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Original Research Article

A Comparative Study of Architecture in Traditional Bazaar and Golestan Shopping Center in Kermanshah, Iran through the Lens of Synomorphy Theory*

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Abstract

Problem statement: Establishing fitting relationships between users and physical spaces is among the contemporary challenges for architects in a way that the success rates associated with the functional plans of environments are typically assessed based on the structure-behavior connection. As stated by Barker (1968), the high harmony between the physical and social components, also called synomorphy, gives birth to more efficient spaces. Investigating associations between physical environments and behavioral patterns in public spaces has been thus of utmost importance as it helps reach a better understanding of the relationships between humans and their needs as expressed by a diverse set of behaviors in an environment. Against this background, this study reflected on two commercial centers as behavior settings to evaluate the effects of their distinctive physical structures on users' behavior formation.

Research objective: The main objective of this study was to investigate the synomorphy between physical structures and environmental behaviors in the Traditional Bazaar and Golestan Shopping Center, as a manifestation of contemporary commercial centers, in the city of Kermanshah, Iran. The study attempted to fulfill this goal by answering this question:

How are the functions of commercial centers, traditional and contemporary, improved with emphasis on Barker's Theory of Behavior Settings (TBS, 1968)?

Research method: Utilizing a qualitative approach and a descriptive-analytical, field-based, unsimulated research design, this applied study was fulfilled at certain intervals.

Conclusion: The study results revealed that the Traditional Bazaar had a much more appropriate function thanks to its stronger structure-behavior synomorphy, and was even quicker to respond to users' behavioral patterns, granting the prospect of minimizing the diversity of such patterns and undermining the market plan, attributable to the threats and weaknesses. Reflecting on Golestan Shopping Center, the structure-behavior relationship was assessed to be uncomplimentary, so more constructive steps needed to be taken to boost its functions based on the suggestions raised here.

Keywords: *Synomorphy, Behavior Settings, Ecological Environment, Market Function, Traditional Bazaar, Kermanshah, Iran.*

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Introduction and Problem Statement

The establishment of appropriate relationships between users and physical spaces (Faizi & Sohrabian, 2014) has been to date among the major challenges facing contemporary architects. due to the conflicting opinions between architects and users in terms of defining the right environments (Lang, 2016). In other words, most architects have merely devoted much attention to the principles of metric design and passed over those of behavioral design in physical environments (Tafakor, Shahcheraghi & Habib, 2020). For that reason, some architects have realized the necessity of creating a common, uniform language and developing new knowledge to build spaces familiar to people better than before (Paknejad & Latifi, 2018). Besides, research on human-environment relationships has been founded on the combination of environmental and behavioral knowledge to shed light on the perception and recognition of human behavior in terms of interactions with the surrounding environment. To avoid a quantitative attitude toward the assessment of human-made spaces, the environment in such studies has been assumed as a container of collective actions and behaviors, and then its psychological and sociological aspects have been analyzed.

The given studies have been divided into two parts, viz., environmental perception sciences and environmental behavioral sciences or ecological psychology. Among the related theories, the ecological approach has a more systematic, comprehensive view of behavior due to its realistic-objective and empiricist-pragmatic approach. It has been thus defined by most researchers as the straight answer to restoring the quality of human living environments. From the perspective of ecological psychology, the human-made environment is composed of organizations with separate physical and behavioral systems that are then connected and form single wholes, called behavior settings. In this view, behavioral patterns are much more stable than the physical ones, since they undergo less change. For this reason, the firmly fixed patterns of environmental behaviors can be utilized to evaluate and predict the functions of the environment. The high harmony between the physical and social components, also labeled as synomorphy or interdependence between the components of an ecological environment, resulting in internal coherence (Barker, 1968), can thus lead to more capabilities and efficiency of spaces (Tafakor, Shahcheraghi & Habib, 2020). Considering abundant ambiguities in environmental design and the way to augment the efficiency of physical spaces, the ecological approach raised by Barker (1968) as well as the studies into the human collective environments based on this approach can serve as guidelines. The research hypothesis addressed here was that the function of physical environments could be evaluated based on their users' behaviors. That is, commercial centers were to be examined as an important territory of daily life and an active collective behavior setting. The main objective of the present study was to investigate environmental function in two commercial centers in the city of Kermanshah, Iran, with regard to their distinctive structures through the synomorphic investigation of structures and behaviors (Fig. 1), and draw on the results to design a suitable space for users. In this study, the following questions were answered:

How are the functions of commercial centers, traditional and contemporary, improved with emphasis on Barker's Theory of Behavior Settings (TBS, 1968)?

How do the architectural elements of the Traditional Bazaar and Golestan Shopping Center in the city of Kermanshah, Iran, impact users' behaviors?

What are the structure-behavior differences and similarities between the Traditional Bazaar and Golestan Shopping Center in the city of Kermanshah, Iran?

Research Background

Hellpach introduced ecological psychology in the first half of the 20th century. In the following decades, researchers further explored its application

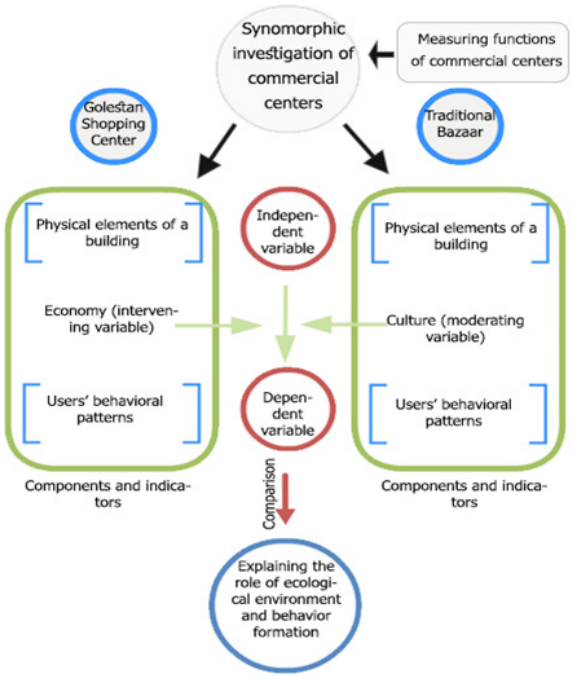

Fig. 1. Structural model of the study. Source: Authors.

in the design and environment-behavior interaction. At the beginning of the 21st century, the impact of environmental issues and human behaviors on the worldwide ecosystem was investigated. The knowledge of ecological psychology during this century also developed with a wide variety of theories, such as Field Theory (Lewin, 1943), Spatial Contiguity Principle (Altman, 1950), the Lens Model Theory (Brunswick, 1952), Environmental Psychology by Ittelson (1964), the Ecological Theory of Perception (Gibson, 1966), the TBS and the formation of Ecological Psychology (Barker, 1968), the Interactionist School of Environmental Perception and Cognition (Ittelson, 1973), and the publication of Creating Architectural Theory: The Role of Behavioral Sciences in Designing the Environment by Lang (1974) (Strumse, 2014; Lang, 2016 & Steg, van den Berg & de Groot, 2017).

