

Evaluating the Effects of Land Use Spatial Structure on Pedestrian's Mental Safety in Urban Mahalla layouts Using Space Syntax (Case Study: Manzariye and Bazar Mahallas in Tabriz, Iran)

**Mahshid Ghorbanian*

¹Assistant Professor, School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran.

Received 09.01.2021; Accepted 08.11.2021

ABSTRACT: The primary purpose of this research is to investigate the effect of land-use spatial configuration and street network structure on people's mental safety in local contexts. A review of various theoretical frameworks demonstrates a feasible causal relationship between morphology and the psychological dimension of safety. Hence, this paper emphasizes the assessment of the effect of urban land configuration, which influences the movement behavior of residents, on the psychological safety of residents of mahallas. This research begins with a review of the literature to identify the gap in the theoretical literature and carry out the problem-finding to obtain an analytical model of research to examine the proximity of uses introduced in three types of proximity. Then, parameters will be evaluated in this framework using the software. The research investigates variables' interactions based on Space Syntax, spatial parameters of connectivity value, spatial integration/segregation, attractive uses, movement behavior, density, and mahallas' main and peripheral centers. The results indicate that the safety of urban areas depends on how uses are located and, consequently, on the movement behavior of users'. The comparison of the two mahallas showed that compared to Bazar, Manzarie offers a better arrangement of uses in the inner axes and sub-nodes. It establishes an appropriate spatial relationship between its various gravity points, thus bringing about various movement behaviors. Therefore, it displaces more people in the axes connecting different uses, allowing surveillance and spatial dynamics.

Keywords: *Safety, Land Use, Spatial Structure, Urban Mahallas layout, Movement Behavior, Space Syntax.*

INTRODUCTION

Urban planners and designers influence the emergence of functional patterns and social relationships via shaping urban spaces. Although the environment is not the sole most important factor affecting human interaction, it forces humans toward specific behaviors and actions by providing opportunities that lead people to do or prevent them from doing specific actions. Human behaviors can be within the framework of social norms and customs or infringe the accepted norms or laws, to take abnormal, anomic, and offensive, and get categorized as crimes.

Physical features of spaces can significantly impact our behavior and the quality of urban life. Among the mix of critical factors affecting the quality of life and the superiority of societies, safety is a vital requirement for the continuation of civilization. As a settlement that includes a large population of diverse individuals, the city will fulfill its special functions

provided that its inhabitants assess its safety at an acceptable level. Lack of safety, being endangered, and fear of being victimized threaten the use of public spaces and the creation of successful urban places. The last century's literature suggests that the construction or modification of the physical environment can influence human behavior and ultimately create a catalyst or barrier against crime prevention.

In the present century, it seems that improper urban environments have caused many problems for the safety of citizens and have contributed to the growth of social harm. The spread of these harms weakens safety and increases the rate of crimes forcing people to act cautiously in their social interactions, face fear and apprehension in any event, and as a result, feel unsafe. The sense of unsafety or low mental safety is one of the main elements determining safety in urban spaces and is affected by many variables. One of these variables studied to investigate its impact on the sense of space safety is

*Corresponding Author Email: ghorbanian@iust.ac.ir

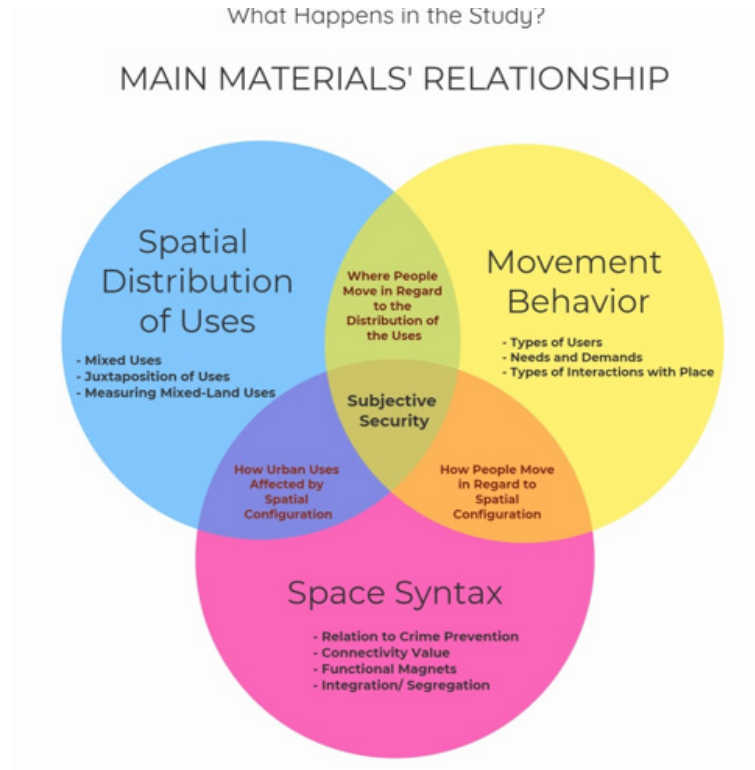


Fig.1: Main Materials' Relationship of the Study

land-use spatial configuration (Fig. 1).

Review of the Literature

Social Safety; Beyond a Common Necessity of Urban Life

Prominent scholars in the field of safety have provided various descriptions of this concept. The diversity of these definitions reveals the multiplicity and ambiguity of the concept and its Hardly Analytical feature (McSweeney et al., 1999). In general, there are three major groups of the approaches provided for crime and fear reduction (Farid Tehrani, 2011, 25-26):

- The first approach is the Dispositional Approach, or Social Crime Prevention, based on changing and reducing personal motivation for committing crime through education and moral guidance or social/ economic development. This approach examines the social context and factors affecting the behavior of offenders and targets criminals instead of crime.
- The second approach focuses more on the punishment of criminals.
- As the main emphasis of this paper, the third approach to crime prevention is the Situational Approach, which addresses the role of the situation in crime and safety. Accordingly, it is assumed that there is a relationship between the environment and behavior; behavior can be corrected according to the effect

of the environment (Farid Tehrani, 2011, 27). Situational crime prevention approaches that study the causes and methods of combating crime in the environment can be studied in two broad categories: classical theories and modern theories.

Jacobs is the pioneer in applying classical theories in urban spaces and emphasized the role of urban spaces in preventing crime and increasing the safety of cities. Subsequently, other theorists (such as Oscar Newman, Patricia, and Paul Brantingham.) emphasized the environmental variables explaining crime and safety as a function of the individual and the environment. With the progress of these theories, modern theoreticians advanced in urban planning and provided effective changes in previous theories to enhance their practical dimensions. Table 1 presents the opinions and findings of the most influential theorists with a situational approach to crime prevention in two groups of classical and modern theories (Table 1).

