The Role of Form Structure in the Formation of Place Identity and the Emergence of Social Interactions in Qazvin Bazaar

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ABSTRACT: The transformation of urban living patterns and the decline of social interactions in contemporary urban spaces have heightened the urgent need to reassess the role of formal structure in creating meaning and strengthening place identity. This study aims to explore how the components of formal structure contribute to enhancing the significance of social interactions that stem from place identity. The importance of this research lies in recognizing that formal structure, beyond its physical dimension, holds perceptual, cultural, and behavior-oriented potentials for generating meaning, shared experiences, and collective memory. Employing a mixed-methods approach (qualitative and quantitative) with a descriptive-analytical framework, data were collected through field studies, technical surveys, and analyzed statistically using SPSS software. The historic Qazvin Bazaar, with its rich historical and social identity, was selected as the representative case study. The findings reveal that seven dimensions of formal structure—centrality, functionality, movement, visual and sightlines, physical form, spatial connections, and spirituality—significantly influence social interactions and the overall sense of belonging to place. Furthermore, the results demonstrate that the interrelation between physical form, spatial legibility, and perceptual experience provides a fertile and dynamic ground for the reproduction of collective memory. In this respect, historic spaces such as the Qazvin Bazaar are capable of sustaining cultural values while simultaneously playing a more active role in strengthening and revitalizing social interactions. Consequently, attention to the qualitative and multidimensional aspects of formal structure should be regarded as a fundamental strategy for future urban planning and design, positioning it as a key factor in enhancing place identity and ensuring the long-term sustainability and vitality of urban life.

Keywords: *Form structure, place identity, social interactions, Qazvin Bazaar.*

INTRODUCTION

In historic urban fabrics, the formal spatial structure not only defines the physical framework of the environment but also serves as a crucial foundation for lived experience, playing a key role in shaping and conveying place identity. The historic Qazvin Bazaar, as a notable example of traditional Iranian spatial and architectural organization, embodies multiple layers of meaning, function, and perception. These are expressed through its central and functional axes, symmetry and balance, visual and sight lines, movement and accessibility, spiritual dimensions with cultural and social aspects, horizontal and vertical physical-structural elements, as well as spatial connection axes. However, recent physical transformations and functional changes have weakened the spatial qualities, leading to the erosion of place identity. Consequently, this study primarily seeks to investigate how these structural components affect the perceptual dimensions of place identity in Qazvin Bazaar. Drawing on theoretical foundations and previous research, a conceptual framework was developed that simultaneously examines spatial and perceptual elements. The ultimate aim is to identify the components that, in interaction with the quality of spatial structure, enhance the sense of place attachment, strengthen social interactions, heighten visual sensitivity, and more precisely define spatial boundaries. These factors contribute to the sustainability of historical-cultural identity in urban spaces, such as Qazvin Bazaar. To deepen

the analysis of structure and its impact on place identity, this study begins with a review of relevant theoretical concepts concerning formal structure, semantic axes, and place identity in architecture, providing clearer insight into the relationship between form and meaning. Structural theorists such as Durand, Krier, and Herdeg argue that architecture can be understood by classifying forms and geometric structures. Identifying basic shapes (e.g., square, rectangle, circle) and geometric properties such as symmetry, repetition, and centrality is key to comprehending architectural structure and meaning (Tabatabai, 2014; Memarian, 2023). Durand describes architectural form development as a process evolving from simplicity to complexity, integrating biological evolutionary principles and geometry. Krieger examines urban spaces through the analysis of fields and networks, tracking the diversity and evolution of forms across historical periods (Seidian et al., 2017). Herdeg emphasizes that structure encompasses not only the order and harmony of parts but also the visual and semantic experience of forms in the observer's mind, analyzable through visual elements such as points, lines, volumes, and light. He stresses the use of geometric tools and precise plans to reveal architectural relationships and convey profound meanings within Iranian architecture (Herdeg, 1997). Semantic axes in architecture include the central axis, symmetry axis, visual axis, movement axis, spiritual axis, horizontal and vertical axes, and connection axes. Besides their structural and functional roles, these axes hold symbolic and semantic significance, representing order, movement, spatial relationships, and spiritual values (De Botton, 2022; Hillen Brand, 2014; Perlman, 2020; Palladio, 2013). In Iranian Islamic architecture, these axes organize space and reflect social, cultural, and spiritual relationships. For instance, the spiritual axis points toward the Qibla, while movement axes function as main pathways guiding circulation, closely linked to place attachment and identity (Herdeg, 1997; Soltanzadeh, 2014). Place identity refers to the character and distinctive identity of a place, emerging from reciprocal interactions between people and their environment, encompassing physical, semantic, and social dimensions. This dynamic identity is shaped by personal and collective experiences, meanings, values, and social interactions with the place (Relph, 2008; Arbab et al., 2016). A strong sense of place attachment is vital to identity formation and is reinforced by increased presence and engagement with the place (Falahat, 2006; Habibi et al., 2018). Furthermore, social interactions and spatial legibility are essential in developing identity and attachment. Architectural spaces, especially traditional Iranian bazaars, provide environments with high legibility that meet the needs of movement and communication, facilitating meaningful social interactions and strengthening place identity (Najari Nabi & Mahdinejad, 2020; Alqahtani, 2023). Reviewing previous theoretical and empirical studies reveals how the concepts of place identity and spatial form have been analyzed in various contexts, particularly in historic bazaars,