There have been many studies in this field in Iran. For example, Mansoornia, Qaraei, and Bahrami (2016) evaluated the responsiveness of the leisure spaces on the brink of the Zarivar Lake, Marivan, and reported that the existing conditions did not adequately meet the needs of users. In another survey by Alimardani and Thaghafi (2016), the public spaces of urban commercial centers were examined via the TBS, and some suggestions were offered for the behavioral diversity of the users. Somewhere else, Shoeleh, et al. (2018) assessed public realms and analyzed the activity and behavioral patterns in Ahmadi Pedestrian in Shiraz. Paknejad and Latifi (2018) also evaluated the effects of environmental components on the formation of behavioral patterns in urban spaces in Tajrish Square, Tehran. In another investigation, Paknejad, Tabibian, & Latifi (2019) considered the effect of the spatial components in Zargandeh and Darus neighborhoods in Tehran on citizens' behaviors. Moreover, Paknejad, Tabibian & Latifi (2020) in one other study reflected on behavioral patterns in the spatial organization of Zargandeh and Darus neighborhoods using AGRAF. Besides, Tafakor, Shahcheraghi & Habib (2019) comparatively investigated the architecture of Tajrish Traditional Bazaar and Arg Shopping Center in Tehran based on Synomorphy Theory.

Since human-made spaces have a dynamic nature, the systematic ecological observation of collective environments is of utmost importance, and some factors such as the changes in lifestyles and daily activities as well as the emergence of new users have been so far addressed (Gehl & Svarre, 2013). With reference to previous research in the field of synomorphic investigations of collective spaces, the present study was to examine the synomorphy of the Traditional Bazaar and Golestan Shopping Center in the city of Kermanshah, Iran, as a manifestation of contemporary commercial centers.

Theoretical Foundations

• Theoretical review of ecological concept

Ecology is rooted in the Greek term, oekologie, and the knowledge of ecology is assumed as a subset of the knowledge of biology. Research on the relationships between living organisms and other species, assimilation with one's habitats, the way living organisms change the environments, population distribution, social organizations, the cycle of different species, and ecological succession

to become more compatible with the changing environments, has been thus of interest in this domain (Charles, 2012).

• Behavior settings and ecological environments

Psychological research on the role of the physical-social environment in determining behaviors has to date led to the conception of the interdisciplinary field of environmental psychology and environmental behavioral sciences, that is, ecological psychology, as its subset. In this respect, the TBS proposed by Barker (1968) has been derived from ecological psychology (Keshmiri & Nikounam Nezami, 2023). Behavior settings are the common units of analysis for the environment-behavior interaction, consisting of the physical and social elements of the environment as a whole. In other words, the behavioral environment is a combination of environment and behavior (Raja & Heras-Escribano, 2023). On top of specifying some possibilities, behavior settings impose a selection of normative restrictions (Kalis, 2023). According to Barker (1968), the physical-social environment contains physical and social structures as the units of analysis, also called the ecological environment or behavior settings, and behavioral patterns are typically organized in keeping with such structures (Scott, 2005 & Strumse, 2014). Of note, behavior settings as ecological units are a combination of environmental and behavioral components. They are also systematic, structured, and altogether dynamic and changing, while a semi-stable balance is often observed between environmental forces and controls and behavioral patterns in many settings (Francovich, 2008). Behavior settings help connect roles and actions in individuals to their occurring natural habitats, and further raise an explanatory hypothesis to understand the changes in people's behaviors. Besides, an organized structure is always fashioned to expand research and understand the impact of the environment on behavior through very detailed behavioral observations and the study of people's daily behaviors appearing naturally in everyday situations, i.e., free conditions, in their natural habitats, and then their synthesis with accepted foundations and higher-order descriptive systems, that is social structures. Among the reasons for the significance of the TBS is its empiricist, pragmatic, objective, and realistic orientation toward the study of human behavior, simultaneous attention to both theoretical justification and empirical research, as well as more practical considerations to deal with functional problems in real-life situations, which have been the grounds for numerous investigations and the emergence of scientific disciplines (Eklund & Scott, 1985; Popov & Chompalov, 2012).

- Descriptive characteristics of Behavior Settings

Main objective: Each behavior setting has its own distinct plan, as the rationale of its formation is to state what a behavior setting actually does.

The dominant pattern of activity: Barker (1968) initially divided the patterns of activity into observational ones to evaluate them in a setting, and then developed the observational patterns at a finer level for more detailed analysis.

Behavioral mechanisms: Barker (1968) classified behavioral mechanisms into five groups, viz. motor activities, finer skills (namely, use of objects and equipment), mental activities, social activities (that is, verbal and non-verbal interactions), and emotional reactions.

Reference to overall richness and behavioral diversity: Different patterns of activity and behavioral mechanisms within a behavior setting help evaluate the richness and diversity of behavioral patterns.

Mechanisms for maintaining behavioral structures: A behavior setting has a self-regulatory nature. In this sense, the setting continuously adjusts itself with this specific goal, and then removes disruptions and corrects or eliminates those that deter the realization of a plan.

Influence (namely, behavioral role and functional position of people): Subordinates have different degrees of influence in a behavior setting. In this context, Barker (1968) defined six distinct functional

roles, i.e., viewer or supervisor, audience or guest, member or customer/client, personnel, and active role-player (viz., people with power over one part of a behavior setting, but not directing it), co-op leader in different fields, and individual leader.

Pressure: Barker (1968) refers to pressure as the forces motivating an individual to start or withdraw or even avoid a behavior setting, and categorizes its gravity on an individual as compulsion (namely, the necessity to enter a behavior setting due to an individual's need), persuasion, motivation, and insistence (that is, forcing an individual to enter), an invitation for entry, neutrality (i.e., the indifference of a behavior setting toward the entry of people), tolerance (viz., limited requirements for the entry of people), resistance (here, obligations for the entry of people), and prevention of the entry of people.

Welfare and comfort: Among the main objectives of the human environments with diverse behavior settings is to meet needs. The responsiveness of different settings to the needs of various people and subgroups is not accordingly the same. In other words, different needs of a person are met at different times.

Local independence: According to Barker (1968), the four rules of behavior setting (including, determination of performance, mode of accepting members, costs and prices, and the basis of costs and prices) are not solely determined by the settings, but they are somewhat influenced by the laws of the upstream geographical areas and the setting bases (Bonnes & Secchiaroli, 1995; Perkins, Burns, Perry & Nielsen, 1988; Scott, 2005; Eklund & Scott, 1985; Golrokh, 2012; Lang, 2016).