Land Use Planning and Urban Spatial Structure Spatial Distribution of Land Use

One of the most important criteria for assessing the urban land uses is the eligibility of distribution patterns and the relationship between the land uses and their overlap in the city

Table 1: The Most Influential Views on Crime Prevention Using a Situational Approach Based on Two Categories of Classical and Modern Theories

Classical Crime Prevention Theories		
Expert(s) and the initial year of their ideas release	Key Viewpoints	Explanation of the Main Idea
Ancient Cities to new urban towns	Gated Community	Gated communities, small residential developments for middle-class or wealthy residents; these enclaves are usually designed as such from the beginning, not subsequently created out of previously public streets (Clarke, 2002).
Wood (1961)	Housing design: a social theory	In the early 1960s, the American sociologist, Elizabeth Wood, focused on the micro-environment of public housing blocks in the United States (Colquhoun, 2004, 38). She (1961) was one of the first to discover the relationship between the physical environment and crime. The Philosophy she developed over the years was to mix residents by race, economic class, and family size. A building's height should be limited to the distance that a mother in a window could be heard when calling to a child in a playground below, she said (Lambert, 1993, 38).
Jacobs (1961)	Eyes on the street	She criticized the rigid separation in the USA of land uses into different parts of the city and the concentration of similar uses into exclusive centers, such as civic, cultural, shopping, etc. She argued against new residential developments, which arranged to house around green spaces away from streets. She considered that new housing would only be successful if it followed traditional street patterns with mixed uses, rather than following the utopian theories of Le Corbusier and other twentieth-century planners (Colquhoun, 2004, 39). She claimed, "it does not take many incidents of violence on a city street, or in a city district, to make people fear the streets. Moreover, as they fear them, they use them less, which makes the streets still more unsafe" (Jacobs, 1961, 30).
Newman (1972)	Defensible Space	In his book <i>Defensible Space: Crime Prevention through Urban Design</i> (1973), Oscar Newman claims that Defensible Space relies on self-help rather than on government intervention, and it depends on resident involvement to reduce crime and remove the presence of criminals (Newman, 1996). Newman's central concept was Defensible Space, which has four main design elements. These contribute both individually and together to the concept of Defensible Space. They are (Colquhoun, 2004, 40): <ul style="list-style-type: none"> -Territoriality -Surveillance -Building image -Juxtaposition of residential with other facilities.
Alexander (1977)	A Pattern Language	While his book, <i>A Pattern Language</i> , published in 1977, does not focus on crime, design elements could have crime preventive and fear-reducing effects (Colquhoun, 2004, 64-68).
Brantingham & Brantingham (1978)	Geometry of Crime	First proposed by Paul and Patricia Brantingham in 1978, the theory inspired by the Chicago School, focuses on the design, form, physical dimensions of urban utilities, transit systems, land uses, and more which affects abnormal and criminal behaviors. It also focuses on the size and dimensions of the space necessary for committing crimes and studies the need for space to commit a crime. The geometric theory of crime was based on nodes, paths, districts, and edges. The crime template is a concept for understanding crime site selection. They (1981) mark the search areas of the immediate surroundings of activity nodes and the linear paths between them as high-intensity search areas (Andresen, 2016), steadily decreasing that intensity with distance from the nodes and paths (Clarke, 1992, 11).
Coleman & Bachin (1979)	Utopia on Trial	Based upon Newman's work, Professor Alice Coleman of King's College in London headed up a research group called the Land Use Research Unit in 1979. Its mission was to study public housing design and how it leads to crime as well as general social "malaise." The group's finding led directly to Coleman's highly influential book, <i>Utopia on Trial</i> , in 1985 (Corbett, 2003, 2). In sum, Coleman's studies focus more on architectural details. The four main themes of her design principles are Size, Circulation, Entrance variables, and grounds manifested in her 16 design features. Coleman views her principles as surveillance, visibility, permeability, and, to a degree, the separation of public and private spaces.
Jeffery (1971); Saville & Cleveland (1997)	Crime Prevention Through Environmental Design (CPTED): first and second generations	The main subject of CPTED is creating space based on the fact that the elaborative construction of the physical environment can affect behavior and reduce crime. This idea is the basis. So the goal of CPTED is the design of an environment that reduces .of Secured by Design the incidence and fear of crime. The long history of the relationship between humans and their environment has proved the affection of their behavior by the environment. This is the significant underlying implication of deploying CPTED. CPTED is based on the fact that the physical environment can be built or modified to influence the behavior of humans, which will eventually create an atmosphere or barrier that deters crimes (Tseng, 2006, 18-19). & At its core, CPTED consists of four major strategies. These principles include (Kitchen : (Schneider, 2007, 24 <ul style="list-style-type: none"> -Natural surveillance; -Access control; -Territorial reinforcement; -Proper placement of land uses.

Continuie of Table 1: The Most Influential Views on Crime Prevention Using a Situational Approach Based on Two Categories of Classical and Modern Theories

Modern Crime Prevention Theories		
Hillier (1984)	Space Syntax Theory	Space Syntax is a tool for describing the relationship between human behavior and spatial structure from a sociological point of view. The techniques focus specifically on making physical connections between the way people use places and the design of the places themselves (Colquhoun, 2004, 70).
Duany & Plater-Zyberk (1994); Calthorpe (2000); Polyzoides & Moule (1998); Solomon (2003)	New Urbanism	Plater- Zyberk, one of the gurus of new urbanism, has argued (Duany & Plater-Zyberk, 1994, 12): ‘We believe that the physical structure of our environment can be managed and that controlling it is the key to solving numerous problems confronting government today: traffic congestion, pollution, financial depletion, social isolation, and yes, even crime’ (Kitchen & Schneider, 2007, 44-45).

(Pourmohammadi, 2003, 105-106). The type of uses possible within an area also depends on how they are developed spatially. Four arrangements would indicate how urban areas and use patterns might develop (Table 2). People needing access to shops and other facilities within the new residential schemes will probably find them in one of these four forms (Biddulph, 2007, 137-140).

The Effects of Land Use Spatial Structure on Distributing Crime Centers

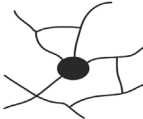
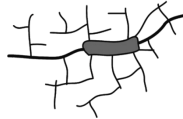


Several researchers have found that some land uses have been influential in forming urban crime centers. Sherman, Gartin, and Burger are among those who point to the type of land use and the distribution of crime centers (Sherman et al., 1989). So an approach to reducing the physical environment's vulnerability to delinquency and related issues is to provide conditions for safer use of neighborhoods. This can be achieved by reducing the perpetrators' access to criminal purposes. The internal layouts, boundary characteristics, and traffic patterns

of neighborhoods may encourage or discourage different types of crime. By implication, changes in land use, boundaries, and traffic patterns may result in higher or lower crime rates because they affect potential offenders and users (Taylor & Harrell, 1996, 32).