highlighting the components that have the greatest impact. The concept of "place identity" was introduced by Proshansky in the 1970s as an individual's mental perception of their bond with a place, based on memories, emotions, and lived experiences (Proshansky et al., 1983). Later developments in environmental psychology expanded this to include internal and external attitudes such as attachment, meaning, and physical structure (Gifford, 2002; Peng et al., 2020). Kevin Lynch's urban cognition theory defines place identity as the recognizability of an urban environment, distinguishing it from other spaces (Rezazadeh, 2006). In architecture, formal structure is recognized as a fundamental element in meaning-making within space. Durand, in the 18th century, viewed physical structure as having psychological effects, including security, comfort, and social interaction (Durand & Good, 1974). Rob Krier's Urban Space analyzes urban areas through the lens of social relations and physical form (Krier, 2007). Similarly, Herdeg highlights symmetry and form as carriers of meaning and power in social contexts (Herdeg, 1997). Recent Iranian studies align with this perspective. Ebrahimi Mojarad (2021) emphasized the role of residential neighborhoods in forming place identity through physical, psychological, social, and cultural aspects, highlighting continuity, self-esteem, and self-efficacy as key factors. Abi Zadeh (2018) described the Tabriz Historic Bazaar as not just a physical structure, but also a socially and spiritually valuable element that preserves cultural heritage. Changizi (2020) focused on the role of women in shaping the spatial structure and enhancing the architectural identity of traditional Iranian homes. Rollero and De Piccoli (2010) and Soni et al. (2012) demonstrated that place attachment and identity correlate with length of residence, social participation, and emotional bonds with place (Rollero & De Piccoli, 2010; Soni et al., 2012). Ghahremanpour et al. (2020) identified human scale, order, and skyline as influential in shaping the physical identity of urban façades. Studies on geometric structure and form by Jalali et al. (2021), Hosseinian (2022), and Khoshroui et al. (2019) showed that numerical proportions ($\sqrt{2}$, $\sqrt{3}$, golden ratio), form arrangements, and compositional principles form the basis of spatial identity and architectural structure recreation in examples like Naqsh-e Jahan Square and Isfahan Grand Mosque. These findings align with traditional Iranian architectural principles regarding form, meaning, and physical identity, providing a solid foundation for contemporary reinterpretation and design (Silvaye et al., 2012; Mohseni, 2018). The table below provides a brief review and analysis of key studies related to place identity and formal spatial structure, offering a framework for prior findings. The research background in Table 1 concerns the review and analysis of articles and studies on place identity and formal structure.

Based on theoretical foundations and findings from previous research, this study's conceptual model has been developed to illustrate the relationship between the components of formal

Table 1: Review and Analysis of Articles and Research on Place Identity and Formal Structure