- **Synomorphy**

Three factors, including non-behavioral factors, such as time and environment; permanent, recurring behavioral patterns; and the relationship between both preceding factors contribute to the formation of behavior settings. In addition to time and environment, named as the factors confounding the behavioral patterns in the third factor, synomorphy has been introduced as the central aspect of communication, as it helps describe the fit between behavior and physical environment (Keshmiri & Nikounam Nezami, 2023).

All behavior settings have their unique functional structures as well as a set of physical patterns and behavioral frameworks (Lang, 2016; Popov & Chompalov, 2012; Shahcheraghi & Bandarabad, 2015). The TBS accordingly connects environmental sciences to behavioral ones (Golrokh, 2012). Barker (1968) believes that non-homogeneous components of an environment (i.e., the behavioral and physical-structural components) are in harmony with each other, and there is convergence, consonance, synomorphism, compatibility, conformity, and fit between them in an ecological environment (that is, a behavioral base) due to the interlinking of the physical and social-behavioral structures arising from specific functional goals. Lang (2016) has also tapped the same interpretations. Synomorphy thus goes beyond the ergonomic (viz., form-based) and anthropometric (that is, dimensional) coordination between the human and physical space, but lays much focus on the functional management of all physical and behavioral components within a spatiotemporal boundary, based on special functional plans. From the structural viewpoint, a behavior setting stands for a collection of synomorphs, and the synomorphic features refer to vital concordance, interdependence, and structural entanglement of environmental and behavioral components. This means that the functional nature of a behavior setting (i.e., an ecological environment) and its practical activities describe the strict requirements for matching the functional compatibility of physical-structural and social-behavioral aspects with each other to create a single functional structure and make these two aspects interdependent and complementary. There is no doubt that the functional goals of an environment fail to be fully realized if the characteristics of these two aspects are not coordinated. Some have also translated synomorphy into structural similarity (Shahcheraghi & Bandarabad, 2015; Golrokh, 2012). The co-construction of the border, form, and

structure of the components of behavior settings and the resulting unity has been thus delineated as one of the basic criteria for their identification (Scott, 2005). In this vein, Heft, et al. (Heft, Hoch, Edmunds & Week, 2014) directly considered this term as a criterion for identifying the identity of behavior settings. In their words, it was not possible to utilize behavioral or environmental patterns alone as the criteria for mere action. According to other researchers, this feature could be both the basis of structural classification and the evaluation of dynamic relationships between behavior settings.

- **Nature of commercial centers**

Human-based collective environments incorporate various activities and behaviors. Such behavior settings are thus good grounds for measuring environment-behavior synomorphy. The TBS accordingly looks into environmental behaviors demonstrated by people within collective settings. Notably, today's commercial centers as a manifestation of collective spaces have changed their own nature, characterized by passive, communicative, and cultural consumption of the environment, as well as creative production, viz., developing an arena for social interactions and behaviors, power conflicts, and conflict of interest between the strong and the weak. In this respect, the forgotten or non-productive sections of society typically present their hidden production in the process of using items, goods, and urban spaces. The concepts other than shopping, as the main functional plan, accordingly make them attend and use the environment irregularly or the wrong way around. Here is a setting against saying no, opposing, evading, showing expertise, undermining and declining rules, rising over policies and inequality imposed by the society, but in an implicit, wise, conservative, and revolutionary way, to adapt the environment to their interests while gradually changing (Varij Kazemi, 2022).

Methods

Utilizing a qualitative approach and a descriptive-analytical, field-based, unsimulated research design, this applied study was performed at certain intervals. To collect and analyze the required data, some tools, such as document review, ethnography and fieldwork techniques, especially non-interventional observation, and the logical inference process were implemented. Notably, ethnography was implemented as a useful method to understand the living experiences of people in their daily lives and public realms. This method could allow researchers to make inquiries within the existing spatial context and link physical-spatial characteristics and environmental-behavioral patterns, formerly disregarded in sociological and environmental design studies, respectively. In this sense, ethnography could help focus on the researcher's interaction with the collective space.

Considering Barker's (1968) emphasis on changing the ecological structures of the environment and behavioral patterns over time (Lang, 2016), two commercial centers were selected from traditional and contemporary physical spaces to evaluate their potential for comparatively adopting behavioral patterns. To control the effect of the intervening variables, including the diversity and density of the urban context and the cultural characteristics of the users, the nearby behavior settings were further taken into account. As well, the environmental behaviors of the users were studied over four months. To this end, six time intervals were designated when these two settings were expected to show the most behavioral diversity and overlapping, thereby showing a comprehensive view of the collective behavioral nature. Of note, weather conditions and sociopolitical events were also assumed to be influential in the observations.

Following repeated presence in the study areas, a video camera was permanently placed in the selected behavior settings. Regarding the curiosity, concerns, and misconceptions of the users, there was much attempt to collect the information unobtrusively, by respecting privacy and ethical principles. Within each time interval, the field observations

were recorded through constant 15-minute video recordings at the time intervals of every 15 minutes. In each video recording, at least every 7. 5 minutes, one frame was then selected out of those in the most crowded and diverse state of the environmental-behavioral display. The minimum timing of 7. 5 minutes between the frames was to consider the time needed to change behavior because people were likely to change their behavioral patterns in the environment many times and even play a role within one of the eight patterns each time. During the 15-minute intervals of filming, three random photos were further taken in the most crowded and diverse situations to display the environmental behaviors. Throughout the entire 10-hour field observations, 100 frames were selected for each behavior setting (Fig. 2). Behavioral note-taking was correspondingly used to complete the data. During the observations, digital counters were further recruited to count the behaviors for recording purposes. In this way, the behaviors were counted during the review of the films. The activities and behavioral patterns that occurred after filming were then shown on maps. In addition, the behaviors and activities of some users were tracked without their knowledge by a camera or the unarmed eye, because they could have different behaviors while entering each setting).

To study the types of behavior in the course of each observation, the person practicing the behavior (personality typology), the reason for performing the behavior (the underlying factors, the reason for choosing the time and place of performing the behavior by the users and the space on the behavior), the place of expressing the behavior, the time of doing the activity, and the mode of doing the activity (the number of companions, appearance, and the goals) were also discussed.