Mixed Land Use

A city is a place of mixture and diversity, which are the main factors in creating vital urban spaces. Various combinations of people with different needs require different functional spaces. One way to encourage greater use and "ownership" of public spaces is to encourage land use mixes that enhance opportunities for cultural or recreational activities (Sarkissian Associates Planners, 2000, 19). According to Jacobs, a balanced mix of work, service, and activity centers provides a secure, vibrant, and livable social realm. She discussed two different kinds of diversity; primary and secondary uses. The first, primary uses, bring people to a specific place because they are anchorages, like dwellings. Any primary use is relatively ineffectual as

Table 2: The Spatial Distribution of Uses (Source: Biddulph, 2007, 137-140)

	Centralizing shops and facilities: locate a mix of uses at the center.
	Corridors: Mixed-use corridors often develop in a linear form along main streets.
	Planned neighborhood shops and facilities: typically locate any retailing element at the entrance to a community so that all residents have easy access while passing trade from the main road users is also possible.
	Decentralizing retailing: Taking advantage of car-borne residents, large shops are in decentralized locations, situated at the junctions of major roads and providing extensive car parking.

a creator of city diversity. When a primary use is combined with another that puts people on the street, secondary diversity grows in response to them serving the people, such as shops, restaurants, and other small-scale services (Jacobs, 1961, 163). Several conditions influence this mix of outdoor activities. The physical environment is one factor that influences the activities to a varying degree and in many different ways (Gehl, 2011, 3).

A key component of local land use is the availability of local neighborhood services. The provision of services and facilities depends on the resident population's requirements, so a particular land use mix differs from neighborhood to neighborhood. Therefore, the local urban context and the population's requirements are crucial in this matter. It is not, however, clear which services and facilities can and should be provided at which spatial scale (Dempsey et al., 2010, 24), but it is evident that literal and continuous mingling of people is the only device that keeps streets safe (Jacobs, 1961, 156).

Whether positive or negative, diversity in the place makes a difference in the incidence of behaviors and movements. Movement generators result in more people moving through a place. Urban designers and planners need to know what combination they are looking for and the aim. The various

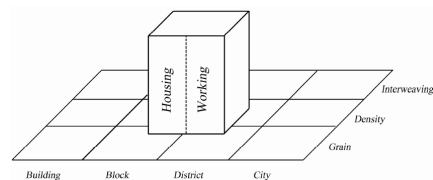
combinations will have different gains that, along with all this, diversity is accompanied by the presence, and the presence of people in space will change the amount of crime and their type. Altering these variables makes it controllable to reduce crime commitment. Hence, land use location and spatial distribution influence citizens' movement circulation, behavior, and social interaction levels.

Measuring Mixed-Land Use

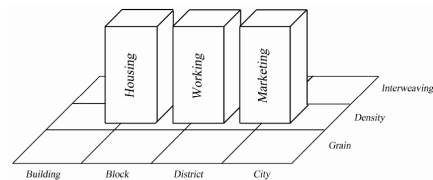
There are several ways to categorize and evaluate the mix of uses. Bento et al. (2005) use jobs-housing imbalance to evaluate land use (Spears et al., 2014). Cervero and Kockelman (1997) use two significant variables to measure land-use diversification; 1) Vertical Mixture: proportion of commercial/retail parcels with more than one land-use category on one site, 2) Activity Centre Mixture: proportion of activity centers with more than one category of commercial- retail uses (Cervero & Kockelman, 1997). Miles & Song (2009) do not apply different uses ratios for measuring mixed-use. However, they acclaimed that mixed land uses measures include four items on the block: 1) the land devoted to commercial uses, 2) the number of neighborhood stores, 3) the land for industrial and 4)

Table 3: Types of Mixing Uses (Source: Yinan & Chen, 2009; Hoppenbrouwer & Louw, 2005)

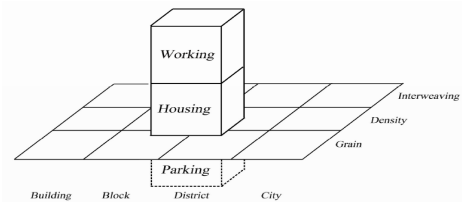
Share Premises Dimension; which refers to multifunctional use at a particular point, i.e., premises in a building or dwelling used by one household.



Horizontal dimension, i.e., mixed-use between buildings on the flat surface.



Vertical dimension, land uses are vertically mixed by building two or more functions above each other, a well-known example being housing over shops.



The Time dimension, when two or more functions use a particular space after each other; for example, a school can be used as a community center in the evening. A theatre can be used for conferences during the daytime and as a cinema in the evening.

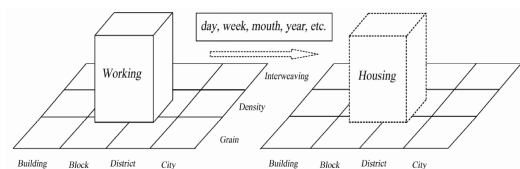




Fig. 2: How to Evaluate the Land-use Mixture?

public use (Miles & Song, 2009). Fleissig & Jacobsen (2002) believed that when planning for diversity, one must consider how people and spaces can differ from one another (e.g., Price, access, design, lifestyles.). Good design is the link to creating a diverse environment that is responsive and respectful to a range of users with various needs (Miles & Song, 2009).

Rowley (1996) believes Jane Jacobs defined four 'indispensable' conditions for generating 'exuberant diversity' in city streets and districts, asserting that all four were necessary to create street diversity. Her preconditions are: 1) The district, and indeed as many of its internal parts as possible, must serve more than one primary function; 2) Most blocks must be short; 3) The district must mingle buildings that vary in age and condition, and 4) There must be a sufficiently dense concentration of people.

Rowley claimed that Mixed-use development is an ambiguous, multi-faceted concept, but it is essentially an aspect of settlements' internal texture (Rowley, 1996). His comprehensive conceptual model of mixed land use and development is mainly based on this fact. To this end, Table 3 describes the conceptual model of Alan Rowley (Table 3). In this model, several aspects of mixed land use, as mentioned earlier, are combined. First of all, it comprises the critical features of the settlement texture: grain, density, and permeability, which is based on Jacobs' social ideas (Hoppenbrouwer & Louw, 2005).

In this paper, the mixture of land will be evaluated by three measurements (Fig. 2):

(i) the Vertical Mixture as a combination of different uses on the floors of a building; (ii) the Horizontal Mixture including a combination of different uses along a corridor; and (iii) the Activity Center Mixture as deploying different land uses in one core.

MATERIALS AND METHODS

The procedure for conducting this study begins with reviewing the literature to identify the gaps in the theoretical literature

and declare the problem (Fig. 3). This review aims to arrive at an analytical research model to examine the proximity of uses. Then, the indices will be evaluated in this framework using software techniques.

