition of Boshruyeh are as follows. The reason behind the formation of the body of the city on a small scale is the development of houses, which had previously led to the emergence of the neighborhoods based on the economic motivations of the expansion and development of houses. This formation has been in line with the access to water resources compatible with the climate and at the macro level (city complex, location selection and continuity of main buildings, including civil, religious, service, etc.) with an attitude towards life priorities that reflect the culture and ideology of the city residents for a long time. The historical texture of Boshruyeh consists of four main neighborhoods named Moghri, Paeinmahalleh, Mian Deh, and Sarpol. These neighborhoods are girdled by a city wall locally known as Diwar-e Shahrband (possibly dating from the Zandian period) (Documenting Report, 2008: 17). The alleys in Boshruyeh neighborhoods were generally named after the predominant occupations of their residents. In addition, four gates are built around the city in the cardinal directions, namely North Gate: Godo, East Gate: Ahmad, West Gate: Bagh Ali, South Gate: Gabrestan. The gates of the city link to each other through wide and long north-south and east-west passages. These passages connect the four neighborhoods through a rectangular square, and at the same define the borders of the neighborhoods. Therefore, what stands out more than anything else in the spatial structure of Boshruyeh is the absence of a market as a backbone and a focal point as well as the prominent presence of residential units throughout the city (Figure. 2).

The Economic Environment of the Urban Context of Boshruyeh in the Qajar Era

In addition to defining its position at the regional, territorial, and even extra-territorial level, examining the performance and economic role of the city in each historical period shows the level of socio-economic development of the society in those periods. Geographical and natural factors on the route of commercial convoys, loading and port location, political situation, benefiting from advanced profession and industry and even having fertile agricultural land determine the economic status of any region or city (Hajianpour and Jokar ,2018: 2). The economic-social (political and cultural) relationships of humans are as much “temporal” or historical as they are “spatial” or

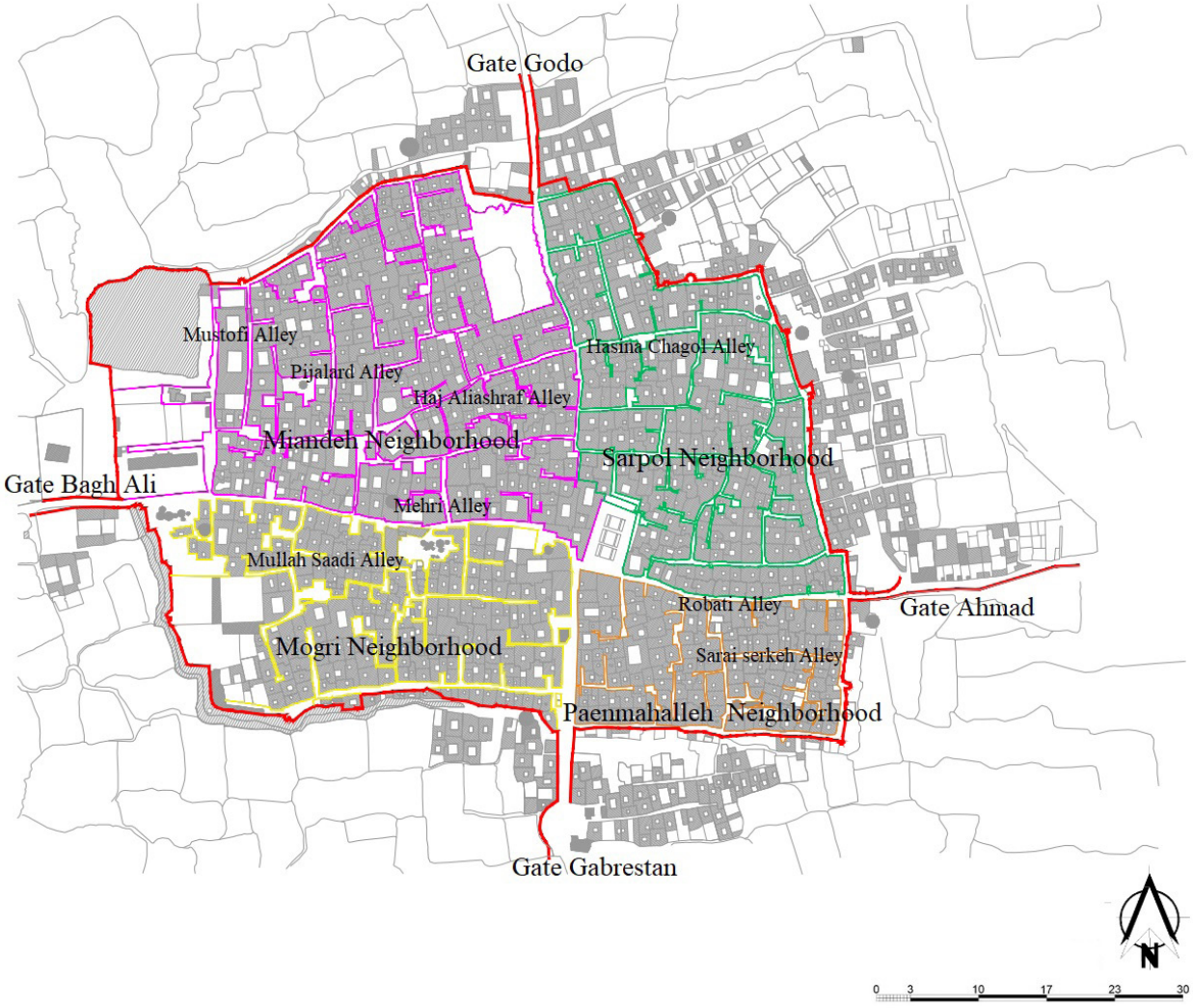


Figure. 2: *Neighborhoods, alleys and gates of Boshruyeh in the Qajar period*[1]

geographical. In fact, the space is the manifestation of economic-social relations and in turn is the foundation of their existence. From one hand, all the economic and social relations of humans have a definite manifestation and regularity in space; on the other hand, regular economic relations are established between humans regarding space, which is a factor of production (such as land) and also a consumer product (housing) (Athari, 2010: 55). The most important means of livelihood of the people in this city has been growing grains (wheat, barley) and cotton in a rainfed manner. Besides that, in order to create more comfortable conditions for the residents, they have started gardening in the surrounding villages, such as Karand and Raqqa. "The climate of Boshruyeh is suitable for fig and pomegranate to grow, but date and citrus do not grow in it. The good fruits of that region are Karand pomegranates and Jafari melons" (Documenting report, 2008: 17).It is believed that agricultural activities provided only the basic needs of the region's people and did not play a role in the accumulation of the city's wealth. On the one hand, small workshop industries play a significant role in the urban development due to their undeniable role and position in creating effective employment in cities, and on the other, due to their close connection with other economic sectors (Nasiri Hendeh Khaleh, 2009: 130). Weblien believes that small workshop industries are one of the most effective factors for achieving urban development in small cities due to the existence of homogeneous goods, mass production, and a large

[1]Maps were redrawn based on the aerial photo of 1956 AD by the authors to be read by the software.

number of enterprises (Weblien, 1989: 230). The development strategy of small workshop industries in different countries originates from the fact that urban small-scale industries are able to create more employment and income opportunities and, thus, provide a suitable platform for urban development (Nasiri Hendeh Khaleh, 2009: 130). The presence of textile workshops and barak-weaving niches at city's houses indicates the practice of producing new goods and services in line with the environmental conditions, which has resulted in gaining income and wealth for the residents of the city. "The only thing that is produced here is a type of woolen cloth called barak, which is made from goat's hair. barak is a soft and warm textile and looks very cheap. There are two types of it. The superior type is called Shamshirak, which costs 16 rupees per 18-yard square, and the coarser type is called barak, which costs 6 rupees per square. Boshruyeh has neither a market nor merchants because the produced barak is sold without intermediaries. Apart from barak, in the village of Zirak, which is located ten miles from Boshruyeh, beautiful earthenware with reliefs is produced" (McGregor, 1987: 135–136). Therefore, there have been different factors in the location of houses, with the intention of settling families in Boshruyeh City. Economic activities have been one of the most important factors in this regard. The economy in this city has had an effect on the size and dimensions of the houses and their related spaces, viz. the barak-weaving niche. Thus, the dimensions of the courtyards of the houses can be classified into 4 types based on the size: Type 1—Very large yard; Type 2—medium to large yard; Type 3—medium yard; and type 4—small yard. This means that the presence of pits in houses with medium to small yards explains the abundance and dispersion of type 3 and type 4 compared to the other two types in Boshruyeh, considering the entrepreneurship role and urban housing economy assumed by the houses (Figure. 3).

Also, access and movement indicate the occurrence of two different phenomena in Boshruyeh. On the one hand, it is an indicator for measuring access and permeability to the spatial structure of the city (physical access), and on the other hand, it shows social access and visual access in the city area. This means that the common people in every class and with every social strata are able to use the spaces and the openness in the observer's horizon has prevented the blocking of the view and created urban security for the citizens. In addition, passages and crossings have been responsible for communication between neighboring units and bringing citizens to urban infrastructures to receive facilities, as well as selling, presenting and moving manufactured products (Figure. 4). On the other hand, Boshruyeh has played the role of a line of communication between central Iran and its eastern regions throughout history (ibn Hoqal 1966; Le Strange 1985; Chardin 1985 Savory, 1984; Abbott 2010), thus the emergence of various caravanserais in different periods in this direction.