• Study area and selected behavior settings

- Traditional Bazaar

The city of Kermanshah is among the old cities of Iran, located in the Zagros region (Figs. 3 & 4). The Traditional Bazaar in this city is positioned in the east-west direction. This commercial center has been divided into separate sections by the streets developed during urban regeneration plans. This building, organically formed during the Qajars, has an Esfahani architectural style, and its main structure is based on arches and columns. This traditional shopping center includes marketplaces, such as Alaf-Khaneh, Tork-ha, Kalimi-ha, Chal-e Hasan Khan, Toop-Khaneh, Hori-Abad, Koloochepaz-ha, Halabisaz-ha, Sahaf-ha, Mesgar-ha, Saraji-ha, Bazaz-ha, Sadooghsaz-ha, Bonakdar-ha, Ahangar-ha, Zargar-ha, and Dalan-e Vakil-al-Dowleh. At the intersection of Mesgar-ha, Saraj-ha, Sahafi-ha, and Zargar-ha, there is Chahar Sough in the direction of Sandooghsaz-ha, Emad-al-Dowleh Gheisarieh in Alaf-Khaneh, Seyyed Ismail arcade, as well as houses, caravanserais, mosques, and several baths located in this commercial center (Momeni & Soltani, 2017).

- Golestan shopping center

This shopping center is located in the city of Kermanshah (Fig 5), whose construction was launched in 2008, and then was put into operation at the end of 2017. This commercial center is among those located next to the Traditional Bazaar. Golestan Shopping Center has 141 stores, one restaurant, one fast food restaurant, and 12 service units.

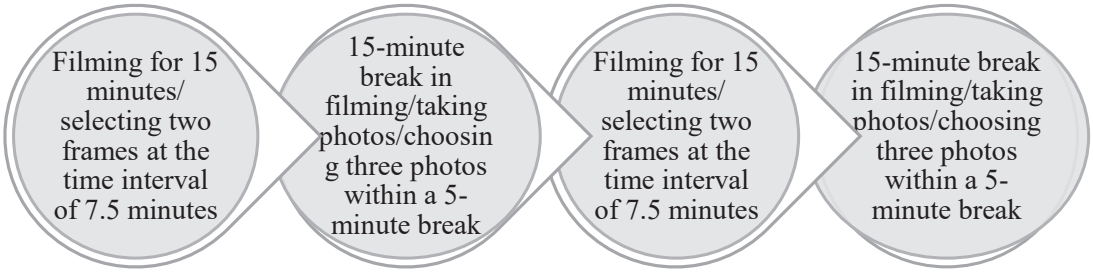

Fig. 2. Timing for sampling during the one-hour behavioral observations. Source: Authors.

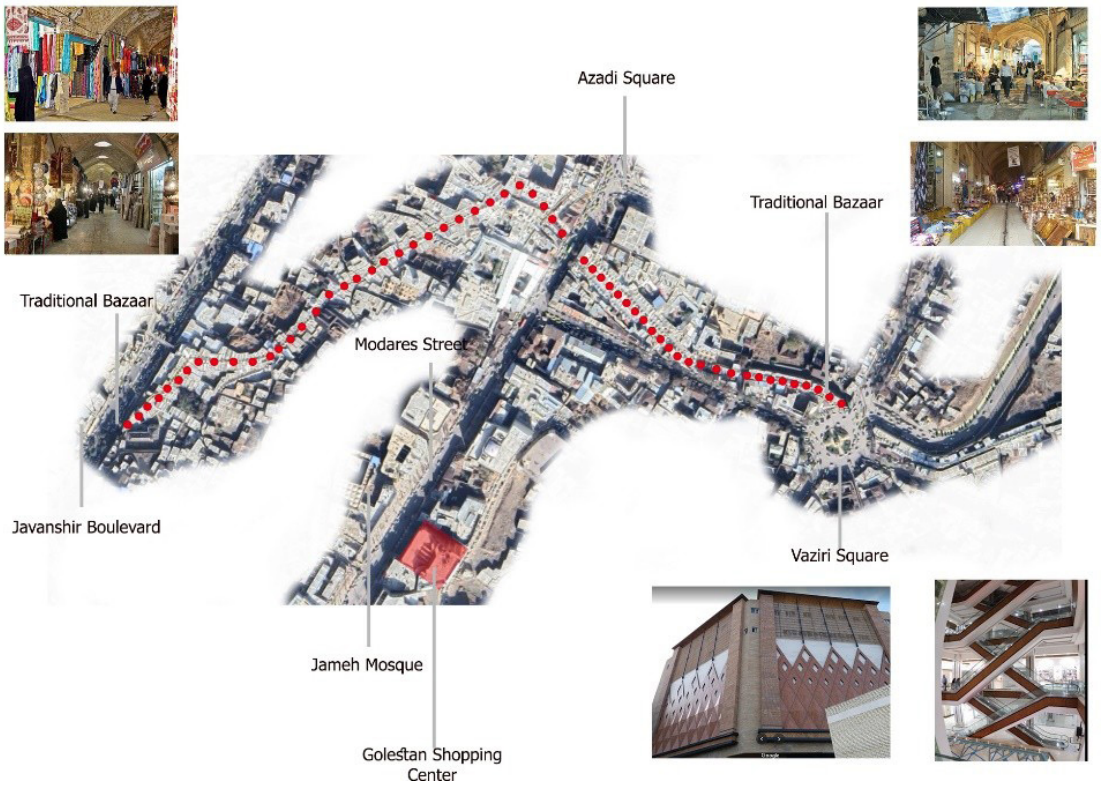

Fig. 3. Locations of the Traditional Bazaar and Golestan Shopping Center. Source: Authors taken from www.google.com/maps.

Fig.4. Location and access points of the Traditional Bazaar and its behavior settings. Source: Sajadzadeh, Abbasi Kernachi & Sohrabi, 2020.

Discussion

Based on Barker's (1968) TBS on the changes in the ecological structures of the environment and behavioral patterns over time (Lang, 2016),

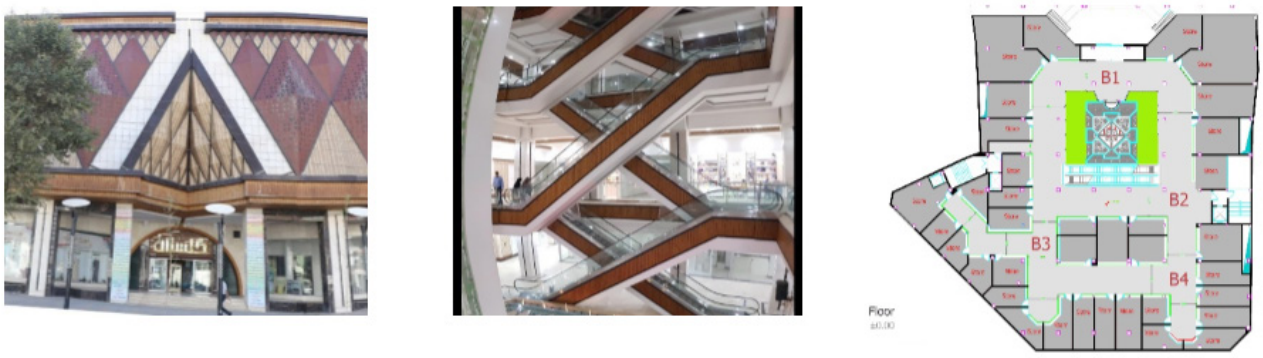

Fig. 5. Golestan Shopping Center map. Source: Authors.

two commercial settings were selected from two traditional and contemporary physical patterns in this study to compare their potentials in terms of adopting the desired behavioral patterns. The positions of these two behavior settings in the same urban area and the points of access were also of importance in picking these samples, so the impact of the intervening and underlying factors, such as the diversity and density of the urban fabric and the sociocultural characteristics of the urban and economic context, were controlled in people's environmental behaviors. Given that, two behavior settings, the Traditional Bazaar and Golestan Shopping Center, were purposively selected.