Much of the value of space syntax analysis concerning crime prevention depends on the implied value of surveillance as a deterrence tool. Indeed, space syntax focuses mainly on what people see, how they move regarding what they see, and whether they perceive being seen by others (Kitchen & Schneider, 2007, 43). Similar to the conceptual

framework of Jacobs, Hillier argues that the "intelligible deformed grid" and "constituted outward-facing block" are the main features of spatial configurations that protect areas from crime (Hillier, 1984, 34)... This mechanism of "strangers protect the streets, and residents watch the strangers" echoes the function of natural surveillance observed by Jacobs in traditional street patterns and makes dwelling environments work against crimes (Shu, 2009).

Therefore, based on space syntax, two critical theories of this approach will be used to answer the research question and examine its related hypothesis. The first is the theory of Movement Economy, which examines the effect of movement congestion on adjacent paths' performance, efficiency, and economic life. Based on this theoretical basis, it is possible to identify attractive uses within the study area, evaluate the effect of movement paths on the performance of their adjacent uses, and study the possibility of mixing the uses in the case area. The parameters studied in this section are: connectivity value, spatial integration/segregation, attractive uses, and movement behavior and density. The second theoretical approach used in this section is the Centrality as a Process theory. Based on this theory, the main and peripheral centers of neighborhoods and their interactions are recognized using the parameters of connectivity value, the relationship between the main and peripheral centers, the relationship among peripheral centers,



Fig. 3: The procedure of conducting the study

and movement density.

RESULTS AND DISCUSSION

Case Study: General Introduction of the Tabriz City in Iran

Tabriz is the largest city in the northwestern region of Iran. It is considered the most important destination for immigrants in the province due to its economic, industrial, and administrative status and international fame. Thanks to its good position, it has been a trading center of the region and is now one of Iran's most important industrial centers. To compare and analyze the level of safety at various urban and local uses, two mahallas¹, i.e., Bazar, the commercial heart of the city, and Manzarie, with a contemporary context and far from the city center, are studied. An assessment of factors is used for selecting these cases (Fig. 4).

Components 1, 3, and 5 were selected as criteria for selecting cases in this study. Therefore, given the spatial morphology of mahallas in the development plan of the city of Tabriz, the grid and organic spatial typology were introduced, and new (contemporary) and old contexts in these zones were identified.

Then, from the contemporary and old contexts (matching regular grid and organic types), two mahallas, including an old organic mahalla and a contemporary grid mahalla, were selected through random sampling.

Morphological Characteristics of Selected Mahallas

In the typological study of the morphology of urban blocks in Tabriz, attempts were made to use a classification that primarily covers all urban blocks and has a minor degree of overlap between their definitions (Fig. 5). Thus, the blocks shaping the urban form and context were divided into regular and irregular categories (Naghsh Mohit Consulting Engineers, 2012).

Based on the above discussions, it can be concluded that various types of context and block morphology can be seen in Tabriz. In the mahallas located in the central part and around the Bazar, the governing morphology type is the organic one. This organic nucleus region can observe various morphological systems (irregular grid, rapid development, and grid blocks). Regular grid context is generally related to outer development (contemporary) and middle zones (Naghsh Mohit Consulting Engineers, 2012). Table 4 describes the characteristics of the

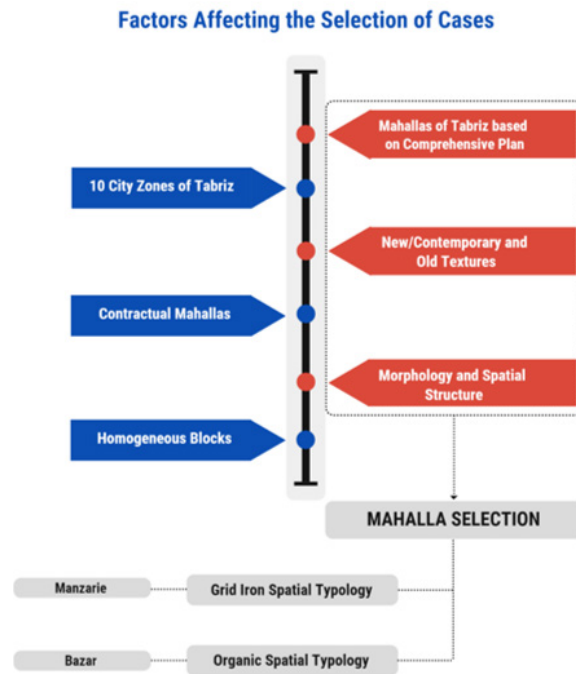


Fig. 4: Case Study Selection

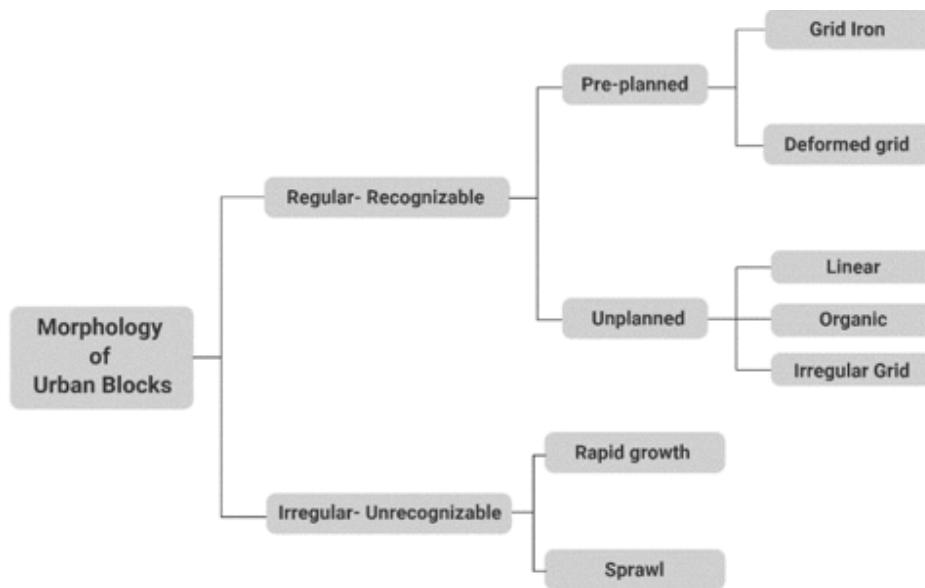
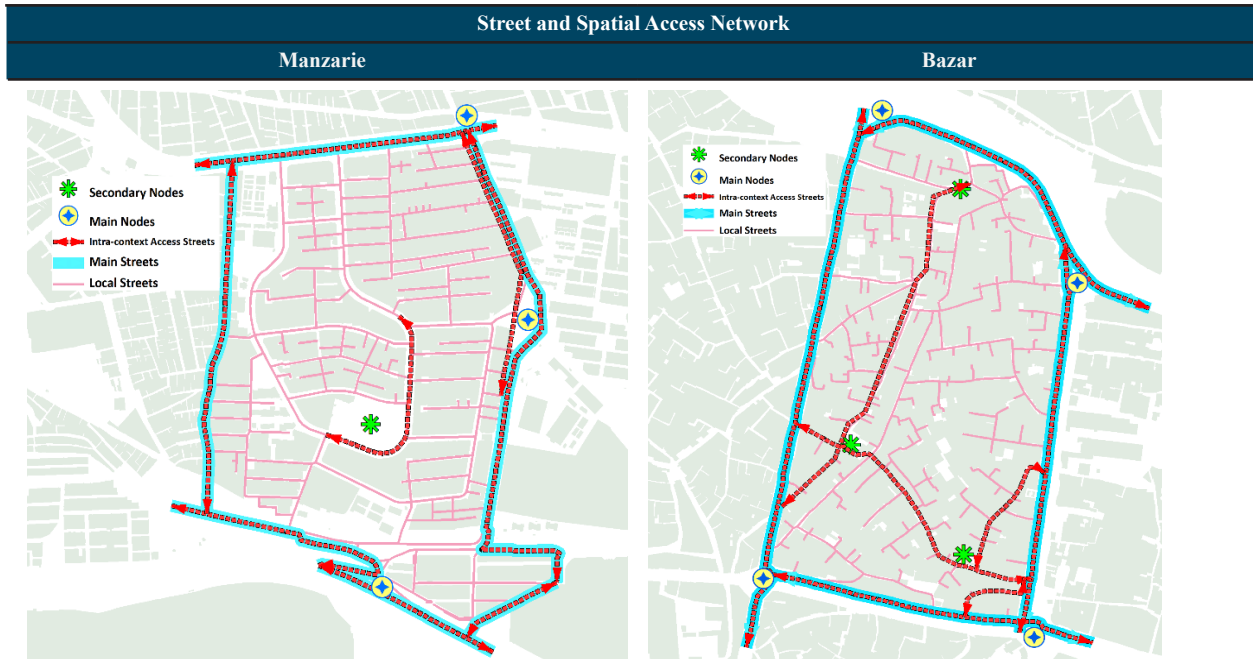