| No.	Source	Results
1	Proshansky et al., 1970	Place identity refers to the collection of an individual's experiences and mental images, shaped by memories and emotions, that give meaning and rootedness to places.
2	Gifford, 2002	Place identity is an interdisciplinary concept in environmental psychology, focusing on the multidimensional interaction between humans and their environment.
3	Peng et al., 2020	Place identity results from the integration of external perspectives (physical and behavioral features) and internal perspectives (perception, emotion, and mental imagery) toward a place.
4	Rezazadeh, 2006	Place identity forms when a person can recognize or distinguish a place as distinct from others.
5	Durand & Good, 1974	Physical environments, through their spatial structure, can directly influence human behavior, emotions, and social relationships.
6	Krier, 2007	The process of forming the physical structure of urban spaces and its relation to social structure has been studied, offering a method to understand their structural system.
7	Herdeg, 1997	The visual language of forms symbolizes social attitudes and hierarchies
8	Ebrahimi Mojarad, 2021	Residential neighborhoods play a crucial role in shaping place identity and psychological balance by affecting physical, psychological, and socio-cultural dimensions.
9	Abi Zadeh, 2018	Historic bazaars in Iran, with their unique architectural features, serve not only commercial functions but also as centers of identity, culture, and social interactions in cities.
10	Changizi, 2020	The identity crisis in contemporary Iranian architecture stems from the neglect of history and culture, necessitating the recognition and reconstruction of Iranian architectural identity.
11	Rollero & De Piccoli, 2010	Place identity emerges from perceptual and emotional interaction with space, strengthened by participation, social communication, and duration of residence.
12	Soni et al., 2012	Place identity is formed more on social ties than environmental features and is experienced more deeply and distinctively among long-term residents.
13	Ghahremanpour et al., 2020	Physical identity is defined by factors such as human scale, order, harmony, and skyline, although user and expert views differ in details.
14	Jalali et al., 2021	Structural patterns, proportions, and spatial geometry are key factors in shaping and endowing spaces with meaning.
15	Hosseinian et al., 2022	Architectural form analysis utilizes geometric principles and proportions to design spaces tailored to diverse needs.
16	Silvaye et al., 2012	Traditional architectural geometric principles, such as order, hidden geometry, and archetypes, continue to influence contemporary architecture and are reflected in the works of modern architects.
17	Mohseni, 2018	Geometric order and proportions, such as the golden ratio, emphasizing functionalism and intellectual roots, play important roles in shaping human-made works.
18	Khoshrooi & Askari Zad, 2019	The plan of Isfahan's Jame Mosque and the hidden geometry of Ali Qapu Palace have been systematically analyzed using geometry, golden proportions, and Safavid archetypes.
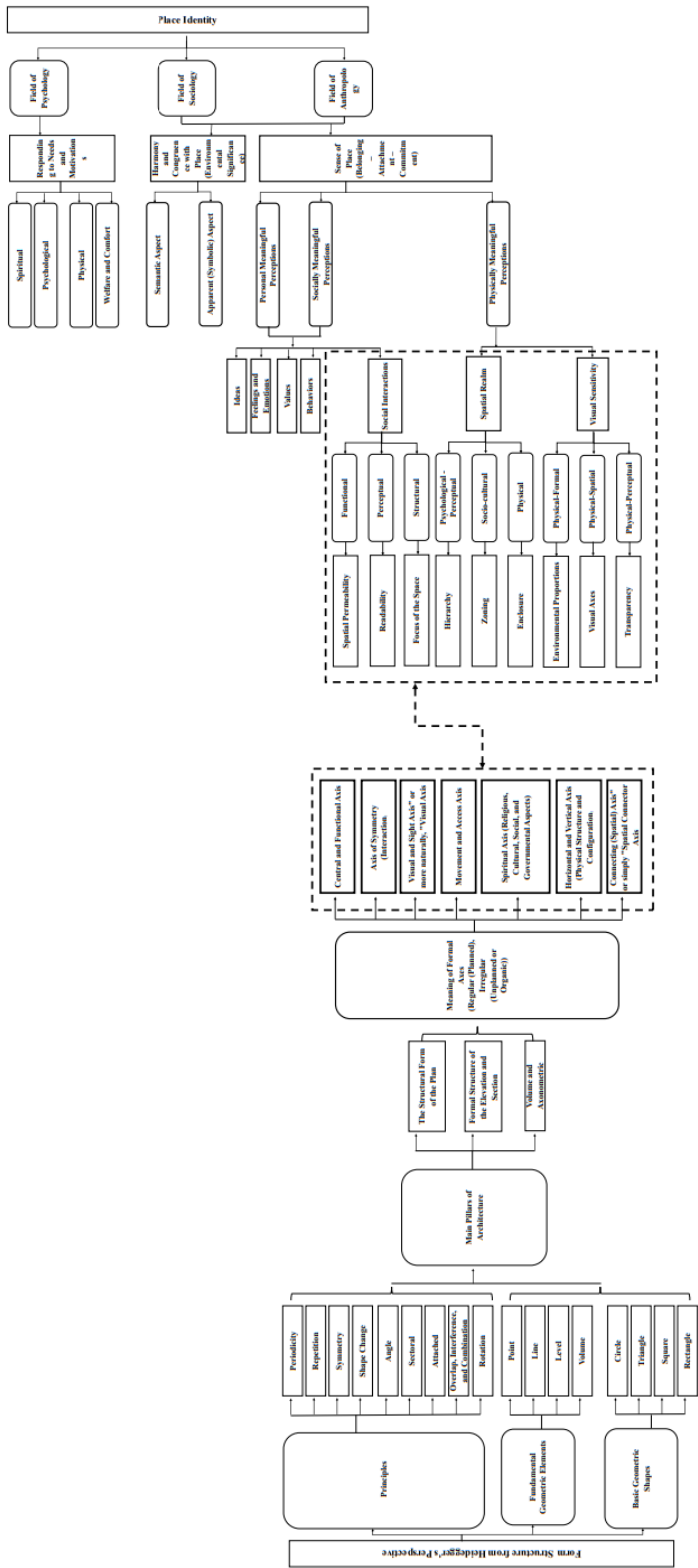
Fig.1: Conceptual Model Depicting the Relationship Between Formal Structure Components and the Perception of Place Identity in Qazvin Historic Bazaar

structure and the perception of place identity. The research conceptual framework in Fig. 1 has been derived from the theoretical foundations.

MATERIALS AND METHODS

This study employed a mixed-methods approach (qualitative–quantitative) to explore the relationship between the formal spatial structure and place identity in the historic Qazvin Bazaar. This approach was chosen to ensure both in-depth conceptual understanding and empirical validity of the findings. In the initial phase, directed qualitative content analysis was used to develop the theoretical framework. Qualitative data were collected through semi-structured interviews with 15 experts in architecture, urban design, sociology, and environmental psychology. The data were then organized using axial coding. This phase identified three main dimensions of place identity—social interactions, spatial territory, and visual sensitivity—and seven structural axes: central–functional, symmetry–balance, visual and sight, movement–accessibility, spiritual, physical form, and spatial connections. In the second phase, the Delphi method was applied to validate the qualitative findings. Through several iterative rounds, expert consensus was achieved, confirming the initial results. Based on this validated framework, a researcher-designed questionnaire was developed. Content validity was established through expert review and the

Delphi technique, while reliability was confirmed with a high Cronbach's alpha of 0.926. The questionnaire was distributed to a purposive sample of specialists and residents with spatial experience in the Qazvin Bazaar. The collected data were analyzed using SPSS software.