Findings

The identity and culture of urbanization includes people's interactions with the environment and the natural environment of the cities, which affects the urban landscape in long-term and has led to the emergence of authenticity and integrity in the texture and spatial structure of the cities. Citizens have always tried to improve their living conditions in order to create favorable conditions for their lives and their land. Therefore, factors such as sustainable development and progress indicators in the field of economy in order to create socio-economic justice at the level of cities have been the criteria for their actions. This point in itself has caused the permanence of cities in their institution. In this way, in order to achieve economic development with the mentioned goals, the builders of the cities have started to create responsive environments such as democratic environments[1] as well as urban spaces that suit their needs. In this way, they have used principles such as permeability, variety of space, readability, flexibility (adaptability) and visual fit. Therefore, in order to discover social behaviors regulated by human habits, which arise from the inner traits of a person and depict human activities in the context of artificial spaces, the theory of space syntax and direct variables (integration, choice) and intermediate variables (combination and normal weighting of variables) have been used in this theory. The data obtained from the multi-section

[1]Democratic environments are urban spaces consisting of two environmental and social dimensions that are organized in the context of movement behaviors. Therefore, democratic environments in urban spaces are spaces that have been formed to respond to human needs in the individual dimension and human civil life, and their task is to implement social justice under the auspices of democracy. Therefore, urban democratic spaces are somehow a part of behavioral spaces.

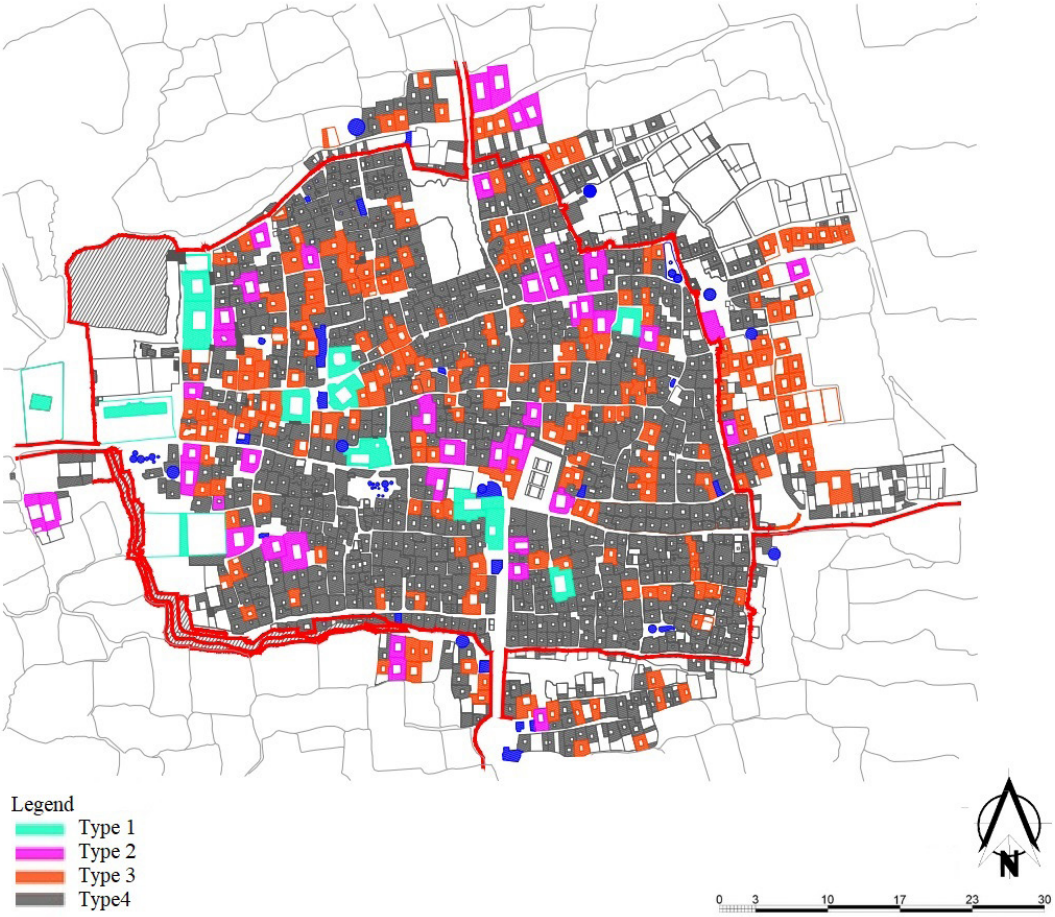


Figure. 3: *The distribution of different types of courtyards in the structure of Boshruyeh in the Qajar period*

map of the city is mathematical and graphical. In the meantime, by converting spatial data into social data, the layers of the social logic of the space behind the movement and visual characteristics of the citizens in Boshruyeh have been recovered. From metric radius in multi-section maps, the implication is the distance that pedestrians travel in 1200 meter radius, module[1] of fifteen minutes, which shows how the neighborhood units are spatially connected to each other in these radial intervals. On the other hand, graphical analysis is based on color valuation so that the indicators are read by the software based on the color tonality (from red to blue), where red color has the highest value and blue has the lowest, and gray is worthless.

Discussion

From the movement perspective, on the one hand, the city was not only a space of presence for the citizens of Boshruyeh in the Qajar era, but also the basis for the occurrence of spatial sequence, function and articulation in the entirety of the urban space. On the other hand, the passage was not only the embodiment of the mind for the inhabitants of the city, but also the space of transition from two different spatial areas in order to achieve social identity. Therefore, the spatial configuration in this city is a model for reading social-behavioral norms, shaped in the form of a movement pattern by pedestrians with the intention of moving between the origin and destination and understanding the relationships between the human self and the spaces. Numerical data (Tables. 2 and 3) obtained from two indicators of integration and choice for Boshruyeh show that the amount of these two indicators has increased with the increase of the metric radius.

[1]Module: size, pattern and equivalent to the Persian word “Pimon” in architecture.

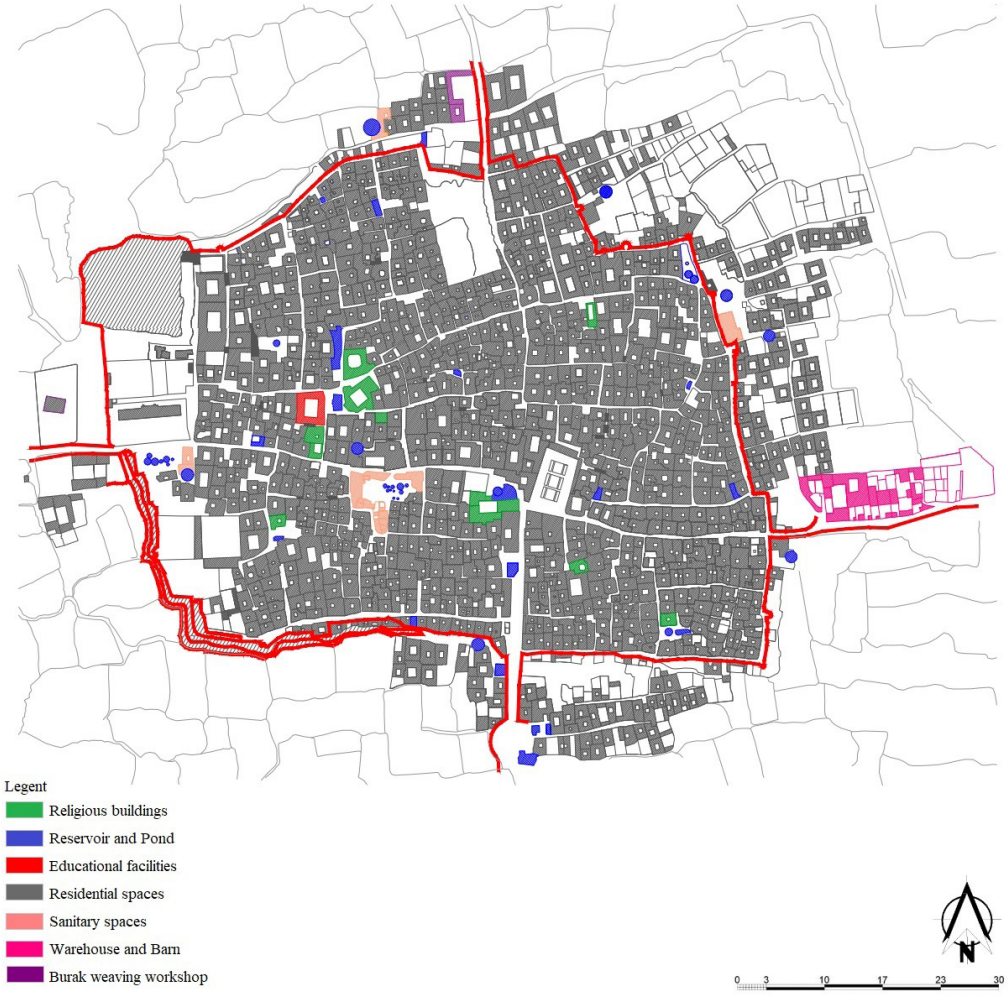


Figure. 4: *The main and secondary transportation routes, location and distribution pattern of urban infrastructures throughout Boshruyeh in the Qajar period*