Fig. 5: Typology of Urban Block Forms of Tabriz

spatial access and network system for both mahallas (Table 4). Bazar has a wide range of uses, especially on the edge of the mahalla, which satisfies the residents' needs (Table 5). An important point to be noted here is the efforts made by the mahalla residents to provide their daily necessities out of the mahalla and on the edges of it, i.e., Tabriz Bazar. On the one

hand, this has led to a decrease in locating intra-context daily uses and over uniformity as evidenced in high residential uses. On the other hand, it has increased existing buildings inside the context as storage places. Manzarie has a good number of well-distributed local commercials at the mahalla scale. In addition, a significant

Table 4: Morphological Characteristics of Selected Mahallas

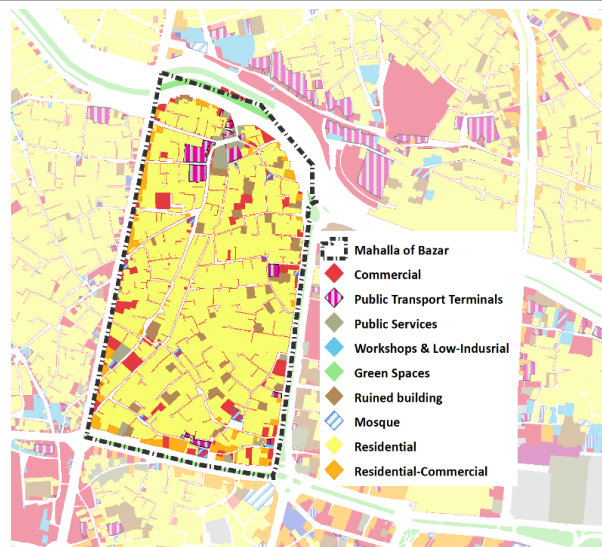
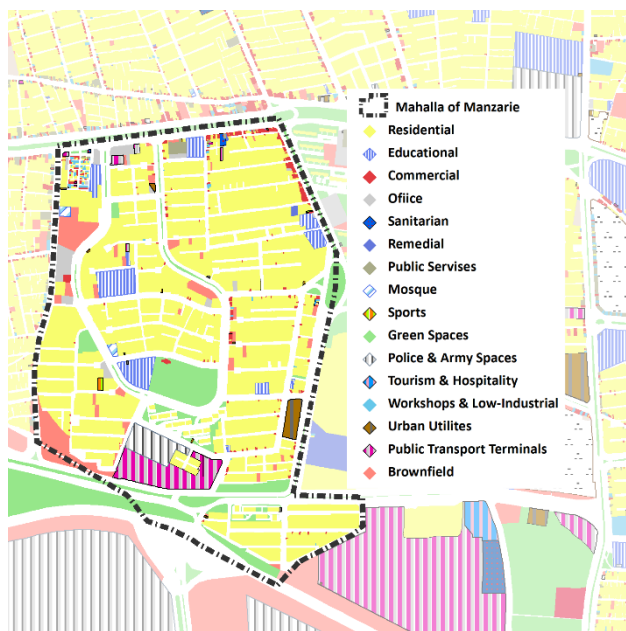


Manzarie has a grid network surrounded by two arterial axes in the north and two collector and distributor axes in the east and west.

The selected area in Bazar, which includes the largest population and residential space, has a street network of organic typology.

Landuse Review

Residential uses occupied the largest share of the lands in Manzarie. Surveys of the categories of uses needed to serve residents in the mahalla suggest that, in general, the neighborhood had a fair share of diverse types of uses, including those providing for daily necessities, recreational activities, educational areas, etc.



Both in general and in terms of its sub-areas, Bazar has the largest share of urban scale and metropolitan scale commercial use due to its function as the city's commercial center. Also, the main historical and touristic centers of Tabriz are located in this area. Among the three superblocks in the large-scale mahalla of Tabriz, i.e., Bazar, the superblock studied as the Bazar mahalla, had the largest share of residential use, which indicates the prevalence of other uses and, in particular, urban business use within the range of these three significant blocks.

Table 5: Types of the Combination of Uses for Creating a Mixed Functional Space

Manzarie	Bazaf
<p>A diverse and wide range of local and cross-local uses is observed in Manzarie mahalla of Tabriz. A typological survey of diversity in this mahalla also represents both horizontal and vertical combinations of uses.</p>	<p>The accumulation of a wide variety of urban and cross-urban uses within the confines of the Tabriz Bazar and its peripheral areas is quite evident. It is sensible given the nature of this area. A typological survey of the variation represents a horizontal combination of uses (variety of uses along a single axis) and a vertical combination of uses (variety of uses in stories in combination with residential usage).</p>

number of commercial uses are located at the edge of the mahalla, which has over-local coverage, i.e., while meeting the needs of its residents, they provide services to residents of peripheral contexts. There are also vital educational uses that are well distributed in the mahalla, and, as the table above shows, they cover a significant part of the mahalla.

Results

Question: What is the relationship between urban land use configuration and residents' movement behavior and safety?

Hypothesis: Urban safety is directly related to the land-use configuration and residents' movement behavior.