For inferential analysis, Spearman's correlation was used to evaluate relationships between the dimensions of place identity and spatial axes, and multivariate regression analysis assessed the combined effects of the axes. The results indicated a significant positive relationship between the bazaar's spatial structure and place identity (R = 0.612, R² = 0.374). Among the axes, spiritual components exerted the strongest influence on identity dimensions, particularly on social interactions and spatial territory. These findings clearly demonstrate that spatial coherence and the purposeful organization of physical and semantic axes play a vital role in enhancing place perception, fostering a sense of belonging, and improving the quality of lived experiences for users in historic environments. The demographic characteristics of the research respondents are presented in Table 2.

The study's respondents comprised a diverse group in terms of age, gender, education, employment status, and familiarity with Qazvin Bazaar. Importantly, 66.7% held doctoral degrees or higher, and all participants (100%) had professional or research-related connections to the bazaar. This high level of

Table 2: Demographic Characteristics of Respondents

Characteristic	Category	Frequency	Frequency Percentage	Cumulative Frequency Percentage	Chart
Age group	34–24	6	40	40	
	44–35	6	40	80	
	54–45	2	13.3	93.3	
	and above 55	1	6.7	100	
Gender	Male	7	46.7	46.7	
	Female	8	53.3	100	
Marital status	Single	6	40	40	
	Married	9	60	100	
Education level	Bachelor's degree	3	20	20	
	Master's degree	2	13.3	33.3	
	PhD or higher	10	66.7	100	

Continiue of Table 2: Demographic Characteristics of Respondents

Characteristic	Category	Frequency	Frequency Percentage	Cumulative Frequency Percentage	Chart
Employment status	Employed	13	86.7	86.7	
	Student	2	13.3	100	
Duration of familiarity with Qazvin Bazaar	years 5–1	4	26.7	26.7	
	years 10–6	5	33.3	60	
	More than 10 years	6	40	100	
Place of residence	Qazvin Province	9	60	60	
	Other	6	40	100	
Type of connection with Qazvin Bazaar	Researcher / Expert	15	100	100	

expertise and diversity strengthens the theoretical and empirical validity of both the qualitative and quantitative analyses. Such a specialized and varied sample facilitated a deep understanding of the relationship between spatial structure and the dimensions of place identity within the historic context of Qazvin.

RESULTS AND DISCUSSION

This section carefully examines the relationship between place attachment and formal spatial structure in the historic Qazvin Bazaar. To achieve this, the questionnaire was designed in two parts: the first collected demographic data to analyze background variables influencing the sense of attachment, while the second measured key variables using a five-point Likert scale. To ensure the conceptual model's scientific rigor, the Delphi method was conducted in three rounds, involving 15 experts from the fields of architecture, urban design, and environmental psychology. The theoretical constructs were confirmed through consensus. Content validity of the questionnaire was assessed using the Content Validity Ratio (CVR) based on Lawshe's method, resulting in the acceptance

of all 18 items with satisfactory values. The reliability of the instrument was evaluated using Cronbach's alpha, which was tested through a pilot study involving 15 participants, confirming the tool's consistency. Therefore, the questionnaire demonstrated sufficient validity and reliability for measuring conceptual dimensions such as place identity, sense of attachment, and semantic spatial structure.

Regarding Cronbach's alpha interpretation, values above 0.9 are considered excellent, 0.8 to 0.89 good, 0.7 to 0.79 acceptable, 0.6 to 0.69 weak, and below 0.6 unsatisfactory. Table 3 presents information on the Number of Items, Cronbach's Alpha Values for the Studied Components, and the Interpretation of Reliability. Additionally, Figure 2 displays the Chart of Cronbach's Alpha Values for the Studied Components and Their Reliability Interpretation, which will be further discussed.

The research questionnaire demonstrated high reliability with a Cronbach's alpha of 0.926, confirming it as a valid tool for measuring components of the sense of place attachment. Its structure is based on three main components: Social

Table 3: Number of Items, Cronbach's Alpha Values for the Studied Components, and Interpretation of Reliability

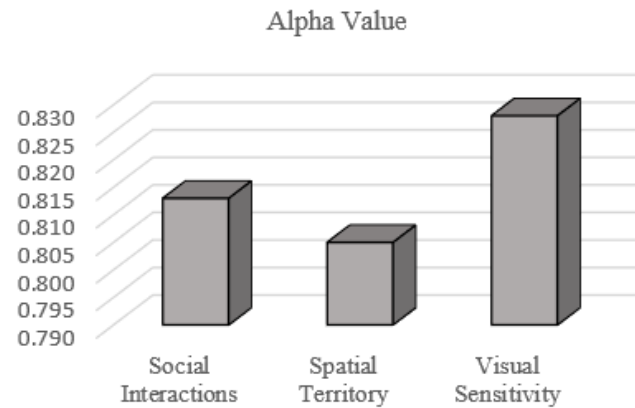| Component	Number of Items	Alpha Value	Interpretation
Social Interactions	6	0.813	Good reliability
Spatial Territory	6	0.805	Good reliability
Visual Sensitivity	6	0.828	Good reliability
Entire Questionnaire	18	0.926	Excellent reliability

