Strategic analysis of the socio-semantic system of space towards enhancing collective identity and revitalizing the Kan River Valley and Javanmardan Park, Tehran[1]

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Abstract

Urban river-valleys possess significant potential for strengthening collective identity. However, physical and engineering-oriented approaches in restoration projects often lead to a disconnection among the spatial, social, and perceptual dimensions of a place. This study aims to analyze the socio-spatial mechanisms influencing the regeneration of collective identity in the Kan River-valley restoration project, emphasizing Javanmardan Park. The theoretical framework relies on Lefebvre's "production of space" theory, examining the socio-semantic structure through a three-layer model: physical-spatial, social-activity, and perceptual-meaningful dimensions. This applied, descriptive-analytical research collected data via documentary studies, field observations, and a survey of 30 urban experts. The primary instrument was a 24-item SWOT questionnaire using a five-point Likert scale, with reliability confirmed by a Cronbach's alpha of 0/70 Findings indicate that the river's ecological dynamism and the historical-cultural background of the Kan district are key strengths, whereas concrete riverbed channelization, spatial discontinuity, and unsafe urban pockets are main weaknesses. Developing green corridors and nature-based tourism are major opportunities, while flood risks and social vulnerabilities pose significant threats. The strategic analysis places the area in an aggressive (SO) position, enabling active leverage of strengths to capitalize on development opportunities. Consequently, the core strategy proposes creating a cultural-ecological corridor along the Kan River-valley connected to Javanmardan Park. This approach aims to reinforce the linkage between nature, social activities, and semantic layers of space, ultimately regenerating the collective identity.

Keywords: Collective Identity, Javanmardan Park, Kan River Valley, Revitalization, Socio-Cultural

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1.Introduction

1.1.The Challenge of Quality of Life and the Role of Urban Public Spaces

In contemporary cities, improving the quality of urban life has become one of the most critical concerns of urban planning and design. This multidimensional concept is not limited to physical, economic, or environmental indicators; rather, citizens' lived experience of urban spaces, their level of satisfaction with the living environment, and the quality of social interactions play a fundamental role in its formation (Makki et al., 2025; Mouratidis, 2021). Meanwhile, urban public spaces, as the primary setting for citizens' presence, social interactions, and the formation of shared experiences, play a decisive role in enhancing the quality of life and strengthening social cohesion (Carmona, 2010). Urban parks, green spaces, and natural-social zones within cities are among the most important examples of these public spaces. In addition to environmental functions such as improving air quality and regulating microclimates, these spaces provide platforms for recreational activities, social interactions, experiencing nature, and the formation of collective memories (Ronael & Ertekin, 2025). Therefore, the quality of design and management of these spaces can significantly contribute to creating environmental satisfaction, strengthening social ties, and shaping citizens' sense of belonging to a place. However, the experience of many urban development projects shows that purely physical interventions do not necessarily lead to the improvement of the social quality of spaces. In numerous cases, an overemphasis on the physical improvement of the environment and the neglect of the social, cultural, and perceptual dimensions of space have resulted in new spaces that, although physically desirable, fail to establish a deep connection with the daily lives of citizens (Long et al., 2025). Consequently, paying attention to the semantic and social dimensions of space has become one of the key focuses of urban studies in recent decades.

1.2.The Social Production of Space and the Formation of the Semantic-Social System

In contemporary urban theories, space is no longer perceived as a neutral container for human activities but rather as a social product resulting from the interaction between physical structures, social relations, and semantic systems. Lefebvre, in his theory of the "Production of Space," demonstrates that space is the product of the interaction of three main dimensions:

1. Spatial practice: Physical space (patterns of use and activity)
2. Representations of space: Perceived and conceptualized space (plans, programs, and planners' visions)
3. Representational spaces: Lived space (the experience and meaning perceived by users) (Lefebvre, 2012).