A) Bazar Mahalla

The locations of attractive uses and the matching of the location of uses and their distribution in the access network structure are specified in Fig 6. To investigate the question and hypothesis, a comparative and overlapping study of GIS and Space Syntax data of paths, especially those with vital uses, is essential to determine the interaction between movement and the distribution of land uses and identify the effect of land-use configuration on safety in the mahalla. Subsequently, the

Another vital point about use-deployment and combination is the choice of the types of uses on the ground floors of buildings. As mentioned above, Bazar mahalla has a wide range of uses due to its proximity to Tabriz Bazar, which includes commercial uses of different types. The commercial prevalence in the area has led to allocating the ground floors of all buildings located on the outer edge of the mahalla to commercial uses. Despite the potentiality, the opportunity to exploit them for nightlife or, at the very least, for creating spaces to optimize the safety feeling in the context has not been taken.

relationship between the mahalla's main and secondary centers will be investigated (Fig. 6).

A. Fig 6 shows the connectivity value of the axes surrounding the Bazar mahalla. The functional axis on the western side of the mahalla has the highest connectivity value. As one of the most critical functional nodes, the centralized commercial area in the west of the mahalla is surrounded by axes with high connectivity value and has made it possible for users to have easy access. The eastern and southern functional axes of the mahalla are ranked second. The western, northwestern, and southern axes of the centralized commercial area of Tabriz Bazar, which provide the most access to this area, have a high average connectivity value. The distribution of magnet poles in the access network structure provides an acceptable level of intra- and inter-spatial connections among these functional magnets leading to high connectivity value. The proper spatial connections among these functional magnets have converted their axes into locations of a diverse range of urban uses and provide the possibility of an extensive range of riding and pedestrian populations in the context. Investigating the

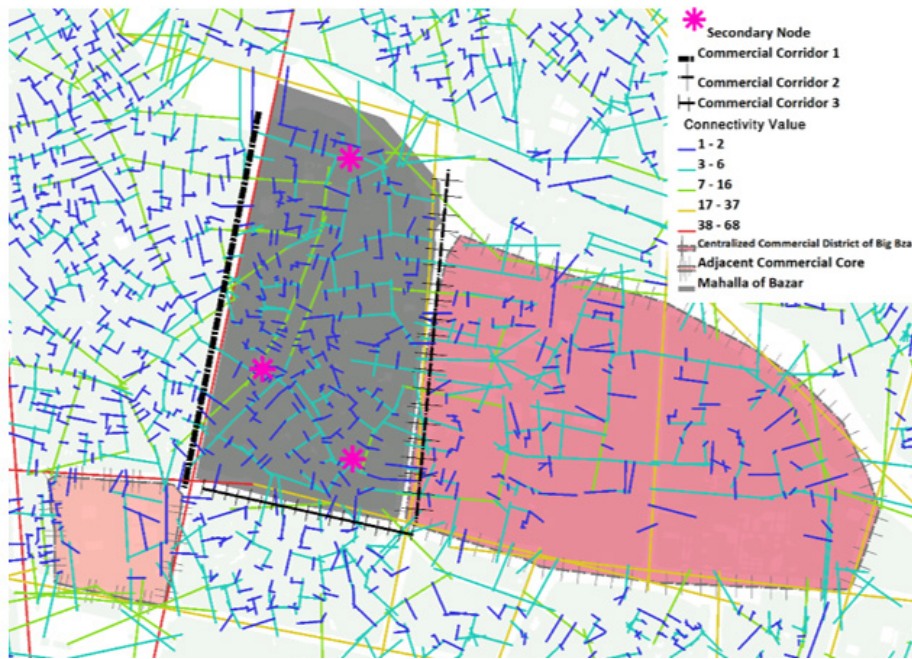


Fig. 6: Movement Economy and Centrality as a Process- Bazar

relationship between the connectivity value of the axes and local integration shows that with the increase in local integration, the connectivity value of the axes increases (Fig. 7). This confirms the spatial cohesion of the context due to access and is considered a strong point in attracting the population into the area - along with the functional nature of the context adjacent to the Tabriz Bazar.

Centrality as a Process: An examination of intra-context secondary centers in the mahalla indicates the lack of appropriate spatial relationships between the secondary and main nodes –of the functional axes- in the Bazar mahalla. According to Fig 6, the peripheral axes of these nodes have a low connectivity value as the axes between these sub-nodes do. In other words, this spatial parameter with such features and the integration parameter represents the spatial-functional segregation of the three nodes mentioned. Fig 7 shows the numerical measurements confirming the direct relationship between connectivity value and local integration in these axes. Regarding, The axial lines with low connectivity values have lower integration. Another point is the lack of a robust spatial connection between the intra-context sub-nodes of the mahalla with the magnet poles in the area. Fig 6 shows how the nesting context and convoluted axes of Bazar have led to a gap between its edges and the interior context of the mahalla and reduced the number of axes attached to the axial lines inside the context. Such spatial segregation is also verified by examining the lower local integration of the context. In general, secondary nodes do not interact actively with main nodes, but the inner connection among these three sub-nodes is passive and non-

dynamic. This is due to the type of context spatial structure on the one hand and the type of uses deployed on them on the other- and secondly, important. As a result, sub-nodes have not been able to play their role as local secondary centers.

In general, it can be concluded that the low connectivity values and the weak spatial connections among sub-nodes with one another and with the centralized commercial areas and the peripheral functional axes lead to a decrease in the flow of movement between them and in the attraction of users.

B) Manzarie Mahallas

A. Movement economy: Fig 8 shows the overlap of the connectivity parameter in the Space Syntax approach and GIS data. Based on this map, the northern axis of the mahalla outside the area, as one of the magnet poles, has the highest connectivity value. The northern and northeastern axes of the mahalla rank second, and the third is the southeastern functional axis (Fig. 8).

There is an excellent spatial relationship between the functional magnet poles in the area, making it easy to move the population among these poles. The result is emerging inter-dependent uses among the magnet poles making economic life possible for a diverse range of mixed uses on the edges of the mahalla, fed by the presence of population and movement congestion in these axes. Such a coherent spatial connection and accessibility of edges are reflected in the high connectivity value of the axial lines. Investigating the relationship between the connectivity value and the area's local integration confirms this finding (Fig.