Table. 2: *Numerical data, direct components (integration and choice) of the space syntax in order to read the social behavior in the structure of the urban economy of Boshruyeh in the Qajar*

Integration in metric radius	Mean	Min	Max	Choice in metric radius	Mean	Min	Max
400	10.62	2.34	76.8	400	34	2.34	10.64
1600	13.09	2.55	88.61	1600	274	2.55	13.09
2800	17.35	3.98	45.69	2800	618	3.98	17.35
4000	21.97	3.47	55.75	4000	1379	3.47	21.97
5200	27.10	3.98	68.73	5200	2617	3.98	27.10
6600	33.58	3.98	84.63	6600	5392	3.98	33.58
7800	39.60	5.60	99.42	7800	8907	5.60	39.60
9000	45.91	6.99	113.40	9000	13004	6.99	45.91
10200	52.49	6.83	125.49	10200	17754	6.83	52.49
11400	59.13	7.56	136.92	11400	23884	7.56	59.13
12600	65.97	7.56	145.23	12600	31430	7.56	65.97
N	271.98	7.56	424.19	N	1.53568e+006	7.56	271.98

Table. 3: *Numerical data of space syntax components in order to read social behavior in the structure of the urban economy of Boshruyeh in the Qajar period*

Integration and choice combination	Mean	Min	Max	Integration and choice weighting	Mean	Min	Max
400	2.98	0.3	23.11	400	266831	0	3.50603e+006
1600	10.35	0.3	71.20	1600	1.7696e+006	0	2.25134e+007
2800	19.32	0.3	122.14	2800	5.0751e+006	0	4.78348e+008
4000	28.97	0.3	166.54	4000	1.06799e+007	0	1.04389e+008
5200	39.66	0.3	216.72	5200	1.96799e+007	0	1.90685e+008
6600	53.38	0.3	285.73	6600	3.56545e+007	192	3.5049e+008
7800	66.27	1.68	354.33	7800	5.42223e+007	192	5.73298e+008
9000	79.97	2.10	242.20	9000	7.841e+007	192	8.38566e+008
10200	94.42	2.05	459.34	10200	1/08628e+008	192	1.15455e+009
11400	109.22	2.27	564.35	11400	1.45364e+008	192	1.61619e+009
12600	124.63	2.27	650.02	12600	1.90693e+008	192	2.25907e+009
N	623.03	2.27	2624.2	N	4.791e+009	192	1.20742e+011

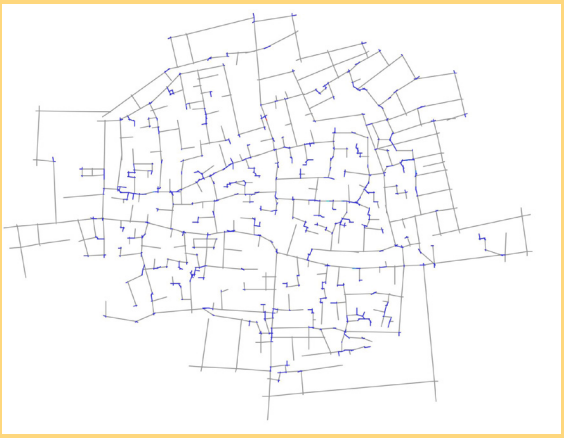
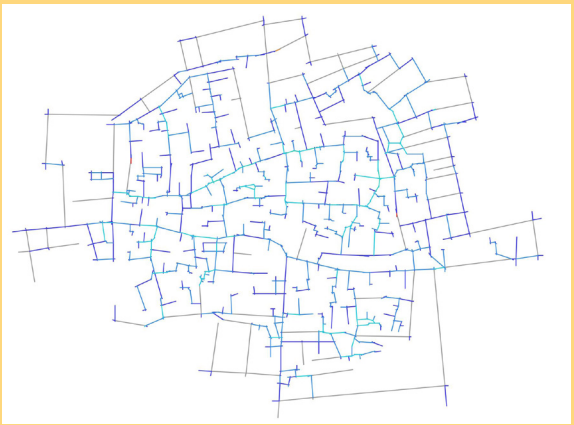
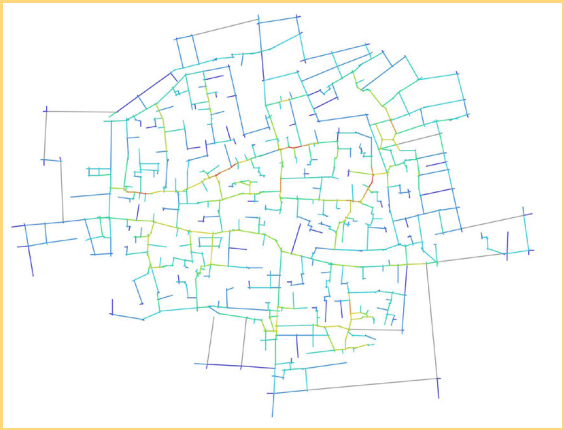
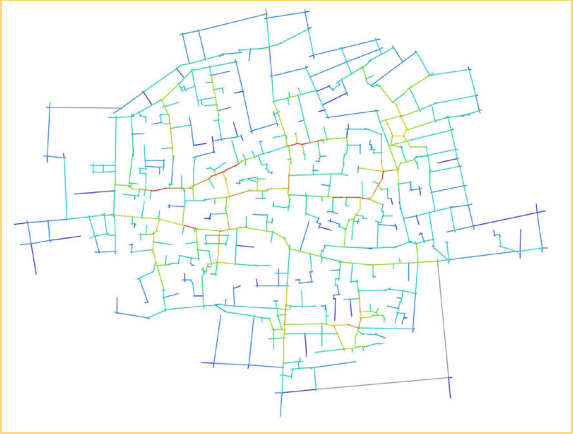
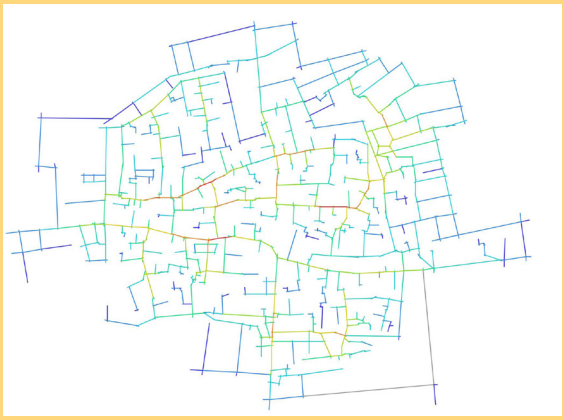
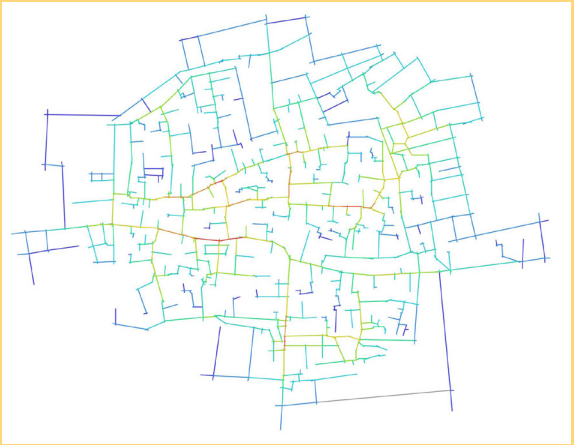
On the other hand, these two indicators are a criterion for checking the concept of movement potential ("movement to" and "movement through") in Boshruyeh. The concept of "movement to" in the city area means the easy access of citizens to reach a certain route. In other words, it is a measurement for the degree of closeness and equivalent to the integration value in the space syntax. And the concept of "moving through" in the city area means the degree of choice of a specific route from among other routes in the city. This pattern is the possibility of spatial selection and is equivalent to choice of the space syntax.

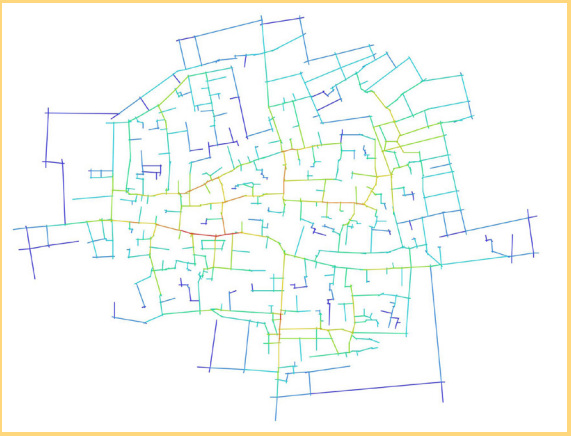
Assumptions resulting from the multi-section graphic maps (Tables 4 and 5) of the integration index show that with the increase in the metric radius, the volume of the route that citizens take in a two and a half hour period to reach their destination has increased. This article shows that there is a direct relationship between the distance traveled and the metric radius. Therefore, based on the multi-section graphic maps, the model of movement economy in the city of Boshruyeh can be interpreted in this way.