Following this perspective, Soja, by proposing the spatial triad of perceived, conceived, and lived space, emphasizes the importance of human experience and cultural meanings in understanding space (Soja, 1996). Furthermore, social semiotics approaches and discourse theories indicate that urban spaces carry a network of signs, symbols, and social narratives that are formed in interaction with users and are stabilized or transformed over time. Based on these perspectives, we can speak of a concept called the "semantic-social system of space." This system refers to an organized set of meanings, perceptions, symbols, and social relations that take shape within the context of a place and are reproduced through the daily experiences of users. This system manifests itself not only in the physical body of the space but also in the patterns of presence, social behaviors, and cultural narratives surrounding it. By integrating the "theory of the production of space," the "spatial triad theory," and semantic approaches to place, the "semantic-social system of space" is formulated in this research as a three-layered model:

1. Physical-Functional Layer: Spatial structure, accessibility, landscape quality, spatial organization of activities, facilities, and land uses.
2. Social Interactions and Spatial Experiences Layer: Users' patterns of presence, types of activities, social interactions, sociability, and the daily use of space.
3. Meanings and Cultural Representations Layer: Collective memories, symbols, social narratives, users' perceptions, and cultural discourses related to the place.

The interaction of these three layers gradually leads to the formation of the social identity of the space and the stabilization of its meanings in the minds of the users.

1.3.Sense of Place, Sense of Belonging, and Collective Identity

One of the most important mediating concepts in understanding the relationship between humans and the environment is the "sense of place." Sense of place refers to the collection of perceptions, emotions, and meanings that individuals attribute to a place as a result of direct experience (Smith, 2011). This perceptual experience is shaped by interacting with the physical features of the space, the activities performed in it, and the social relations among users. Following this concept, "sense of belonging to a place" refers to the emotional and cognitive bond between individuals and the environment, which is created as a result of repeated experiences, shared memories, and social interactions in a place (Altman & Low, 1992). This sense is strengthened when individuals consider the place as part of their personal or collective identity and feel responsible for its preservation and continuity. Various studies have shown that numerous

factors—including aesthetic quality and spatial legibility, a sense of security and comfort, the presence of others and the possibility of social interaction, a variety of activities and land uses, shared memories and experiences, and accessibility and usability for different social groups—play a role in shaping the sense of belonging to a place. When these experiences are stabilized at the group level, they can lead to the formation of a place-based collective identity. A place-based collective identity is formed when a space becomes part of a community's shared narrative, and users perceive it as a symbol of their social, cultural, or local belonging (Rahimi et al., 2025).

1.4.Urban River-Valleys as Public Realms

In many cities around the world, river-valleys and natural zones within cities have garnered attention as spaces with high social and cultural potential. Because they combine natural elements with urban activities, these spaces provide a suitable platform for the formation of collective experiences and social interactions. In Tehran, river-valleys are also considered among the most important natural structures of the city, which have been the subject of numerous restoration and organization projects in recent decades. The Kan River-valley, as one of the most prominent natural axes, plays a significant role in connecting the natural structure of the Alborz mountains with the urban fabric of western Tehran (Bemanian, 2008; Abdollahzadeh Fard, 2018; Shahbazi et al., 2020). Meanwhile, Javanmardan Park, as one of the major public spaces developed along this river-valley, has provided a setting for citizens' presence, recreational activities, social interactions, and the experience of nature. Such spaces can function as public realms; realms where various social groups can be present, engage in face-to-face interactions, and share the experience of the space (Shahbazi et al., 2017). Despite these potentials, many river-valley organization projects have primarily been implemented with physical and environmental approaches, and the systematic evaluation of the social and cultural consequences of these interventions has received less attention. This has meant that the true impact of these projects on the formation of a sense of belonging, collective identity, and the semantic-social system of the space has not been thoroughly investigated.

1.5.Research Problem Formulation and its Necessity

The social quality of public spaces is not limited solely to their physical characteristics; rather, it depends on how the space is experienced, patterns of social interactions, and the users' processes of meaning-making. The land uses and activities located within the space play a decisive role in shaping presence, sociability, sense of belonging, and ultimately, collective identity. From this perspective, the social quality of space is the result of the interaction among perceptual, interactive, and discursive mechanisms flowing within the "semantic-social system of the space." However, what is often observed in urban natural space organization plans, especially in river-valley restoration projects like the Kan River-valley, is a deep gap between the stated goals of these plans (such as improving social quality and forming collective identity) and the actual reflection of these goals in citizens' lived experiences. Many of these projects, by focusing on physical interventions, lack a systematic approach to measuring and analyzing their social and cultural consequences. By identifying and critically analyzing this gap, the present research generates new knowledge regarding the understanding of mechanisms affecting the formation (or non-formation) of a sustainable semantic-social system in restored urban spaces. In the research's theoretical framework, it is expected that disruptions in the formation of collective identity and the semantic-social system of space occur through the interaction of physical, social, and semantic factors. However, determining how these factors operate as strengths, weaknesses, opportunities, or threats, and through what mechanisms they affect the regeneration of collective identity, requires empirical analysis. Therefore, a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is utilized in this research as a systematic tool to identify, classify, and explain these mechanisms, extracting inductively the mechanisms that strengthen or weaken the semantic-social system of the space. Accordingly, the main research question is formulated as follows: What socio-spatial mechanisms have hindered the regeneration of collective identity and the formation of a sustainable semantic-social system in the land uses and interventions carried out in the Kan River-valley restoration plans (focusing on the Javanmardan Park area)?