• Physical structure of selected behavior settings

Given the intricate characteristics of environments, users' behaviors are typically influenced by various factors; thus, behavior settings are impacted by physical characteristics and functions (Do, Nguyen & Nguyen, 2019). To introduce the physical structure of behavior settings, Barker (1968) addressed four components, viz., borders and margins, spatial configuration, sensory factors, and objects (Walsh, 1973). For this purpose, Tables 1 to 6 outline these components and then compare the physical structure of both behavior settings. Coding different settings associated with the occurrence of the behaviors for the field perceptions of environmental activities and behaviors is illustrated in Fig. 6.

The Traditional Bazaar was divided into four main settings with regard to their dynamicity and the crowds (Fig. 6a). The ground floor of Golestan Shopping Center was also chosen as the representative of the three other floors, viz., the basement, the ground floor, and the first floor, which were all for commercial uses (Fig. 6b). The third floor of Golestan Shopping Center was further selected as the representative of the second and third floors since it included the entertainment spaces and restaurants (Fig. 6c). The physical structure of this ecological environment was ultimately analyzed within four categories, namely, borders and margins, spatial configuration, sensory factors, and objects (Tables 1-6).

• Comparing socio-behavioral structure of selected behavior settings

To analyze the socio-behavioral structure of a behavior setting with an emphasis on its direct effect on the occurrence of environmental behaviors, Barker's (1968) TBS has delineated four key characteristics, namely, activity patterns, behavioral mechanisms, behavioral roles, and mechanisms for maintaining a behavioral framework against changes.

Among the 11 activity patterns within this theory, the functional plan of the Traditional Bazaar was associated with daily shopping, wholesaling some goods, vending, and doing workshop activities. On the other hand, the functional plan of the selected behavior settings in Golestan Shopping Center involved the representatives of wholesalers besides the restrictions on types of goods and the purchase of unnecessary items. In the Traditional Bazaar, the dynamic movement of users also shaped the spatial characteristics of the environment. Other

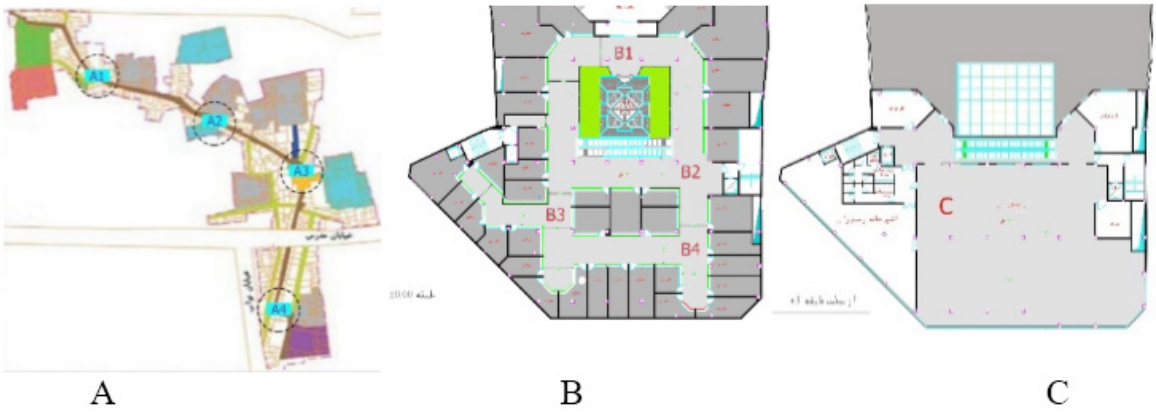

Fig. 6. Coding selected behavior settings. Source: Authors.

Table 1. Borders and margins. Source: Authors.

Borders and margins	Traditional Bazaar	Golestan Shopping Center
Border and enclosure	Fixed borders in the division of stores and semi-fixed borders in the view	Fixed borders
Circulation	Several related paths, an abundance of physical signs, and a physical difference between the arcade and the paths to marketplaces, paths with slopes	Two longitudinal linear paths and three transverse ones, wider linear paths as compared with those in the Traditional Bazaar

Table 2. Spatial configuration (spatial system). Source: Authors.

Spatial system	Traditional Bazaar	Golestan Shopping Center
Spatial organization	Convergent design in the arcade and paths to marketplaces	Linear design in paths centered around a void
Spatial proportions	Linear structure	Radial structure
Placement of focal points	Concentrated in the arcade, scattered in paths	Mainly concentrated in central space and very limited at the beginning or end of connected paths
Spatial unity	Strong (association of outside environment inside)	Weak (isolation of inner space)
Spatial continuity	Strong	Moderate
Spatial diversity	Multiple parts, the difference between paths and the arcade	Single part, similar paths, and central space

Table 3. Spatial configuration (functional-visual and movement system). Source: Authors.

Functional-visual system	Traditional Bazaar	Golestan Shopping Center
Organization of functions	Gathering at one level (simple stairway and some paths with slopes in some places)	Placement of stores at height
Capacity to absorb functions	Inviting and appealing (concave protrusion of walls to attract functions)	Inviting entrance depression, non-appealing stores
Separation of functional territory	Ambiguous territories, no respect for borders between stores and their entrance into the privacy of paths, placing items in paths	Respect for territories, the privacy of stores, clearly defined hallway
Movement opening of walls	Freedom of movement	Small doors and placement of glass showcases
Social interaction of walls	Direct connection between buyers and goods, closer relationships with sellers	Placement of goods inside stores, no direct contact between buyers and sellers (goods on shelves or behind showcases), more formal contact between sellers and buyers
View and general atmosphere	Traditional and friendly	Formal and neutral

Table 4. Sensory factors (visual system). Source: Authors.