The amount of human traffic in the passages and crossings of the northern part of the city is higher than those in the southern part. This flow of footprint movement (of radius 400 to 12600) in the urban landscape of Boshruyeh shows the special importance of pedestrian spaces in this section and was formed for the purpose of special social-economic events. On the one hand, the main roads of the city (west-east and north-south) have the highest value of integration. On the other, all the roads in the city are arranged parallel to these two main roads so the amount of integration index in these roads is favorable.

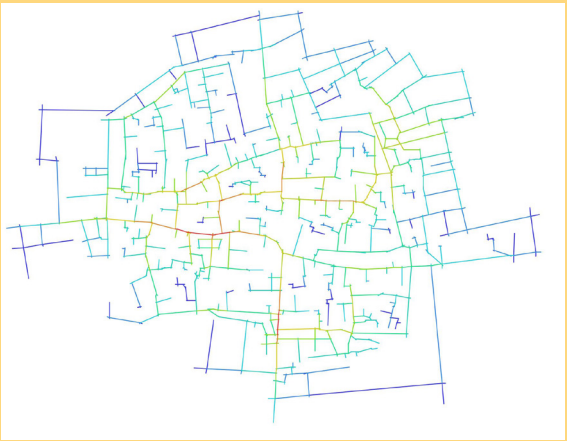
It should be noted that the level of integration index in the routes and passages that end up with urban infrastructures and the center of neighborhoods was desirable. The amount of democratic integration in some of the passages lying outside the city walls (east of Sarpol neighborhood) was also favorable. The location of these routes is vertical to the welfare infrastructure in this part of the city. On the other hand, the volume of human footprints in the southern half of the city is as follows. The main passage has kept its basic character and the horizontal (long) passages that were created parallel to this axis. The amount of integration value of the vertical paths that are located next to the welfare and religious services is desirable. Of the whole passages and crossings in the Paein Mahalleh neighborhood, the productivity of the integration index was high in two of the main passages. One was a passage running in front of Diwar-e Shahrband in this neighborhood and the other was a one extending perpendicular to the main communication (west-east) axis and perpendicular to the passage in front of the city wall. These two footpaths are a link between different parts of Boshruyeh and the inner space of Sarpol neighborhood. The graphic data in Moqari neighborhood shows the generalization of the favorable pattern of the route integration index in this neighborhood as well.

Table. 4: *Graphical data, direct components integration of space syntax for reading social behavior in the structure of the urban economy of Boshruyeh in the Qajar period*

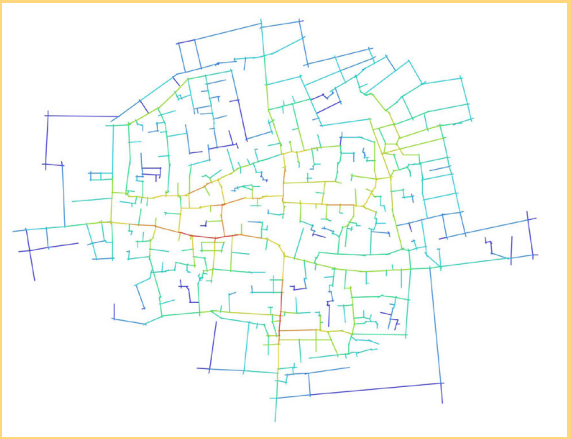
Integration in Metric Radiation	
 R:400	 R: 1600
 R:2800	 R:4000
 R: 5200	 R: 6600



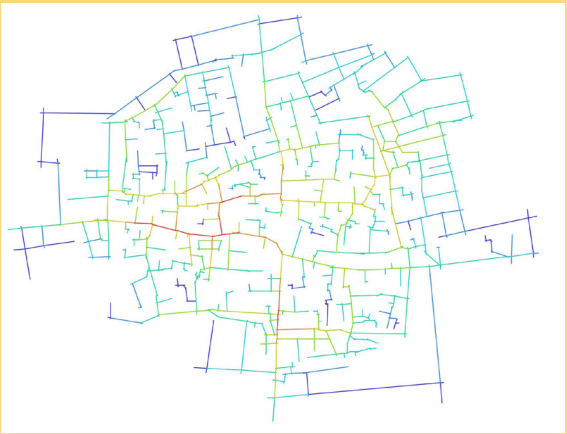
R:7800



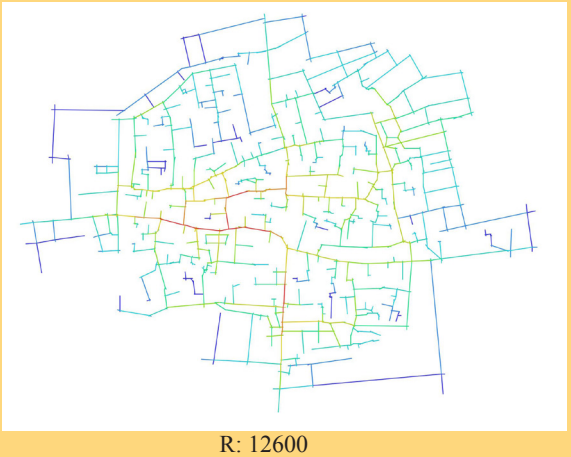
R: 9000



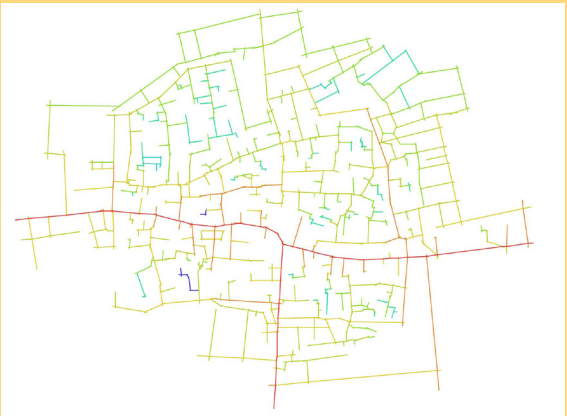
R: 10200



R: 11400

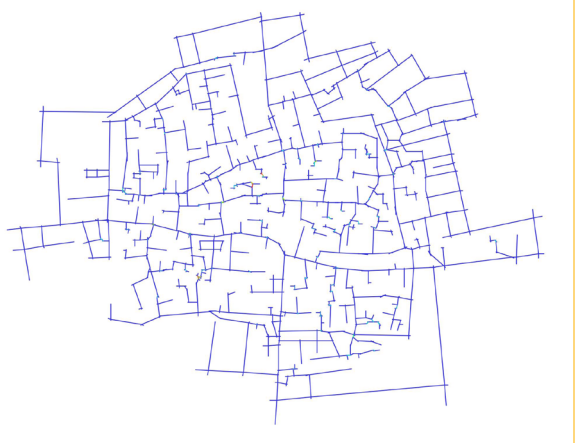
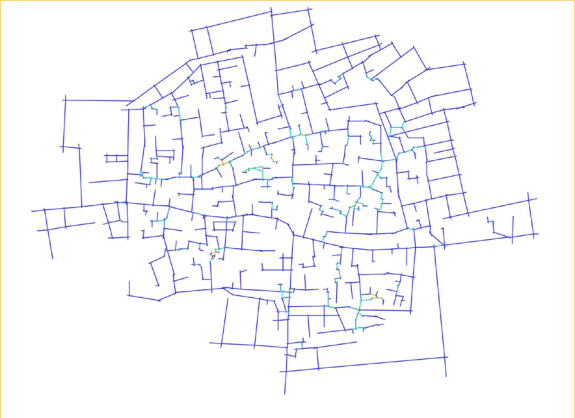
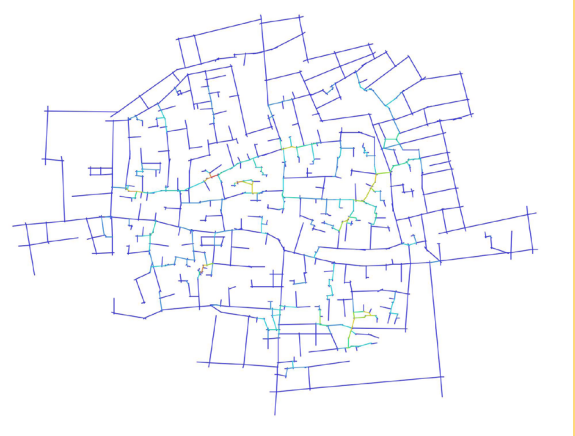
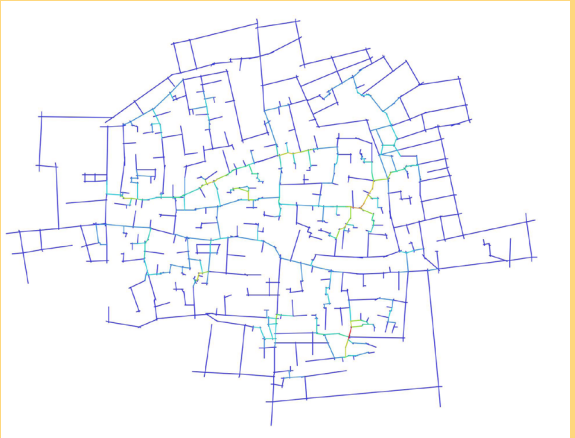
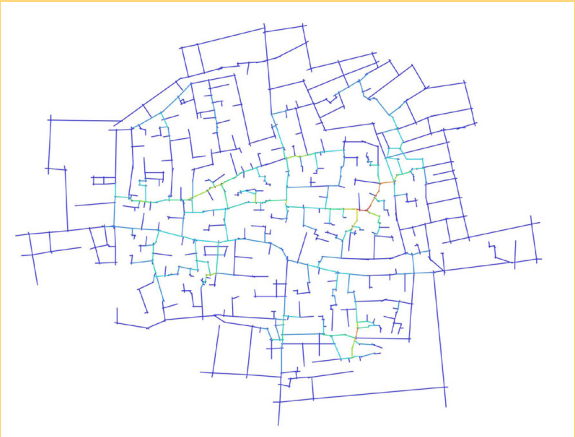