To answer this question, relying on Lefebvre's "Production of Space" theory and concepts related to sense of place, sense of belonging, and collective identity, the present research analyzes the social quality of space within the framework of the interaction among physical structure, social actions, and meaning-making processes. Based on this approach, the conceptual model of the research is designed with a three-layered structure in which the physical-spatial layer (accessibility, landscape quality, spatial structure, and variety of activities), the social-activity layer (patterns of presence, daily activities, social interactions, and social life), and the semantic-emotional layer (sense of place, sense of belonging, and collective identity) are dynamically and causally linked (Figure 1). In the first layer, the "physical-spatial layer," material elements including accessibility, landscape quality, spatial structure, facilities, and diversity of activities set the framework for space utilization. The second layer, the "social-activity layer," encompasses patterns of presence, daily activities, social interactions, and social life, explaining the mechanism of perceiving and

experiencing the space. The third layer, the "semantic layer," includes components such as sense of place, sense of belonging, and collective identity, which are formed as a result of repeated experiences and users' participation in spatial life. There is a dynamic and causal relationship among these three layers: physical features affect social interactions, patterns of social interaction lead to the production and reproduction of collective meanings, and these formed meanings subsequently have a feedback effect on how the space is used over different time frames. Ultimately, this conceptual model relies on integrating Lefebvre and Soja's perspectives with semantic approaches to place, providing a new theoretical framework for explaining the relationships between the physical body, social action, and meaning in urban spaces.

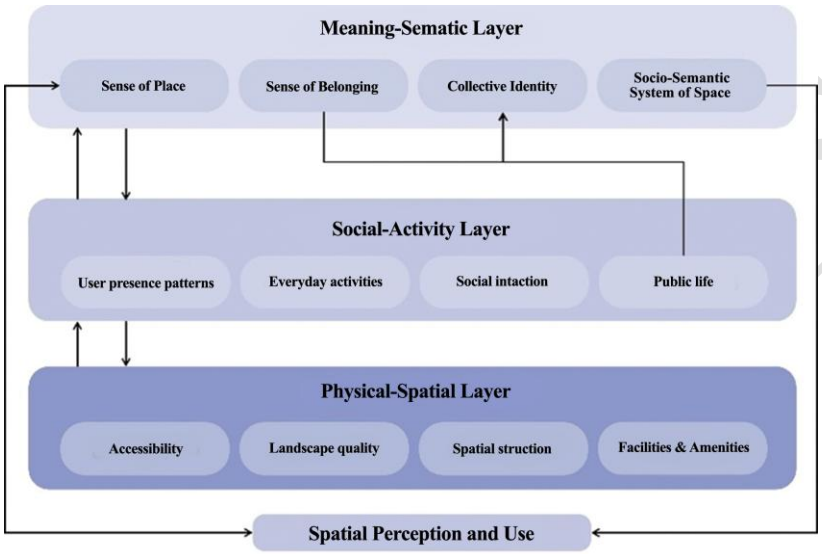

Figure 1. Conceptual model of the production of space and the formation of the semantic-social system in the research