Visual system	Evaluation and measurement	Traditional Bazaar	Golestan Shopping Center
Visual order	Chaos, static, and dynamic order	Diversity along with order and unity	Uniform order
Visual diversity	Visual diversity of walls, floor, and ceiling (Low, moderate, and high)	High variety	Moderate variety

Table 5. Sensory factors (sensory system). Source: Authors.

Sensory system	Traditional Bazaar	Golestan Shopping Center
Sensory interaction	Diverse textures of materials	Variations in textures of materials in parts of paths, smooth materials in most paths
Sensory diversity	Sloped paths with stairways in some places	Flat floors
	Ceiling skylight, high contrast	Harmonized lighting in all paths, bright light in some places
	Bird and wind sounds, noise made by users	Crowds of users, water fountain sound
	The smell of spices and flowers, dust, and dirt	Isolated environment
	Possibility of touching rainfall, uncontrolled temperature	Small-scale plants, water ponds, and fountains, controlled temperature and humidity

Table 6. Objects. Source: Authors.

Furniture, things, and the like	Evaluation and measurement	Traditional Bazaar	Golestan Shopping Center
Function	Physical barriers	No showcase	Having a showcase
Workshop	Workshop-style equipment	✓	×
Leisure time	Benches, tables and chairs, vases	×	×
Movement	Stairways, elevators, escalators	Limited (simple stairway)	✓
Moving goods	Wheelbarrows, carts, etc.	Limited equipment	Freight elevator
Movement of people	Wheelchairs, prams, etc.	×	✓
Communication	Internet, ATMs	×	✓
Monitoring	CCTV, audio systems	✓	✓
Facilities	Fire extinguishing equipment, air conditioning system	×	✓

✓: Equipped, ×: Not equipped

behavioral mechanisms, such as verbal and non-verbal interactions, emotional reactions, and artistic activities along with the dense population had no limits in this commercial center. The users were very diverse in the Traditional Bazaar due to the lack of restrictive rules for the entry of people, so all users were engaged in behavioral role-plays. Owing to private ownership and limited goods and buyers in Golestan Shopping Center, the behavioral roles were obviously more controlled. Moreover, the mechanisms for maintaining the behavioral framework were different in both behavior settings. These control mechanisms were generally more limited in the Traditional Bazaar. The constant presence of the population and the wide range of behaviors accepted by the management had thus minimized norm-breaking and the occurrence of unsettling behaviors in the Traditional Bazaar, but the security guards were responsible for dealing with the violation of behavioral norms in Golestan Shopping Center. In this way, the socio-behavioral structures of these two behavior settings were significantly different. Such differences were of importance in the analysis of environmental behaviors.

- **Behavioral observations**

In this study, eight behavioral patterns of the

given commercial centers, adapted from the state-of-the-art classification of such patterns by Gehl and Svarre (2013), the behavioral study of sociable environments by Ghafari, Doosti, Behzadfar & Varij Kazemi (2018)and the survey of Tajrish Traditional Bazaar and Arg Shopping Center by Tafakor, Shahcheraghi & Habib (2020) were reviewed. Given the limitations of providing detailed statistical reports, the environmental behaviors occurring in the desired settings were collected at different locations within six-time intervals. The data collection process was thus fulfilled following the steps described in the research methods. Six-time intervals were accordingly chosen in such a way that it was expected that both settings would show the greatest variety of behaviors and picture a comprehensive view of their behavioral nature through overlapping. The mentioned intervals were one day at the beginning of the week (November 26, 2022), one off-day on the weekend (December 16, 2022), one day at the beginning of the month (December 25, 2022), one day in the middle of the month (February 6, 2023), one day at the end of the month (March 13, 2023), and just a normal day not far off the ancient, national celebrations of Nowruz (March 19, 2023).

- Types of behaviors examined

Necessary and optional activities: a. buying essential, semi-essential, and non-essential items; b. gatherings and selective activities, such as leisure-entertainment activities as well as art and music performances

Social activities: a. activities not within the behavioral framework of the environment (namely, counteracting the behavioral limitations of the environment and matching it with one's interests); b. wandering around (here, a wanderer is a user spending time looking at the stores and products in an aimless and leisurely way, with a short-term stop of less than five minutes and doing some activities, such as window shopping, taking photos, or stopping for an average of less than 10 minutes associated with behaviors, such as waiting and the like; c. stopping (it means no movement and not catching others' attention for over 10 minutes, once the user is in isolation and self-absorbed to rest and rejuvenate, to quench hunger and thirst, etc.; d. presence, being immersed in the crowd, watching and being watched while being still or moving to create visual interactions and attract the attention of others; and e. insincere and short-term social interactions with strangers or intimate, long-term ones with acquaintances

Behavioral roles: Passers-by, buyers, wanderers, security guards and personnel, owners and sellers, management, vendors, and performers

Mechanisms for maintaining the behavioral framework against changes: Obligation, persuasion, invitation, neutrality against behaviors, modification of maladaptive behaviors, elimination of maladaptive behaviors

- Comparison of behavioral observations

The places with the most occurrences of behaviors are identified in the Traditional Bazaar and Golestan Shopping Center in Fig. 9a-c. The impact of the physical components on behaviors was further investigated, as presented in Tables 7-11.

Along with the study outcomes and observations, the impact of structure on the ecological environment was confirmed. The study further established a significant difference in shopping behaviors, as the main behavior of the functional plan of the commercial centers, within both behavior settings. Such behaviors were recorded to identify the users carrying shopping bags or those paying for their purchases (Fig. 7). The behavior settings of the Traditional Bazaar, as compared with those of Golestan Shopping Center, had thus had a greater share in terms of shopping behaviors (Fig. 8). The increase in shopping behaviors in the Traditional Bazaar could be attributed to its active walls and diverse uses. In contrast, there were many passive walls and glass showcases for visual communication between buyers and goods in Golestan Shopping Center, which had diminished the functional-visual features and even shopping behaviors. The high rate of short-range interactions with strangers in the Traditional Bazaar (12.74%), compared with that in Golestan Shopping Center (7.24%), could be due to the active walls,

Table 7. Borders and margins. Source: Authors.

Borders and margins	Traditional Bazaar	Behavior reinforcement	Behavior weakening	Golestan Shopping Center	Behavior reinforcement	Behavior weakening
Border and enclosure	Absorptive and active with several entrances	Shopping, short-term interactions, long-standing stop	Maladaptive activities, long-term stop	The solid and fixed boundary between movement paths and stores, one entrance	Long-term stop	Shopping

Table 8. Spatial configuration (movement-spatial system and functional-visual system). Source: Authors.