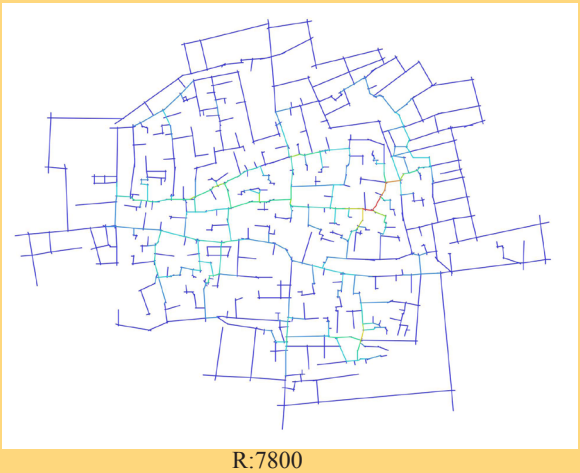
R: 12600



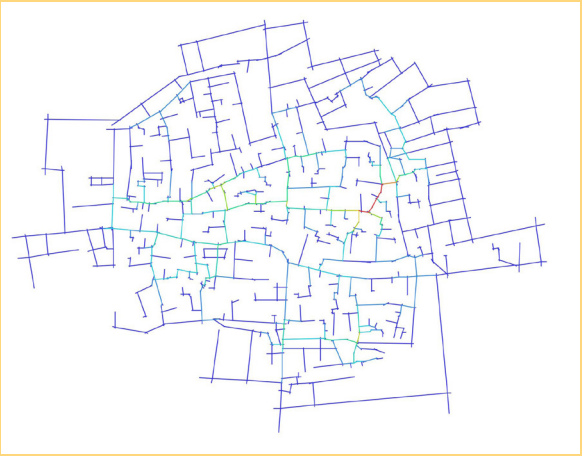
R: N

Table. 5: *Graphical data, direct components choice of space syntax for reading social behavior in the structure of the urban economy of Boshruyeh in the Qajar period*

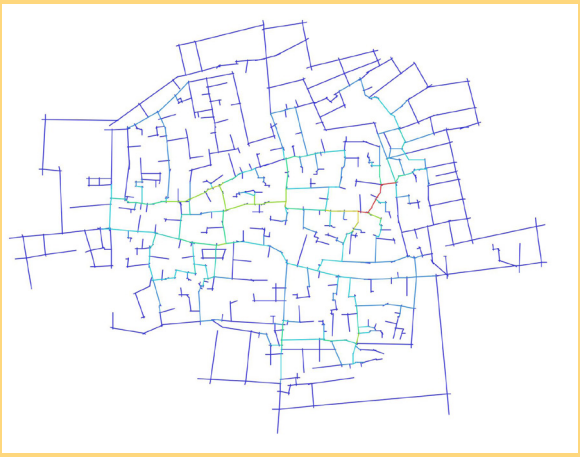
Choice in metric Radiation	
 R:400	 R: 1600
 R:2800	 R:4000
 R: 5200	 R: 6600



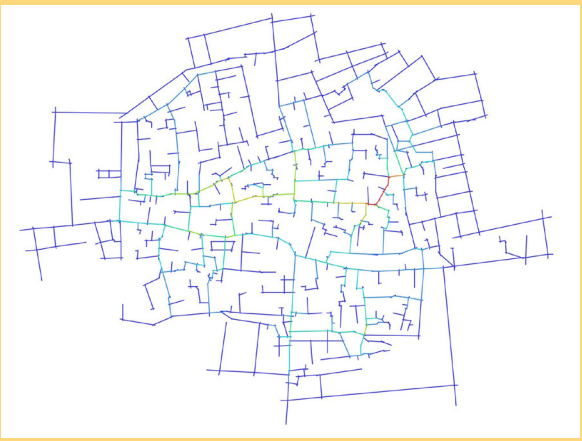
R:7800



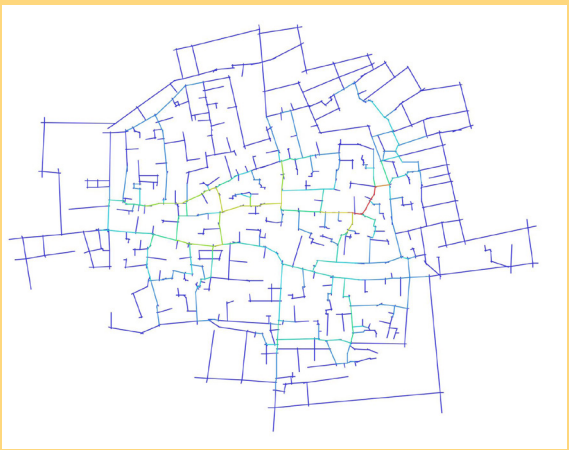
R: 9000



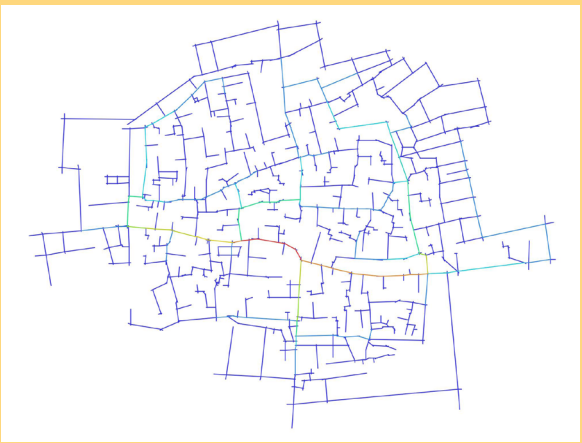
R: 10200



R: 11400



R: 12600



R: N

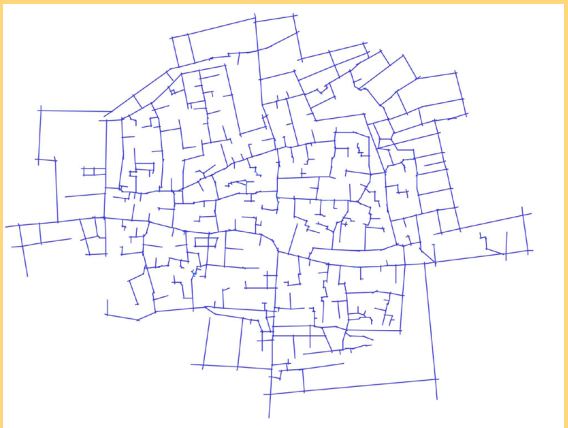
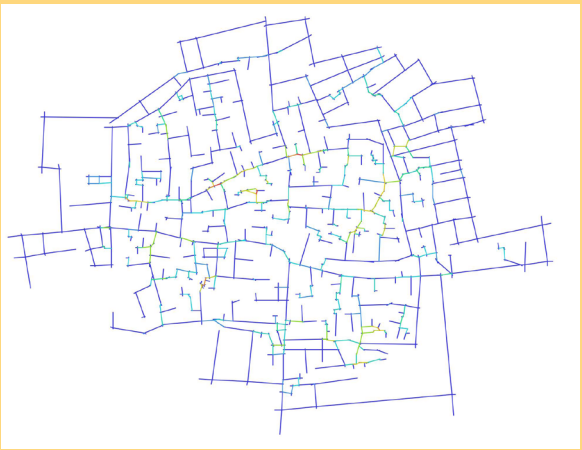
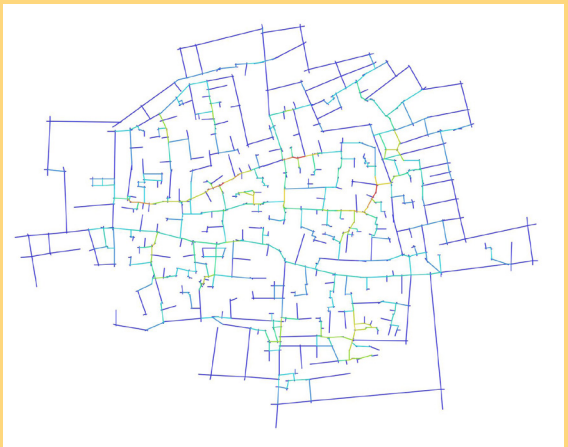
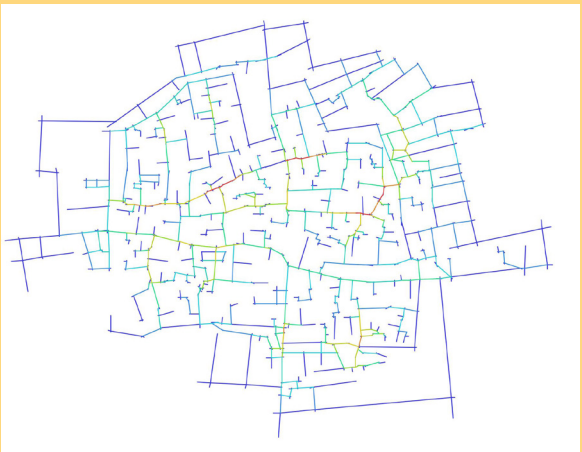
The spatial behavior of the passages in Moqari neighborhood indicates the existence of articulation in the passage network and spatial order in the paths within the neighborhood. According to the graphic data of the segment maps in the large radius, except for some passages, the main causes for the high integration index in most passages and crossings is their ending up in dead end alleys and the existence of continuity and interdependence between the structures of existing spaces in the city. This spatial behavior in the footpaths confirms the existence of integration between the spatial integrity in the city and the high rate of diversity in the accesses within the city whose reason is the social action arising from the common human life in Boshruyeh. Meanwhile, the creation of pedestrian spaces is the basis of these types of relationships and interactions, leading to the creation of integration at different levels of the city.