2.Literature Review

2.1.National Literature

In Iranian research literature, studies related to river-valleys and urban open spaces have mainly focused on the environmental, managerial, and social dimensions of these spaces. These studies show that urban river-valleys, in addition to their ecological functions, can act as spaces for social interaction, experiencing the natural environment, and forming spatial bonds in the city. Bozorgi et al. (2005) in a field study using the Systematic Analysis for Development (SAD) method, examined the Kan River-valley as a study area and evaluated its northern section in terms of natural, artificial, and visual features. The research results indicated that protecting the natural structure of the river-valley and paying attention to environmental sustainability indicators are essential for developing urban resorts. Furthermore, using SWOT analysis, the researchers emphasized the necessity of social and cultural planning to prevent the overexploitation of this space. Ghashghaei et al. (2016), in a study on Bushehr's urban coasts, investigated the factors influencing the sense of belonging to a place. The results showed that components such as adequate accessibility, spatial permeability, natural environment quality, spatial diversity, and safety play an important role in shaping users' sense of belonging to public spaces. These findings indicate that the physical and environmental features of space can be effective in creating users' emotional bonds with a place. Ardalan and Pourjafar (2017) in a descriptive-survey study investigated the socio-cultural variables affecting the restoration of the Kan River-valley. The data from this study were analyzed using SPSS software and multivariate regression analysis. The results showed that components such as identity, vitality, social participation, social equity, and resilience are important factors in improving the river-valley's environmental quality. This research emphasizes that river-valley restoration requires simultaneous attention to physical, social, and cultural dimensions to prevent the formation of spaces lacking identity. Ahmadi et al. (2019) in a descriptive-analytical study evaluated the executive provisions for flood control in the Kan River-valley and Javanmardan Park. The findings revealed that certain existing design features, such as increased impermeable surfaces and a lack of a proper drainage system, have reduced flood management efficiency. In contrast, extensive vegetation cover and designing multi-purpose spaces capable of storing water could be effective in improving the environmental performance of the river-valley. A comparative review with foreign examples also showed that combining structural and non-structural measures along with public education could play a role in

enhancing the environmental and social performance of river-valleys. Maroufi (2021) in a case study of Shohadaye Hadiabad Park in Qazvin, investigated the role of urban green spaces' vitality in strengthening local sense of belonging. The results indicated that diverse activities, the continuous presence of users, and adequate environmental quality can lead to increased social interactions and strengthen users' ties with public spaces. Amiri et al. (2022) in a study on Enghelab Square in Bushehr evaluated the factors affecting citizens' sense of belonging to urban spaces. The results indicated that improving the quality of environmental design, creating cultural activities, and paying attention to indigenous elements could be effective in strengthening place identity and increasing citizens' social participation. Tahamipour Zarandi and Ahmadzadeh (2023) using a descriptive-analytical method and a hedonic pricing model, measured the economic and social value of environmental services in the Farahzad River-valley based on 386questionnaires. The results of three regression models showed that the river-valley's environmental quality significantly affects housing prices and citizens' willingness to pay (averaging 611,000Rials per month). Although regional-scale restoration lacked economic justification, it is defensible at the urban level when social benefits are considered. This study highlights the importance of citizens' perception of environmental quality and the social valuation of urban nature; a matter that holds conceptual importance in analyzing the socio-spatial mechanisms of river-valleys, including Kan. Fotouhi et al. (2024) in an analytical-field study using network modeling examined the environmental pattern of the Darband River-valley landscape in Tehran. This research analyzed two components: Landscape Ecological Capacity (LEC) and the level of social interactions with nature. The results showed that although some areas of the river-valley have been successful in creating a desirable user experience, weaknesses in certain design components have prevented the complete formation of a sense of place. The research concludes that simultaneous attention to the river-valley's natural structure and the quality of human interactions with nature can be effective in strengthening spatial experience and place identity. Although this category of research does not necessarily focus on the Kan River-valley, conceptually they demonstrate that sense of place, place identity, and social action in urban open spaces depend on design quality, opportunities for presence and interaction, and the connection of space to cultural and indigenous contexts. These findings are important for formulating the analytical framework of the present paper, which understands the Kan River-valley as a socio-semantic space rather than a purely natural-physical one.