Movement-spatial system	Traditional Bazaar	Behavior reinforcement	Behavior weakening	Golestan Shopping Center	Behavior reinforcement	Behavior weakening
Spatial organization Spatial proportions Placement of focal points	Unity of elements and convergence of internal components	Selective adaptive behaviors, shopping behaviors, wandering around behaviors	Selective maladaptive behaviors	Convergence of internal components	Selective adaptive behaviors, shopping behaviors, wandering around behaviors	Selective maladaptive behaviors
Spatial unity			-			
Spatial continuity			-	Low		Selective maladaptive behaviors
Spatial diversity	High	Selective adaptive behaviors	-	Low		
Movement order	High	Wandering around behaviors	Long-term interactions with acquaintances, continuing to stop	High	Long-term stop, watching and being watched, long-term interactions with acquaintances	Wandering around behaviors, shopping behaviors, selective maladaptive behaviors
Movement smoothness	High			High		
Traffic volume	Low			Low		
Movement speed	High			High		
Behavioral monitoring of movements	Low		Selective maladaptive behaviors			
Appeal of movements	High					

augmenting the relationships between sellers and buyers and leading to a growth in shopping behaviors. Wandering around was also seen in both settings. In the Traditional Bazaar, there was much more traffic and crowds along with the sensory and visual stimuli of wandering around caused by the narrow and two-way paths. The percentage of this behavior, as compared with other behaviors, was 36.30%. In Golestan Shopping Center, wandering around was also more formal (21.97%) due to the significant width of the movement spaces, and watching and being watched were mostly occurring. The selective behaviors compatible with the behavior settings in Golestan Shopping Center were comparably higher thanks to space security and environmental comfort. While this behavior was at a good level in the Traditional Market, the middle of the arcade or the regression of some walls had raised an opportunity for the presence of vendors. According to the behavioral observations, it was possible to associate the selective maladaptive behaviors with the physical environment. The existence of some abandoned commercial buildings in the Traditional Bazaar further encouraged the space for maladaptive behaviors. Considering monitoring and the linear structure of the paths, such behaviors were lower in Golestan Shopping Center.

Table 9. Functional-visual system. Source: Authors.

Functional-visual system	Traditional Bazaar	Behavior reinforcement	Behavior weakening	Golestan Shopping Center	Behavior reinforcement	Behavior weakening
Behavioral adaptability of walls	High	Shopping behaviors, selective adaptive behaviors	-	Low	-	Shopping behaviors, selective adaptive behaviors
Inviting walls	High			Moderate		
Transparency and the possibility of walls progressing	High	Shopping behaviors, selective adaptive behaviors, short-term verbal interactions, wandering around behaviors	Selective maladaptive behaviors	Low	-	Shopping behaviors, selective adaptive behaviors, short-term verbal interactions, wandering around behaviors
Direct exposure to goods	High			Low	-	
Intimacy of walls and direct encounters	High			Low	-	
Emotional/ psychological/ conceptual/social/ aesthetic/artistic themes	High (intimacy and presence of people upstream and downstream)		Continuing verbal interactions	Low (Formal)	Wandering around behaviors, long-lasting interactions	Shopping behaviors, Selective adaptive behaviors, short-term verbal interactions

Table 10. Environmental-sensory factors. Source: Authors.

Environmental-sensory factors	Traditional Bazaar	Behavior reinforcement	Behavior weakening	Golestan Shopping Center	Behavior reinforcement	Behavior weakening
Visual order	Diversity and order	Selective maladaptive behaviors	Uniform order	Long-term interactions, wandering around behaviors		Selective maladaptive behaviors
Visual diversity	High			Moderate		
Sensory interaction	High			Moderate		
Sensory diversity, environmental-sensory stimuli	High			Moderate		

Table 11. Objects. Source: Authors.

Furniture	Traditional Bazaar	Behavior reinforcement	Behavior weakening	Golestan Shopping Center	Behavior reinforcement	Behavior weakening
Environmental equipment	Low	-	Long-term interactions, watching and being watched, lasting stop	High	Long-term interactions, watching and being watched	-
Adaptation to changes in behavioral patterns	High	Shopping	-	Low	-	Shopping

Fig. 7. Some behavioral observations in the behavior settings in this study. Source: Authors archive.

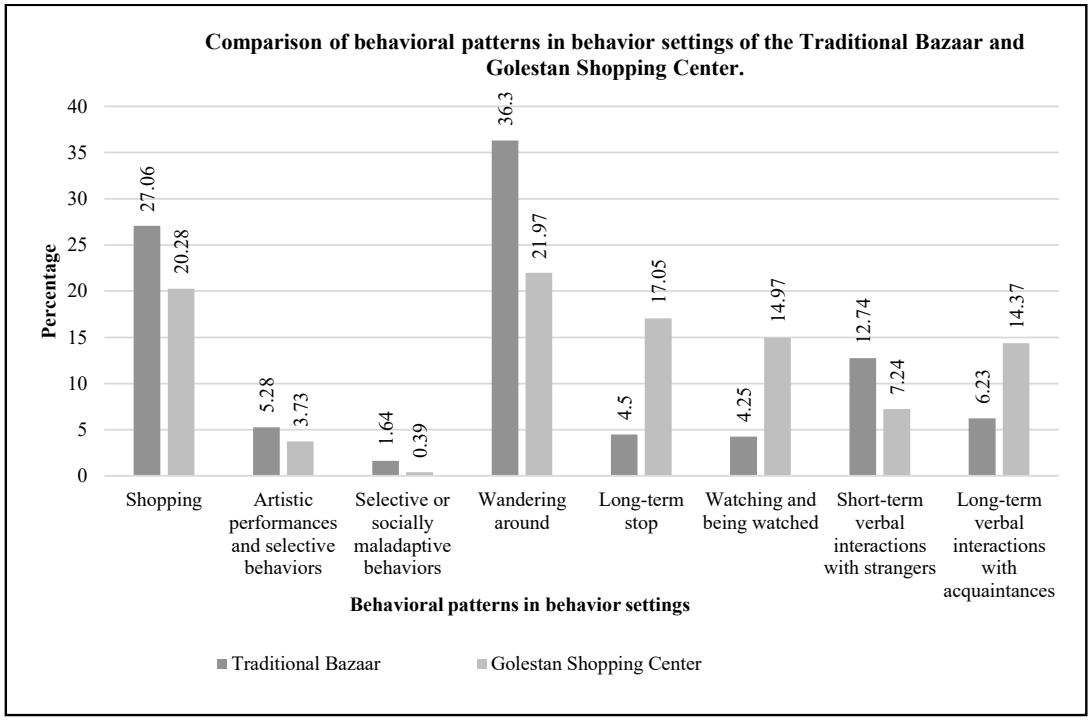

Fig. 8. Comparison of behavioral patterns in behavior settings of the Traditional Bazaar and Golestan Shopping Center. Source: Authors.