Alpha Value

Fig.2: Chart of Cronbach's Alpha Values for the Studied Components and Their Reliability Interpretation

Interactions, encompassing spatial permeability, legibility, and focality of space; Spatial Territory, including hierarchy, zoning, and enclosure; and Visual Sensitivity, covering environmental proportions, visual axes, and spatial transparency. Each component consists of six items, totaling 18 questions. These variables were derived from qualitative data analysis and in-depth interviews to comprehensively cover the conceptual overlap between the formal spatial structure and the dimensions of place identity.

Following data collection, the Delphi method involving 15 experts was used for validation. Data analysis was performed using SPSS, and correlation and regression tests were applied to assess the conceptual model. In Table 4, the Correlation Test Results for Assessing the Relationship Between Place Identity and the Semantic Axes of Formal Structure are examined.

In analyzing the relationships within the research model, Spearman's correlation test was used to assess the connection between "place identity" and the "semantic structure of spatial

form" in the historic Qazvin Bazaar. Results from a sample of 15 bazaar users indicated a positive, significant, and relatively strong correlation between these two variables ($\rho = 0.612$, $p = 0.015$), suggesting that enhancing the spatial coherence and physical order strengthens users' sense of place. Furthermore, detailed analyses revealed that the strongest correlations with place identity were related to the central and functional axes, highlighting the crucial role of the bazaar's social, economic, and cultural functions. Following these, the movement and accessibility, spiritual, formal, symmetry, and balance, visual, and sight aspects, and finally the spatial connection axes, all showed significant and direct relationships with place identity. These findings emphasize that the bazaar's spatial organization, through improvements in legibility, meaningfulness, scalability, and spatial continuity, serves as a vibrant and dynamic context for shaping users' lived experiences and collective memories. In Table 5, the Multivariate Regression Analysis of Formal Structure and Place Identity is examined.

Table 4: Correlation Test Results for Assessing the Relationship Between Place Identity and the Semantic Axes of Formal Structure

Variable	Semantic Axes of Spatial Structure	
Place Identity	Spearman Correlation Coefficient	0.612
	Significance Level (sig. (2-tailed))	0.015

Table 5: Multivariate Regression Analysis of Formal Structure and Place Identity

Index	Correlation Coefficient (R)	Coefficient of Determination (R²)	Adjusted Coefficient of Determination	Standard Error	F-value	Significance Level (sig.)
Value	0.612	0.374	0.334	2.95	7.77	0.015

In this study, multivariate regression analysis was employed to examine the effect of the formal spatial structure on place identity in the historic Qazvin Bazaar, allowing simultaneous assessment of the impact of multiple spatial axes on the dependent variable. The model results showed a correlation coefficient (R) of 0.612, indicating a positive and relatively strong relationship between the spatial cohesion of the bazaar and users' perception of identity. Furthermore, the coefficient of determination (R^2) was 0.374, demonstrating that the formal structure explains approximately 37.4% of the variance in place identity. The adjusted R^2 value of 0.334, which accounts for sample size, further confirms the model's validity. The standard error of the estimate was 2.95, representing an acceptable level of prediction error. Analysis of variance (ANOVA) yielded an F-value of 7.77 with a significance level of p = 0.015, confirming the statistical validity of the regression model and the meaningful impact of formal structure on place identity. In other words, the presence of axes such as central, functional, symmetry, visual, accessibility, spiritual, and physical-spatial not only organizes the physical structure of the space but also carries semantic and perceptual values that contribute to the formation and strengthening of the sense of place. These findings reveal a significant connection between spatial form and identity experience in the historic fabric of Qazvin Bazaar, underscoring the importance of paying attention to spatial qualities in design and urban interventions that play a fundamental role in enhancing place identity. In Table 6, the Regression Coefficients Obtained from the Analysis and, in Fig. 3, the Beta (Standardized Coefficient) among the axes of the model structure are examined, which will be further discussed.