2.2.International Literature

In international literature, studies related to river-valleys and urban public spaces have developed along two main paths: first, managerial-ecological and strategic approaches to river-valley planning; and second, socio-semantic approaches that analyze space as a platform for producing identity and collective experience. In the theoretical realm, Lefebvre (1991), by introducing the concept of the "social production of space," showed that space is not merely a physical container for human activities but is produced and reproduced through the process of social actions, representations, and lived experiences. This perspective, later expanded by Soja (1996) via the concept of "Thirdspace," emphasizes the connection between physical form, perception, and meaning. Similarly, Connerton (1989) highlights the role of collective memory and social rituals in stabilizing spatial meanings, and Edensor (2002) demonstrates how everyday experience and collective practices can lead to the regeneration of place identity. This theoretical stream has paved the way for analyzing urban public and natural spaces, including river-valleys, as platforms for producing collective identity. At an applied level, Omosotsi et al. (2019), in a study on the Sio River Valley sub-basin in Kenya using SWOT analysis and local community participation, showed that the success of river-valley planning depends on simultaneous attention to the region's cultural, social, and environmental capacities. Their findings emphasize that without the participation of local residents, physical interventions cannot lead to social sustainability. Krylova et al. (2020), in research on the Baikal-Angara Valley in Russia, examined sustainable tourism capacities within an ecological context. The results indicated that while the region's natural features are a competitive advantage, a lack of integrated management and tourism pressure could weaken environmental identity and local values. This study stresses the necessity of integrating specialized knowledge and indigenous knowledge in planning. Arif, Hamid, and Anwar (2022) in their study of the Kaghan Valley in Pakistan, using SWOT analysis, showed that infrastructure development without considering the environmental carrying capacity and local social structure could lead to natural resource degradation and weakened place identity. Their recommendations focus on sustainable management and local community participation. Ejikeme (2023), in a study on monolithic heritage sites in Nigeria, analyzed the relationship among cultural heritage, the natural context of the river-valley, and tourism development. The results showed that cultural values can only become a sustainable advantage when defined within the framework of protective and participatory strategies. In a more recent study, Insani and Haryono (2025) on the Kulon Progo River Valley in Indonesia, using a combination of SWOT, TOWS, and AHP analyses, identified geologically sensitive areas and proposed protection strategies based on social participation. The results showed that public awareness, indigenous knowledge, and active local community presence are considered key factors in the sustainability of river-valleys.

A review of international studies on river-valley planning and management shows that the majority of this research has focused on managerial, ecological, sustainable tourism, and strategic analysis dimensions such as SWOT. Although these studies have contributed significantly to explaining the natural capacities and environmental management mechanisms of river-valleys, the dimensions of users' lived experience, the social processes of meaning production, and how collective identity is regenerated in these spaces have rarely been analyzed in an integrated manner. In many international examples, even when local participation, indigenous knowledge, or cultural values are emphasized, these components are mostly examined within the framework of resource management or tourism development rather than as a cohesive framework for understanding the relationship between spatial structure, social action, and identity. References to examples like the Baikal Valley in Russia, the Kaghan Valley in Pakistan, or certain heritage contexts in Nigeria are made in this research not for direct case-by-case comparison with the Kan River-valley, but to illustrate the scope of planning and managerial approaches regarding the natural, cultural, and social capacities of river-valleys. These examples show that the sustainability and effectiveness of interventions are strengthened when, alongside ecological considerations, social interactions and place values are also addressed. Nevertheless, the cohesive relationship among the spatial organization of river-valleys, user experience, and the process of collective identity regeneration remains theoretically and analytically underdeveloped. On the other hand, a significant portion of theoretical frameworks related to the production of space and identity has been formed in the context of Western cities, and directly applying them to non-Western cultural contexts requires critical rereading and conceptual localization. This situation underscores the necessity of conducting a study that, considering the specific socio-cultural characteristics of Tehran, can contextually and comprehensively analyze the socio-spatial mechanisms affecting collective identity regeneration in the Kan River-valley.

2.3.Gap and Summary of the Literature Review

A review of national studies shows that research conducted on the Kan River-valley and other urban river-valleys has mostly focused on environmental dimensions, flood control, strategic planning, ecological capacity, and general social variables such as vitality and participation. Although some studies have pointed to components like identity, sense of belonging, and the quality of spatial experience, these concepts are often examined as independent and isolated variables and are rarely analyzed within a cohesive socio-spatial framework. At the international level, despite the development of theories regarding the "social production of space," "Thirdspace," and the role of memory and collective action in meaning reproduction, applied studies on river-valleys have mostly concentrated on environmental management, sustainable tourism, and strategic analyses, paying less attention to the process of collective identity regeneration in the context of users' lived experiences. Furthermore, a major part of existing theoretical frameworks regarding identity and space has been shaped in Western contexts and has rarely been empirically tested in the cultural contexts of Middle Eastern cities, particularly Tehran. Therefore, the primary gap in the current research lies in the lack of an integrated formulation of the physical, social, and semantic mechanisms affecting the regeneration of collective identity in urban river-valleys (specifically the Kan River-valley)—a study capable of explaining the link between spatial structure, social action, and users' lived experience within a coherent analytical framework.