This center was under collective monitoring due to the absence of blind spots and the placement of the paths in a linear fashion. The long-term verbal interactions with acquaintances and continuing stops also occurred less in the Traditional Bazaar with respect to the crowds, but such interactions were seen in Golestan Shopping Center owing to the width of the paths and the presence of surrounding spaces (Fig. 9a-c; Tables 7-11). As the final point, the atmosphere of the Traditional Bazaar and Golestan Shopping Center were to reinforce some behaviors and weaken some others. For example, the narrow paths could cause wandering around and short-term interactions, while the wide ones as those in Golestan Shopping

Center could lead to watching and being watched along with long-term interactions.

As a whole, the main objective of this study was to measure the function of commercial centers with reference to the ecological approach, so the effect of physical structure on behavior settings was investigated to determine the physical characteristics reinforcing and weakening the behavior settings and their efficiency. In this regard, two behavior settings, viz., the Traditional Bazaar and Golestan Shopping Center, were selected based on the time dimension in both past and contemporary periods to control the intervening variable of culture in an urban area. The physical and behavioral components measured in both behavior settings were thus selected based on library studies, and then a detailed visual examination of the behaviors in such spots. Not taking account of the internal motivations, the study findings demonstrated how the structure could inspire the occurrence of some behaviors and deter others. The difference between the behavioral components in both behavior settings with the same functional plans accordingly indicated that the desired settings were distinct in terms of their physical components. Previous studies, like that on Tajrish Traditional Bazaar and Arg Shopping Center in Tehran, Iran (Tafakor, Shahcheraghi & Habib, 2020), had comparably shown the way structure could have positive and negative effects on behaviors.

Conclusion

In line with the TBS (Barker, 1968), behavioral patterns are more firmly fixed as compared with the physical ones, and even change much more slowly. Thus, the study of the stable patterns of environmental behaviors can pave the ground for analyzing, evaluating, and predicting environmental functions. As stated by Barker (1968), elevated synomorphy in an environment makes it a more efficient space. In this respect, the results of the present study were consistent with those in Tafakor, Shahcheraghi & Habib (2020), examining the synomorphy of Tajrish Traditional Bazaar and Arg Shopping Center as well as the findings by Paknejad, Tabibian & Latifi (2020), reflecting on the impact of an environment on behavioral patterns in urban spaces. In the following, the main differences and similarities of both behavior settings recruited here, the Traditional Bazaar and Golestan Shopping Center in the city of Kermanshah, Iran, are outlined.

In accordance with the study findings, the Traditional Bazaar in the city of Kermanshah, Iran, is more efficient and reactive to behavioral patterns, even though decreased responsiveness to such patterns and a disturbed functional plan are to occur in the future, considering the existing threats and weaknesses. Seizing the opportunities, the weak points of Golestan Shopping Center can be thus moderated to make it an active behavior setting with an enhanced functional plan, i.e., shopping. Given the gap between the opinions of designers and users about physical spaces, researchers are suggested to ecologically evaluate the structure of buildings about the behavior settings of different environments to identify their uses, which can be then further exploited by designers and architects to develop efficient spaces with better capabilities (Table 12).

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Conflict of Interest

The authors declare no conflict of interest in this study.

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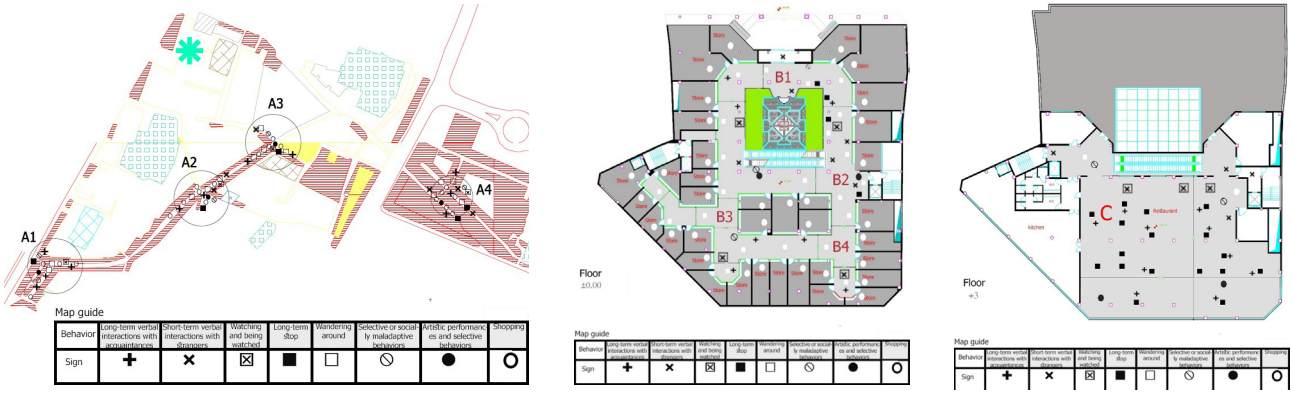

Fig. 9a. Behavioral mapping of behavior settings in the Traditional Bazaar. b. Behavioral mapping of behavior settings in Golestan Shopping Center. c. Behavioral mapping of behavior settings in Golestan Shopping Center. Source: Authors.

Table 12. Comparison of behavior settings, the Traditional Bazaar and Golestan Shopping Center. Source: Authors.

	Traditional Bazaar	Golestan Shopping Center
Strengths	Absorptive and active space, multiple entrances, unity of elements and convergence of internal components, spatial continuity, spatial diversity, movement order, high traffic volume, low movement speed, behavioral monitoring of movements, behavioral adaptability of walls, inviting walls, transparency and possibility of walls progressing, direct exposure to goods, intimate walls and direct encounters, emotional/psychological/ conceptual/social/aesthetic/artistic themes, diversity despite visual order, visual diversity, sensory interaction, sensory diversity, sensory stimuli	Convergence of internal elements, movement order, movement smoothness, behavioral monitoring of movements, moderate-level inviting walls, moderate sensory interaction, sensory diversity, moderate environment, sensory stimuli, environmental equipment, appropriate environmental comfort, proper security
Weaknesses	Low movement smoothness, low environmental equipment, no thermal comfort, moderate security	The solid and fixed boundary between movement paths and stores, single entrance, movement speed, low spatial continuity and diversity, low movement attractiveness, low behavioral adaptability of walls, low transparency and the possibility of walls progressing, low direct exposure to goods, low intimacy of walls and direct encounters, low emotional/psychological/conceptual/social/ aesthetic/artistic themes
Opportunities	Adapting to changes in behavioral patterns	Activating walls, making other entrances, altering showcases to better connect users with goods
Threats	Abandoned spaces, no recreation and entertainment spaces	Inflexibility against changes in behavioral patterns

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