This section presents the results of the multivariate regression

Table 6: Regression Coefficients Obtained from the Analysis

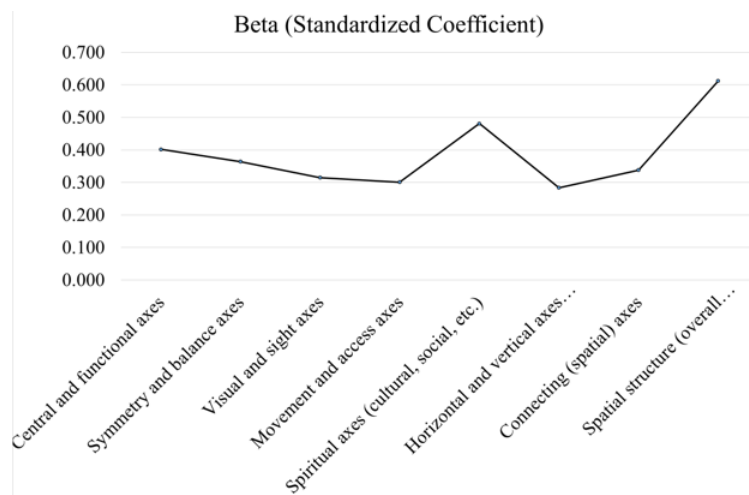| Variable	B (Unstandard-ized Coefficient)	Standard Error of Coefficient	Beta (Standardized Coefficient)	t	Significance Level (sig. (p))
Central and functional axes	0.245	0.101	0.402	2.43	0.032
Symmetry and balance axes	0.211	0.087	0.364	2.42	0.033
Visual and sight axes	0.180	0.093	0.315	1.94	0.075
Movement and access axes	0.163	0.079	0.301	2.06	0.062
Spiritual axes (cultural, social, etc.)	0.298	0.095	0.481	3.14	0.009
Horizontal and vertical axes (physical and structural)	0.137	0.066	0.284	2.08	0.060
Connecting (spatial) axes	0.192	0.088	0.338	2.18	0.049
Spatial structure (overall composition of all axes)	0.600	0.209	0.612	2.87	0.013

Fig.3: Beta (Standardized Coefficient) among the axes of the model structure

analysis examining the precise impact of the seven formal structure axes on place identity. The central and functional axes, with a standardized coefficient of 0.402 and a significance level of 0.032, play a significant role in enhancing the sense of place attachment. Similarly, the symmetry and balance axes also have a positive and significant effect, with a standardized coefficient of 0.364 and p = 0.033. The spiritual axis—which encompasses cultural, social, and religious dimensions—emerges as the most influential factor in the model, with the highest standardized coefficient of 0.481 and a significance level of 0.009, underscoring its profound role in forming identity bonds between users and the space. Other axes, including visual and spatial aspects, movement and accessibility, horizontal and vertical dimensions, and spatial connection, make complementary and meaningful contributions to shaping place identity, with standardized coefficients ranging from 0.284 to 0.338 and p-values near the 0.05 threshold. Overall, the combined effect of these axes, represented by the formal structure variable, demonstrates a strong, significant, and correlated regression model with a standardized coefficient of 0.612, an unstandardized coefficient of 0.600, a significance level of 0.013, and a t-value of 2.87. This suggests a significant relationship between the structural cohesion of space and the development of place identity. These results emphasize that improving any of these components directly contributes to elevating the quality of lived experience and the sense of attachment among users of the historic Qazvin Bazaar. Consequently, they should be given special consideration in spatial design and regeneration processes. Further analyses are conducted in Table 7, titled 'Correlation and Significance of the Research Model Relationships,' followed by Fig. 4, entitled 'Diagram of Correlation Coefficients Among Variables,' which are examined in the subsequent sections.

Spearman's correlation test between the components of formal structure and the three dimensions of place identity—social interactions, spatial territory, and visual sensitivity—revealed positive, significant, and relatively strong relationships. The strongest correlation was observed between the overall formal structure and social interactions ($\rho = 0.712$, p = 0.003), highlighting the prominent role of the combined axes in strengthening social bonds among users of Qazvin Bazaar. The spiritual axis (cultural, social, religious) also plays a significant role in collective experience and sense of place attachment, with a correlation coefficient of $\rho = 0.683$ and p = 0.004. Other axes, such as central, symmetry, visual, movement, and spatial connection, exhibited notable effects on users' sense of place, with correlation coefficients ranging between 0.5 and 0.65 and significance levels below 0.05. These findings clearly demonstrate that spatial cohesion and meaning in the bazaar's structure not only enhance the quality of the spatial territory and environmental legibility but also profoundly influence the subjective experience and identity formation of individuals in relation to the place. Overall, these statistically significant relationships, confirmed with 95% confidence, underscore that design based on meaningful structural axes plays a crucial role in shaping place identity and enhancing the quality of historic spaces, such as Qazvin Bazaar.

The analysis revealed that the seven semantic axes of the formal structure exhibit positive, significant, and relatively strong correlations with nine subcomponents of place identity, including spatial permeability, legibility, spatial focality, hierarchy, zoning, enclosure, environmental proportions, landscape axes, and transparency. These correlations ranged from 0.492 to 0.672. Among these, the spiritual axes—carrying the cultural, social, and religious dimensions—had the highest correlation coefficients (up to 0.672) with a very