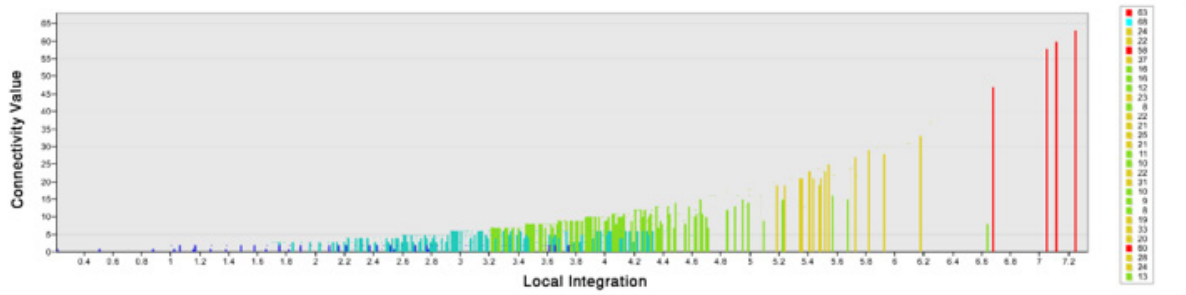


Fig. 7: Relation of the Connectivity Value and Local Integration of Bazar Axial Lines

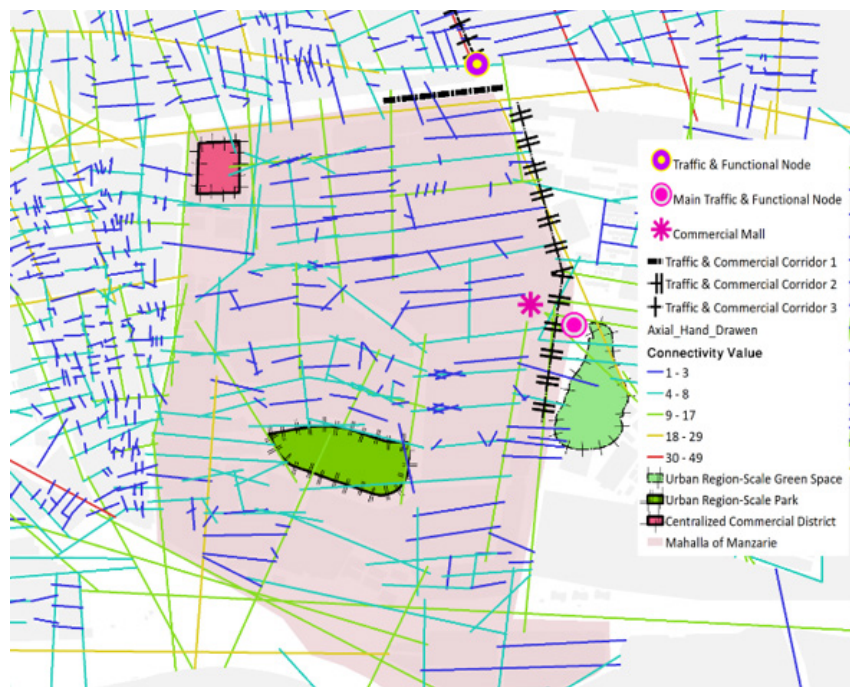


Fig. 8: Movement Economy and Centrality as a Process- Manzari

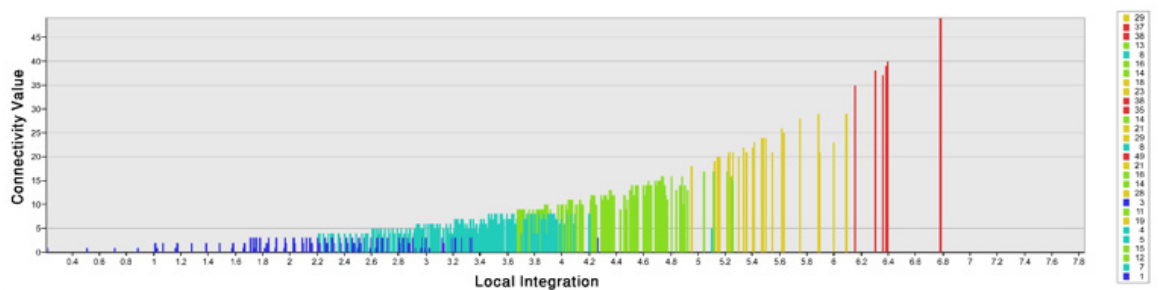


Fig. 9: Relation of the Connectivity Value and Local Integration of Manzari Axial Lines

9). As shown in Fig 9, increasing the local integration of the axial lines boosts their connectivity values.

B. Centrality as a process: The study of the spatial relationship between the main and sub-nodes of the context of Manzari shows that the main node has increased its connectivity value

by being located at the intersection of the access roads, hence the proper spatial connection with the other magnet poles (functional axes on edges) providing good access for users (Fig 8). In other words, this main center will establish a dynamic interacting relationship with other centers and functional

Table 6: Summary of research findings

Mahalla	Movement Economy					Centrality as a Process					Safety Evaluation
	Magnets' Location	Connectivity Value	Movement Behavior	Movement Density	Nodes and Sub-Nodes Relation	Sub-Nodes Relation	Connectivity Value	Movement Behavior	Movement Density		
Bazar	Edges	High	Shopping Passing Resting	High	Weak	Weak	Medium downward	Shopping Monitoring	Low	Low	
Manzarie	Edges	Good	Shopping Promenading Passing Monitoring	High	Good	Weak	Medium	Shopping Promenading Passing Monitoring	Good	Good	

magnet poles in the area. The centralized commercial area on the entrance of the western axis of the mahalla is located on the corner of two main axes with a high connectivity value providing comfortable access for riding users in the area. However, examining the connectivity value of the peripheral axes and especially the axes among the long space between this area and the two main and secondary nodes shows the weak presence of the mahalla's users therein. A remarkable point in this mahalla is the massive presence of cross-local users in the sub-node area, which plays a role as a magnet pole despite having a moderate connectivity value. This can be attributed to the short distance between the main node and the magnet poles of the eastern functional axis and the lack of urban green space in the surrounding mahallas. In addition, the entry axes of the mahalla are inviting.

In sum, the number of axes with high connectivity values in Manzarie mahalla is greater than that of Bazar mahalla, and the inner axes of Manzarie have a higher connectivity value than the axes of Bazar. In other words, the spatial connection between the various sections of Manzarie is better than that of Bazar, and users find them more accessible.

CONCLUSION

The research findings to answer the research question can be summarized in table 6.

Confirmation of Hypothesis: It can be concluded that the safety of urban areas depends on the location of uses within them and, consequently, on the users' movement behavior in these areas. Comparing the two mahallas shows that Manzarie offers a better arrangement of uses in the inner axes and secondary nodes than Bazar, provides an excellent spatial connection among its various gravity points, and thus presents various movements behavior typologies (Table 6). Therefore, it displaces more people in connecting axes among different uses, enjoying the possibility of surveillance and spatial dynamics, which makes the area safer. In contrast, the inner sub-centers of the Bazar follow the functional arrangement of the extensive commercial uses present in the area (Tabriz Bazar

and its related business centers in the peripheral areas) and thus lack the appropriate spatial connections with the main poles and centers. It does not provide good access among sub-areas. It is subject to a limited range of movement behaviors in the context, reducing the number of users and thus endangering the safety of all its users, especially non-local ones.