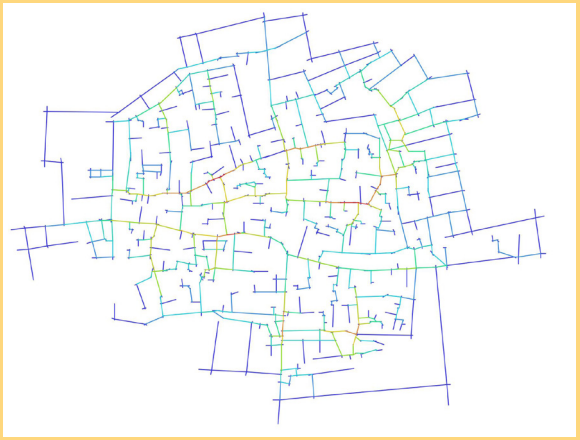
The resulting data from the graphic maps related to the choice index (Table. 5) show that increased metric radius is associated with the growth of the flow of movement in the space by the citizens. In this sense, citizens have chosen the shortest route to reach their destination from these passages. The amount of pedestrian traffic could have increased earlier in the passages and crossings of the two neighborhoods of Sarpol and Mian Deh, especially the passage that connects these two neighborhoods. The existence of such a norm in the passages and crossings of the city has been the interpretation of the role of pedestrian spaces in urban life and the development of social relations and spatial homogeneity for maintaining these relations. In addition, in the communication path between the neighborhoods, the passage that is perpendicular to this path, the communication drive of this passage with the urban open space in the north of the city (north-south axis), the choice index is high. Besides, the main thoroughfare of our city (west-east) is located in two parts of the city and has a high ability to be chosen by users. After that, in the southern half of the city, the highest value of this index is related to Molasaadi Alley, the center of Moghri neighborhood and the alley that is parallel to the center of Moghri neighborhood between the two previous crossings. Also, there is a horizontal passage between the center of Moghri neighborhood and Molasaadi Alley, at the end of which Bagh Khan is located. In the lower neighborhood, the maximum of this index is related to Robati Alley, at the end of which service infrastructures are located. After that, this indicator belongs to Sarai Serkeh Alley and the passage that was formed in front of Diwar-e Shahrband. It should be noted that the above-mentioned crossing is connected to the (north-south) axis, which has become the motivation to increase the choice of this part of the city. The higher selection index in these crossings compared to other crossings indicates serving further roles than just passing through them. Also, the graphic map of the choice index in the large radius evinces the importance of the main transportation routes of the city as well as some urban roads, especially in the neighborhood of Sarpol and Mian Deh. The results obtained from the two integration and choice indicators in the segment maps of the city reflect the flow of the directional movement of citizens in the urban spaces of Boshruyeh, which emerged during the subordinate conditions. For this purpose, to reread the concept of the city as the life fabric of the citizens, two concepts of the movement-to and moving-through potential are expressed. To read the economy of movement in the city, they have been combined and weighted to be normalized so that the existence of logical connections between the social data and the spatial data of the city can be detected. In other words, rereading Boshruyeh City in the Qajar period means the development of the relationship between the objective dimension of the place and the mental dimension of the space in which the citizens of Boshruyeh have achieved individual and collective hopes and goals in a common cultural framework in the geographical space of Boshruyeh City. The historical documentation of Boshruyeh City is a confirmation of Boshruyeh's urban planning system based on the democratic order. Assumptions resulting from modeling of two integration and choice indicators in metric radii show how the temporal economic variable has been able to guarantee the socio-economic development and growth of Boshruyeh City. Reading the theory of natural movement in Boshruyeh shows that the configuration of the space initially caused the movement; then, the location and placement of other uses were selected based on this movement, and finally it caused the attraction of more pedestrians and the productivity of the urban environment.

The graphic data (Tables. 6 and 7) in different metric radii (400–12600) indicates that the potential of natural movement in the northern half of the city, especially in the two neighborhoods of Sarpol and Mian Deh was higher than in the two neighborhoods

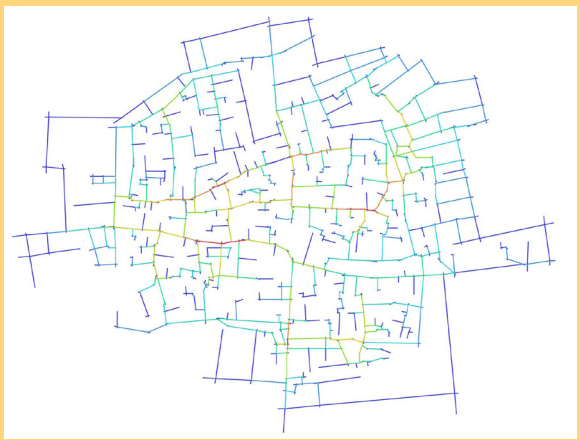
of Moqri and Paein Mahaleh. This does not mean that the potential for natural movement in the other two neighborhoods is low, but rather it means that in the neighborhood of Moqri and Paein Mahaleh, the diversity of accesses has been higher compared to the size of the neighborhoods. Therefore, based on the change in the economic variable of the city, the foundation of the spatial configuration has rewritten the foundation of the access system and pedestrian orientation in the city. In this way, people's participation in the economy has led citizens to be more democratic in the work environment. In this sense, the flow of movement has not only manifested itself in economic activity but also in the flow of pedestrians in the city. Therefore, the passages of the city and the residential spaces of Boshruyeh are a reflection of the social image of the space in this city; they have become the link between the city and the people in the urban space and have fueled the persistence of city's life throughout its history, especially in the Qajar period. Thus, the motivation for the formation of dense residential fabric, especially small houses, in the spatial configuration of the city neighborhoods has definitely been economic conditions. As a stimulus, it has increased the annual income of the citizens along with the limited agricultural economy. On the other hand, the absence of intermediation in the city has become a double motivation for increasing the traffic flow on its roads and has brought the necessary conditions to move towards economic stability and the flow of liquidity at city level.