Table 7: Correlation and Significance of the Research Model Relationships

| Variables	Social interactions		Spatial territory		Visual sensitivity	
	Correlation coefficient	Significance level	Correlation coefficient	Significance level	Correlation coefficient	Significance level
Central and functional axes	0.654	0.007	0.611	0.012	0.580	0.018
Symmetry and balance axes	0.631	0.009	0.590	0.015	0.561	0.021
Visual and sight axes	0.603	0.011	0.577	0.019	0.549	0.023
Movement and access axes	0.589	0.014	0.543	0.024	0.532	0.027
Spiritual axes (cultural, social, etc.)	0.683	0.004	0.652	0.006	0.615	0.011
Horizontal and vertical axes (physical and structural)	0.574	0.020	0.529	0.028	0.500	0.035
Connecting (spatial) axes	0.598	0.012	0.567	0.021	0.537	0.026
Spatial structure (overall composition of all axes)	0.712	0.003	0.681	0.005	0.648	0.008
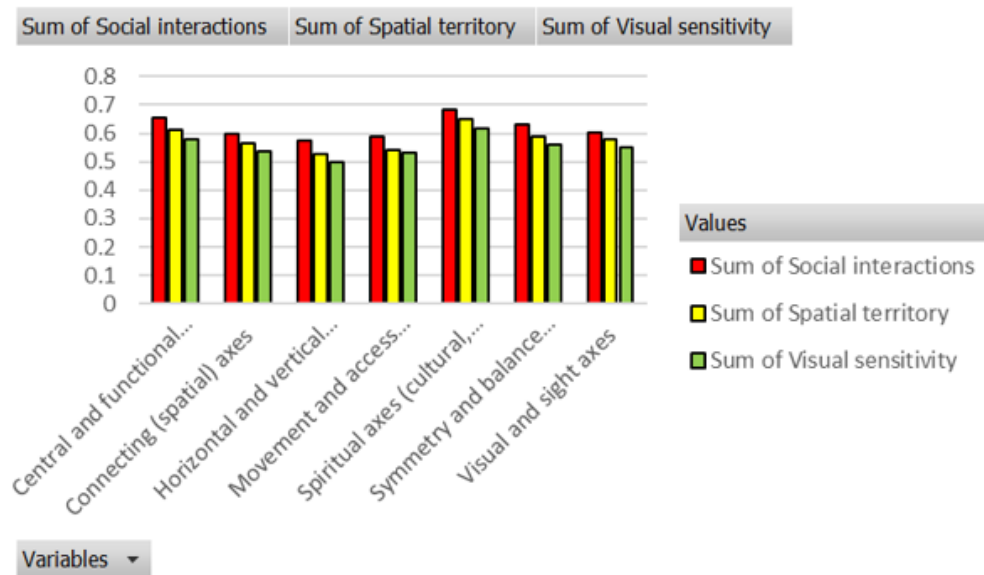
Fig.4: Diagram of Correlation Coefficients Among Variables

Table 8: Correlation Status Among Research Model Relationships

| Components	Spatial permeability	Legibility	Spatial focality	Hierarchy	Zoning	Enclosure	Environmental proportions	View axes	Transparency
Central and functional axes	0.642	0.611	0.587	0.573	0.568	0.554	0.538	0.550	0.526
Symmetry and balance axes	0.631	0.602	0.581	0.560	0.542	0.528	0.519	0.534	0.511
Visual and sight axes	0.613	0.600	0.586	0.571	0.559	0.544	0.530	0.564	0.526
Movement and access axes	0.591	0.575	0.561	0.543	0.530	0.518	0.507	0.511	0.499
Spiritual axes (cultural, social, etc.)	0.672	0.648	0.631	0.618	0.602	0.584	0.566	0.574	0.556
Horizontal and vertical axes (physical and structural)	0.573	0.561	0.547	0.531	0.514	0.506	0.498	0.509	0.492
Connecting (spatial) axes	0.594	0.578	0.563	0.550	0.534	0.518	0.509	0.522	0.504
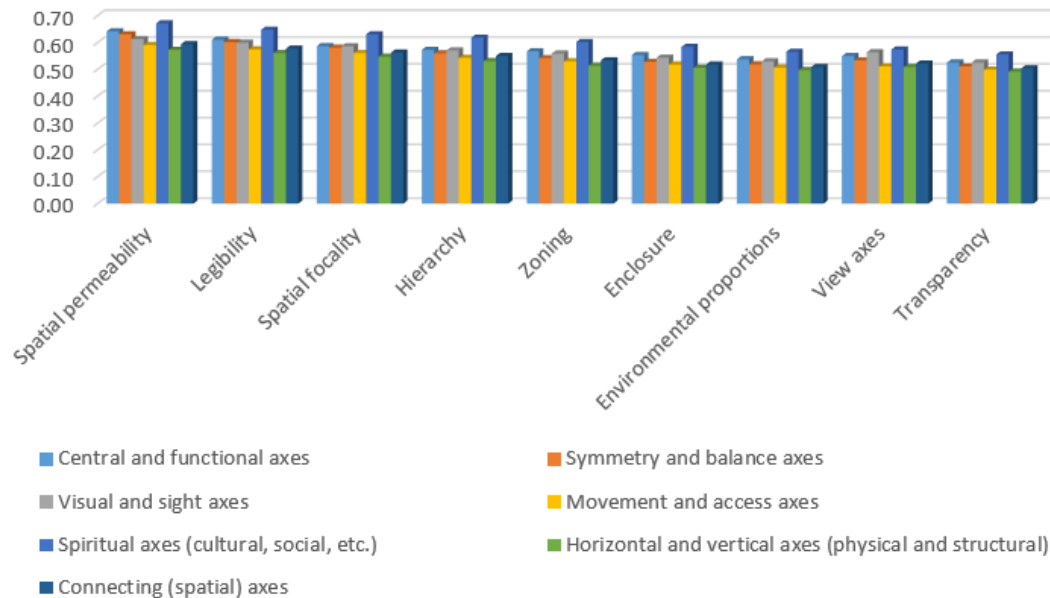
Fig.5: Correlation Status Among Research Model Relationships Chart