It is suggested to carry out further studies on the type of uses, their functional scale, users' behavior, and the level of feeling safe to obtain more detailed information about the perception of safety next to each land use or a mixed zone of uses.

ENDNOTES

1. Historically, mahallas were autonomous social institutions built around familial ties and Islamic rituals. It is also popularly recognized by non-Muslims as a neighborhood in large cities and towns. It is an official administrative unit in many Middle Eastern countries instead of the neighborhood.

REFERENCES

Alexander, C. (1977). *A pattern language: towns, buildings, construction*. Oxford university press.

Andresen, M. A. (2016). *The place of environmental criminology within criminological thought. In Classics in environmental criminology* (pp. 21-44): CRC Press.

Biddulph, M. (2007). *Introduction to Residential Layout*, UK: Oxford.

Brantingham, P. L., & Brantingham, P. J. (1978). A topological technique for regionalization. *Environment and Behavior*, 10(3), 335-353.

Calthorpe, P. (2000). New Urbanism and the Apologists for Sprawl [To Rally Discussion]. *Places*, 13(2), 67-68.

Cervero, R., & Kockelman, K.(1997). Travel demand and the 3Ds: density, diversity, and design. *Transportation Research Part D, Transport and Environment*, 2(3), 199-219, [https://doi.org/10.1016/S1361-9209\(97\), 00009-6](https://doi.org/10.1016/S1361-9209(97), 00009-6)

Clarke, R. V. G. (1992). *Situational crime prevention: Successful case studies*. Harrow and Heston Publishers. Lynne rinner publication.

Clarke, R. (2002). Closing streets and alleys to reduce crime: should you go down this road? Problem-oriented guides for police response

- guides series No. 2. US Department of Justice Office of Community Oriented Policing Services. Retrieved from: www.cops.usdoj.gov.
- Coleman, A., & Bachin, W. G. V. (1979). Land use maps. *The Cartographic Journal*, 16(2), 97-103, <https://doi.org/10.1179/caj.1979.16.2.97>
- Colquhoun, I. (2004). *Design Out Crime: Creating Safe and Sustainable Communities*: Routledge.
- Corbett, J. (2003). Alice Coleman, Design Disadvantage, 1985. *CSISS Classics*. Retrieved from <http://www.csisss.org/classics/content/41/>
- Dempsey, N., Brown, C., Raman, S., Porta, S., Jenks, M., Jones, C., & Bramley, G. (2010). *Elements of urban form*. In M. J. a. C. Jones (Ed.), *Dimensions of the sustainable city* (pp. 21-51): Springer, <https://doi.org/10.1007/978-1-4020-8647-2>
- Duany, A., & Plater-Zyberk, E. (1994). *The neighborhood, the district, and the corridor. The new urbanism: Toward an architecture of community*.
- Farid Tehrani, Saye, (2011). *Fear in Public Spaces*. Tehran: Armanshahr Publication.
- Fleissig, W., & Jacobsen, V. (2002). Smart scorecard for development projects. *Paper presented at The Congress for New Urbanism and US Environmental Protection Agency*.
- Gehl, J. (2011). *Life between buildings: using public space*: Island Press.
- Hillier, B. (1984). *Space is the machine: a configurational theory of architecture*. Space Syntax.
- Hoppenbrouwer, E., & Louw, E. (2005). Mixed-use development: Theory and practice in Amsterdam's Eastern Docklands. *European Planning Studies*, 13(7), 967-983, <https://doi.org/10.1080/09654310500242048>
- Jacobs, J. (1961). *The death and life of great American cities*. New York: Vintage.
- Jeffery, C. R. (1971). Crime prevention through environmental design. *American Behavioral Scientist*, 14(4), 598-598, <https://doi.org/10.1177/000276427101400409>
- Kitchen, T., & Schneider, R. H. (2007). *Crime prevention and the built environment*: Routledge.
- Lambert, B. (1993). Elizabeth Wood: Innovator In Early Days of Public Housing. *The New York Times*, section 1, P.38. Retrieved from <http://www.nytimes.com/1993/01/17/us/elizabeth-wood-93-innovator-in-early-days-of-public-housing.html>
- McSweeney, B., McSweeney, W., & Bill, M. (1999). *Security, identity and interests: a sociology of international relations* (No. 69). Cambridge University Press.
- Miles, R., & Song, Y. (2009). "Good" neighborhoods in Portland, Oregon: Focus on both social and physical environments. *Journal of Urban Affairs*, 31(4), 491-509, <https://doi.org/10.1080/17549171003764470>
- Naghsh Mohit Consulting Engineers. (2012). *Tabriz Comprehensive Plan: Social and Physical Study*. Tabriz: General Directorate of Roads and Urban Development in East Azerbaijan province.
- Newman, O. (1996). *Creating defensible space*: Diane Publishing.
- Polyzoides, S., & Moule, E. (1998). *Towards an architecture of urban and ecological consequence*. University of Virginia.
- Pourmohammadi, M. R. (2003). *Urban Landuse Planning*. Tehran: SAMT Publication.
- Rowley, A. (1996). Mixed-use development: ambiguous concept, simplistic analysis, and wishful thinking? *Planning Practice & Research*, 11(1), 85-98, <https://doi.org/10.1080/02697459650036477>
- Sarkissian Associates Planners. (2000). *Crime Prevention and Urban Design Resource Manual*. Canberra: Australian Capital Territory Government.
- Saville, G., & Cleveland, G. (1997). Second-Generation. CPTED: The Rise And Fall Of Opportunity. Theory. In *21st century security and CPTED* (pp. 93-104). Auerbach Publications.
- Sherman, L. W., Gartin, P. R., & Buerger, M. E. (1989). Hot spots of predatory crime: Routine activities and the criminology of place. *Criminology*, 27(1), 27-56, <https://doi.org/10.1111/j.1745-9125.1989.tb00862.x>
- Shu, C.-F. (2009). Spatial configuration of residential area and vulnerability of burglary. *Paper presented at the 7th international space syntax symposium*, Stockholm, Stockholm.
- Solomon, D. (2003). *Global city blues*. Island Press.
- Spears, S., Boarnet, M. G., Handy, S., & Rodier, C. (2014). Impacts of Land-Use Mix on Passenger Vehicle Use and Greenhouse Gas Emissions. *Policy*, 9, 30.
- Taylor, R. B., & Harrell, A. (1996). *Physical environment and crime*. US Department of Justice, Office of Justice Programs, National Institute of Justice.
- Tseng, C.-H. (2006). Safety performance analyzer for constructed environments (SPACE). (Ph.D.), The Ohio State University.
- Wood, E. (1961). *Housing design: A social theory*. *Ekistics*, 12(74), 383-392.
- Yinan, Z., & Chen, H. (2009). Intensity Control in Mixed-Used New Urban Area: A Case Study of the Waterfront in Xiasha, Hangzhou: *Paper presented at The 4th International Conference of the International Forum on Urbanism (IFoU) Amsterdam/Delft*.