Table. 6. *Graphical data, mediated components of space syntax (Integration and Choice Combination) in order to read social behavior in the structure of the urban economy of Boshruyeh in the Qajar period*

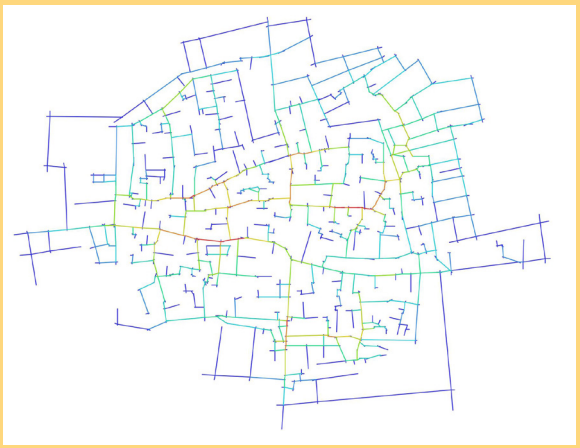
Integration and Choice Combination	
 R:400	 R: 1600
 R:2800	 R:4000



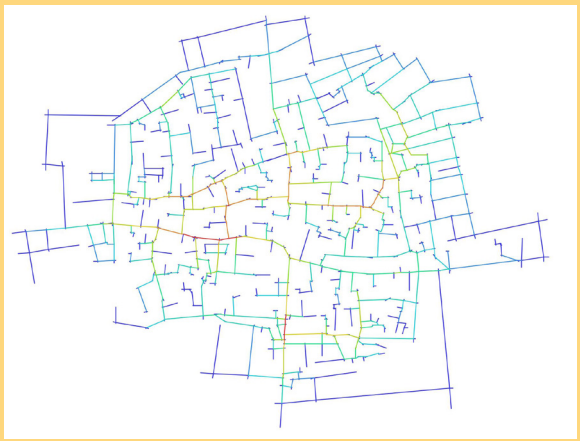
R: 5200



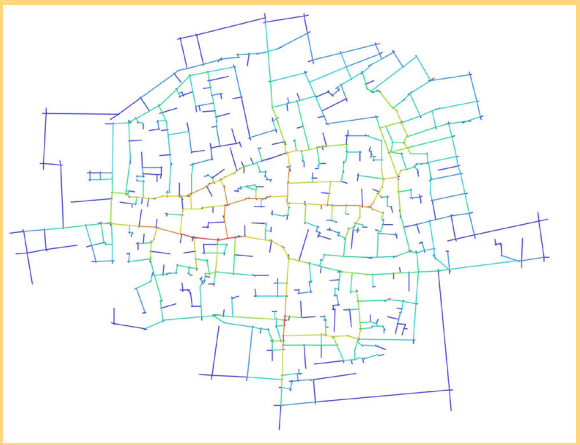
R: 6600



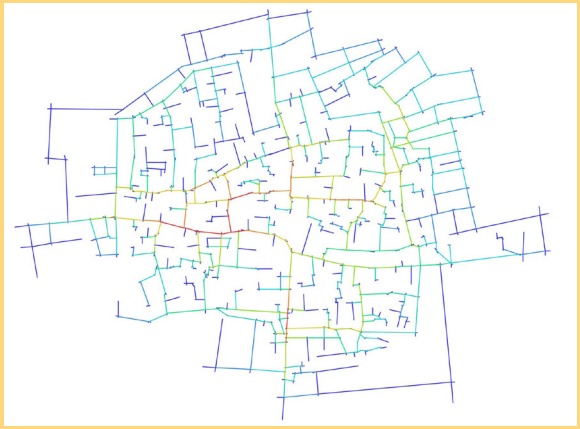
R:7800



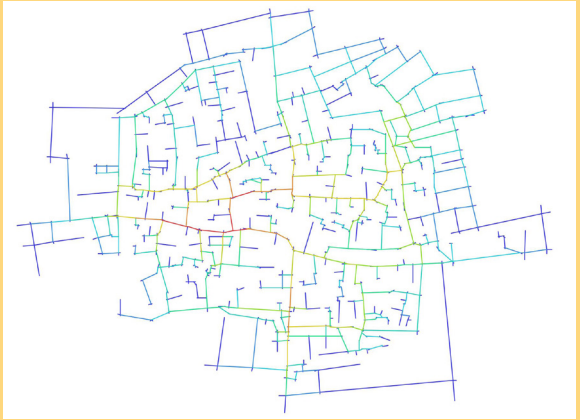
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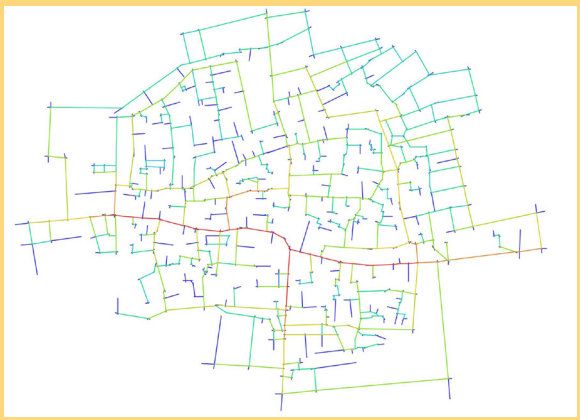
R: 10200



R: 11400

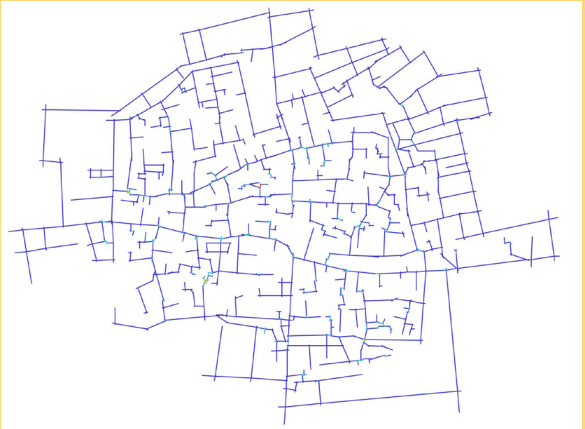
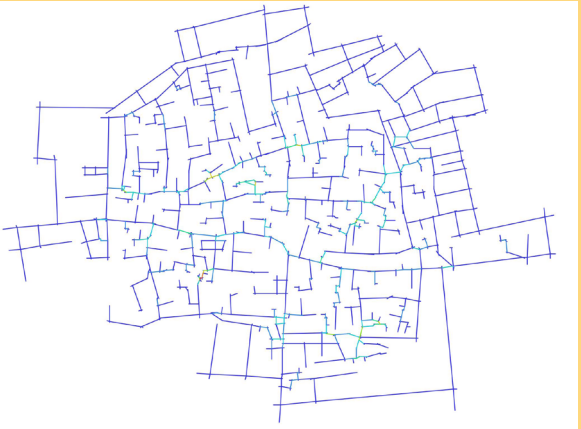
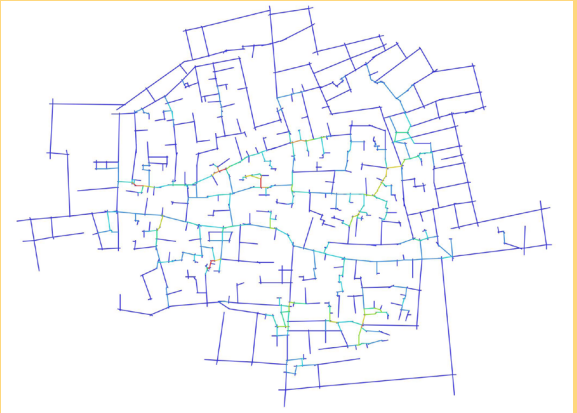
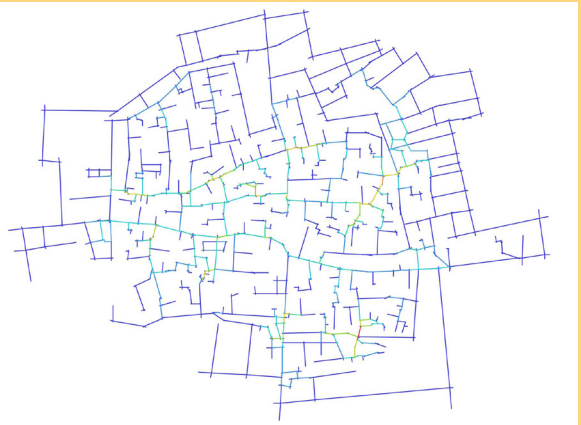
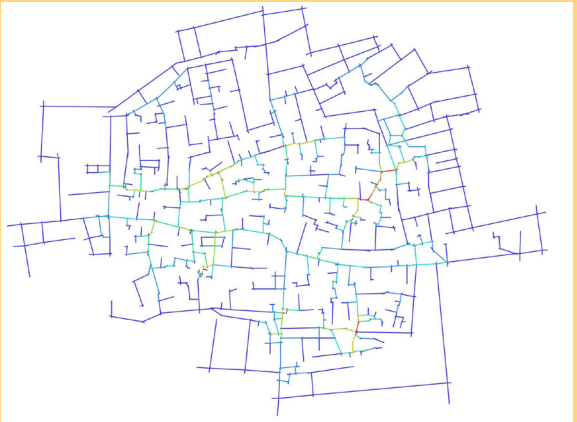
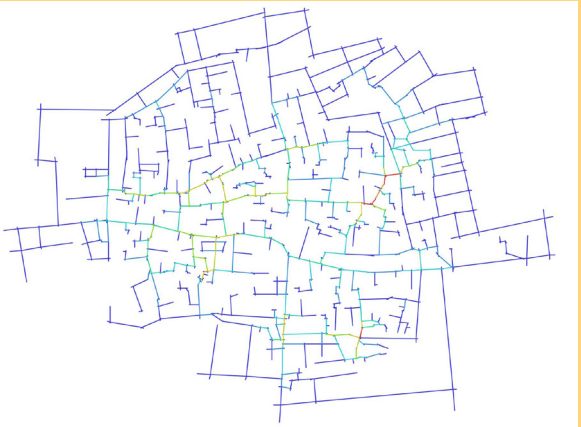