strong significance level (p = 0.004), playing a key role in strengthening the sense of belonging, spatial awareness, and depth of identity experience among users of the historic Qazvin Bazaar. All significance levels were below 0.05, confirming the statistical validity at a 95% confidence level, and indicating that the relationship between the physical-spatial structure and the detailed aspects of place identity is both genuine and fundamental. These findings highlight the importance of purposefully and coherently designing the semantic axes of the formal structure to enhance the quality and richness of lived experiences in historic environments. Ultimately, this highlights the organic interplay between physical form and human experience in shaping place identity. In Table 8, the Correlation Status Among Research Model Relationships is examined, and the corresponding chart is presented in Fig. 5.

CONCLUSION

This study was conducted to investigate the fundamental question: "How do the components of formal structure influence the meaningfulness of social interactions derived from place identity?" The findings from theoretical, field, and statistical analyses reveal that formal structure, beyond mere physical organization, serves as a conceptual and perceptual foundation of space, enabling the formation of meaningful social interactions and sustaining place identity. In other words, formal structure acts as a connecting link

between physical form and lived experience, where meaning, memory, and collective behaviors are intertwined. The case study of the historic Qazvin Bazaar clearly demonstrated that the coherence and legibility of formal structure—reflected in axes such as centrality, function, movement, visual and spatial connectors, and especially the spiritual axis—provide a foundation for deep social interactions. Regression analysis showed that the spiritual axis, representing the deepest cultural and social layers of the space, had the greatest impact on the meaningfulness of human interactions, providing clear evidence of the link between intrinsic spatial meaning and the quality of social relationships within the place. From a theoretical perspective, components such as legibility, permeability, human scale, spatial hierarchy, and symbolic significance of forms play fundamental roles in creating both mental and physical contexts for interaction. Structures organized based on cultural contextuality and internal order reinforce the sense of place, creating meaningful cohesion among individuals, space, and community. In such spaces, people are not only actors but part of the place's narrative; their actions carry meaning, and an identity-rich experience accompanies their presence. Statistical analyses also confirmed significant correlations between components of formal structure and the three dimensions of place identity (social interactions, visual sensitivity, and spatial territory). The strongest correlation was found between formal structure and social interactions, indicating that

an effective formal structure, by guiding movement flows, creating meaningful spatial nodes, and enhancing survival and presence capabilities, facilitates social actions at both micro and macro levels. Such a structure, by providing the cognitive conditions for understanding, preserving, and reproducing collective memory, contributes to strengthening place identity. Furthermore, when formal structures are designed based on human-centered, meaningful, and context-sensitive principles, they not only improve the physical quality of space but also directly enhance social actions and cultural cohesion within the place. Designing such structures can be an effective strategy for regenerating place identity, strengthening the sense of belonging, and enhancing urban quality of life. Ultimately, what grants a space legitimacy, durability, and continuity is not merely its physical form. However, the meaningful connection established among form, behavior, and collective memory—a connection that becomes deeper, more vibrant, and more enduring when thoughtfully embedded in the formal structure. Based on the critical role identified for the spatial structural configuration of the urban environment in reinforcing place identity and facilitating social interactions, it is strongly recommended that urban policymakers and designers adopt a design approach grounded in contextuality and human-centered principles; specifically, semantic axes of spatial structure—including central, functional, spiritual, and spatial connectivity axes—should be preserved and revitalized to bolster spatial coherence and social cohesion. Furthermore, enhancing legibility and spatial hierarchy through the reinforcement of navigational networks, spatial focal points, and visual corridors must be prioritized within urban planning frameworks to elevate users' sense of belonging, security, and spatial comprehension. In addition, safeguarding and amplifying the spiritual and cultural values embedded in the physical form—particularly the spiritual axis embodying cultural, social, and religious dimensions—is essential to ensure the sustainable identity of urban spaces. Moreover, urban space design should explicitly aim to facilitate and encourage social interactions as dynamic cultural and social entities, thereby fostering meaningful lived experiences. Strengthening community participation and local educational initiatives to enhance the sense of place attachment and identity preservation, coupled with the integration of interdisciplinary approaches involving architects, sociologists, and environmental psychologists, constitute vital prerequisites to guarantee the quality and sustainability of historic and cultural spatial designs. This comprehensive approach not only protects and enriches the spatial and identity quality of places but also plays a pivotal role in shaping social belonging and sustaining the cultural vitality of urban environments, serving as an effective strategic framework for policy and urban interventions in both historic contexts and contemporary cities.

AUTHOR CONTRIBUTION

P. Sarraf Moayeri: First author, Literature review, conceptualization, data curation, modeling, validation, data analysis, preparation of the main manuscript, and editing. Prof. J. Soheili: Supervising professor and corresponding author, supervision, project administration, and formal analysis. Prof. K. Rahbari Manesh: Advising professor, project supervision.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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