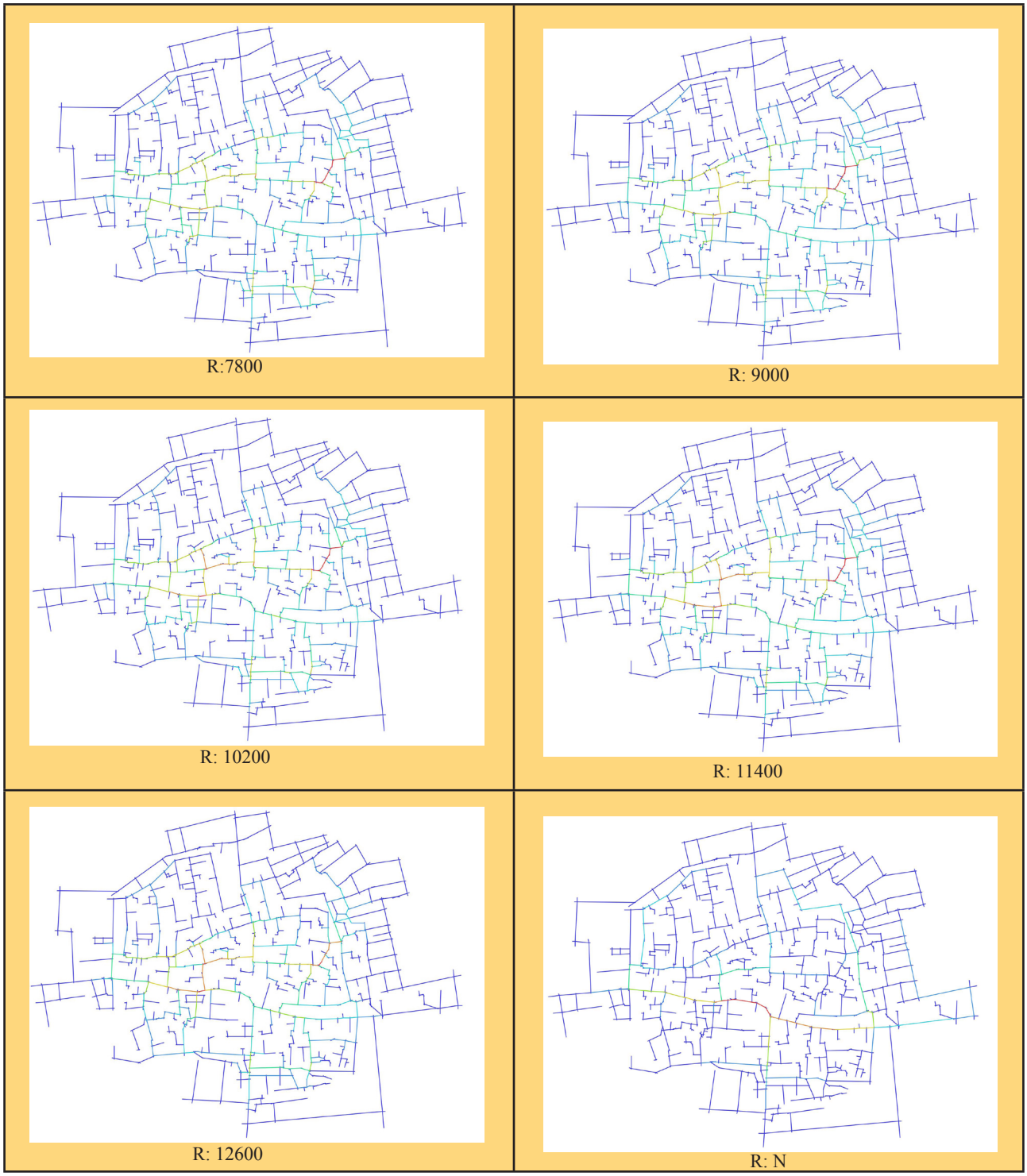
R: 12600



R: N

Table .7: *Graphical data, mediated components of space syntax (Integration and Choice Weighting) in order to read social behavior in the structure of the urban economy of Boshruyeh in the Qajar period*

Integration and Choice Weighting	
 R:400	 R: 1600
 R:2800	 R:4000
 R: 5200	 R: 6600



The graphic data (Tables. 6 and 7) shows that the style of the formation and distribution of the house patterns was in conformity with the pattern of the pedestrian movement system in the streets of Boshruyeh. In addition, based on multi-segment graphic maps in different radii, the capacity of human traffic has increased in some of the pedestrian paths adjacent to houses with large and medium courtyards. According to the dominant use of these spaces, these units have been serving spaces at the neighborhood level. It should be mentioned that some of these neighborhood units were not urban infrastructures, but residential spaces where the economy of movement had been high in the passages leading to them. This spatial behavior has shown the acceptance of a fundamental and new role

in the urban economy of Boshruyeh. The absence of barak-weaving niches in these houses does not mean the lack of participation of their residents in the urban economy, but points to the existence of a direct relationship between their natural movement and presence in the urban economy. In this sense, on the one hand, the high movement economy in these passages means that the products of the city have been traded on these routes; on the other hand, the space size of these houses indicates the ability of their owners in supporting the city economy indirectly as their residents would transfer the products produced by the barak-weaving workshops to the spaces of their own homes or buy guaranteed products from small neighboring units; then, they would sell and supply the products.

Graphic data in multi-segment maps (Tables. 4 and 5) show the adoption of spatial sequence by passages and crossings, especially in the pedestrian paths in Sarpol and Mian Deh neighborhoods and their fundamental role in the urban economy of Boshruyeh. Meanwhile, the main transportation axes of the city (north-south and east-west) have played a prominent role in transport and moving of products from inner city to outside of it. The multi-segment maps at the macro level show the city expansion based on the order of people in the roads, especially the 1st and 2nd grade roads. Also, the numerical data (Table 3) indicates that with the growth of the metric radius in the city space, the role of passages in fostering social participation and cooperation among the people of the society has increased, and also these passages have caused the formation of a sense of belonging to the place and the improvement of the sense of identity of the citizens and the necessary duties to improve visual perception in order to form collective memories and create a sense of spatial security of the environment in the spaces of Boshruyeh city.

Conclusions

The city of Boshruyeh, lying close to the salt desert and lacking in arable lands, has been able to develop its barak-weaving industry as a new economic variable in urban development, leading to the stability and spatial growth of the city in the Qajar period. To achieve their idea, the builders of Boshruyeh City have built a city based on the development of human resources in which people played the role of the main capital of the city. In the meantime, they have used the policy of urban housing economy based on small enterprises to create added value. In other words, the urban fabric of Boshruyeh consists of residential units with different classifications in yard dimensions, which has led to the democracy in the work place of these small production units. In this sense, the presence of a barak-weaving niche in the porch of the houses, especially the houses with medium to low and small porches, shows the free and fair participation of people in the production; on the other hand, it is the social aspect of the space that depicts the life pattern of the city. In the meantime, the crossings and passageways have caused interdependence, interaction and the emergence of democracy in the urban spaces, and are a model for the formation of independent organizations to present the products of manufacturing enterprises at the urban level. Therefore, it can be said that the economic variable (barak-weaving industry) in an entrepreneurial manner has brought the necessary grounds and responsibilities to create effective employment for the families of Boshruyeh. Barak production as a homogeneous product in many weights and scales has led to an increased wealth, making a suitable platform for the city development both inside (in the neighborhoods) and outside the city (in caravanserais). In this sense, the strategy of changing the economic variable in the network of roads and locating and creating urban facilities inside and outside has brought the distribution of different types of houses, especially the abundance of houses with the medium and small yards in the neighborhoods. This norm was the result of the spatial interaction between supply and demand. That is, a class system has been formed at city level with the development of the economy; so, in order to prevent the disruption of social justice in different areas of the city, the builders of Boshruyeh city started to provide economic activities in democratic environments in the form of residential spaces. They sold their products to maintain these democratic work places for sale, which were provided in the main routes and passages leading to these production units and more or less in the urban open spaces and the center of the neighborhoods. Thus, this spatial behavior became an incentive over time to remove the market order of the past periods in the city. In other words, the existence of coordination between different parts of the spaces in Boshruyeh City has led houses and passages to become places for the production and supply

of goods and products, turning Boshruyeh into a productive city. These economic relations have also brought about the emergence of commercial relations inside and outside the city. Thus, the construction of caravanserais on the trade routes as well as fortifying the city with the construction of walls around it in order to defend its privacy and citizens, have made it completely justified. Therefore, the location of service infrastructures in the city of Boshruyeh has been in line with the urban economic variable. In other words, the urban economic system in Boshruyeh is completely consistent with the model of the pedestrian movement system as well as the economic urban spaces. Also, the main (north-south and east-west) roads of the city have played the role of the communication route between other neighborhoods and have also been responsible for moving the load of industrial products in other dense residential parts outside the city. So, it can be acknowledged that along with spatial behaviors, human behaviors have been the cause of stability in the economic security and spatial economy of Boshruyeh City and a stimulus for income generation and wealth accumulation, resulting in the growth of the financial efficiency of the city's residents during the Qajar period.

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