3.Methodology

3.1.Overall Approach and Execution Process of the Research

This research was conducted with a descriptive-analytical approach and an applied-strategic goal. Its objective is to analyze the socio-spatial mechanisms affecting the regeneration of collective identity in the Kan River-valley restoration plan, emphasizing the Javanmardan Park area. In this framework, documentary, field, and expert data were collected and analyzed using the SWOT model to explain the current situation while providing the basis for extracting practical strategies. The details of the extracted factors are presented in the findings section. The research process was carried out in four stages. First, by reviewing library resources and urban documents, the theoretical framework and preliminary indicators were extracted. Second, field observations were conducted in the Kan River-valley and Javanmardan Park to evaluate spatial quality, users' attendance patterns, and identity markers. Third, based on integrating theoretical and field findings, a questionnaire consisting of 24items was designed within the SWOT framework, adjusted on a five-point Likert scale (very unimportant - very important). Fourth, the quantitative data were analyzed, the relative weight of the factors was calculated, and the quantitative results were then combined with the qualitative analysis. This staged structure ensured data triangulation and increased analytical precision. Tables of factors and scores are presented in the findings section.

3.2.Statistical Population and Sampling

The statistical population of the research includes 30scientific and executive experts related to the restoration of Tehran's river-valleys, selected via purposive (judgmental) sampling; the sample size was considered equal to the

population. Of these, 10 are faculty members of the University of Tehran in the fields of arid and mountainous region restoration, geography, environment, and urban landscape, who have a history of research or consulting regarding river-valleys. The other 20 are senior managers and experts from the Social and Cultural Deputy of the Tehran Municipality who have played a direct role in planning, executing, or supervising projects related to river-valleys. The questionnaire tool was distributed exclusively among these 30 individuals. The users' experience of the space was also incorporated into the qualitative analysis through field observations.

3.3.Validity and Reliability of the Questionnaire and Data Analysis

To measure content validity, the questionnaire was provided to several professors and experts and finalized after necessary corrections. To check the internal correlation of the items, the inter-item correlation coefficient was calculated to be 0/08, indicating a meaningful relationship among the statements. Subsequently, to measure the reliability of the instrument, Cronbach's alpha coefficient was calculated, resulting in a value of 0/70 This value indicates acceptable internal consistency and the adequacy of the tool for statistical analysis. Finally, data analysis was conducted at two levels. At the first level, the score of each of the 24 factors was calculated based on the 30 experts' responses on a five-point scale, and their sum and average were extracted to determine the relative weight of each factor. At the second level, based on the weighted factors, a strategic analysis was performed, and combined strategies were extracted. At this stage, the quantitative results were integrated with the qualitative findings from field observations to identify the effective and inhibitory mechanisms in the regeneration of collective identity. The details of the analysis and the final tables are provided in the findings section.

3.4.Study Area

Kan River-valley: The Kan River-valley is one of the most important natural-ecological elements of Tehran. Its origins and upstream areas are located in the western heights of Tochal, encompassing peaks such as Bazarak, Lavarak, Siasang, Taloun, and Karkou. The highest points of this basin reach an elevation of about 3775 meters. The main waterway, which forms the core of this river-valley, turns into the main stream in the village of Sulqan after joining the tributaries of Imamzadeh Davoud, Sangan, and Kenardareh Sulqan; its discharge then decreases as it passes through the city of Kan due to extensive exploitation (Figure 2). Further down, the Darakeh River joins it, and the flow continues after passing Eram Park, the Tehran-Karaj freeway intersection, Fath Highway, and the Yaftabad River. Passing under the Azadegan Highway and transiting towns like Golshahr, the Tehran-Ahvaz railway, and the Tehran-Saveh freeway, the river enters District 18 of Tehran Municipality and the Ray County area, disappearing at an elevation of about 1100 meters above sea level (Aghabalazadeh, 2019). This route is about 22 kilometers long and naturally flows from the northern heights towards the southern plains of Tehran. This river-valley covers extensive areas of Districts 5, 9, 18, 21, and 22 of Tehran Municipality, and due to its geographical location and considerable length, it has become one of the most important natural-ecological elements in Tehran's spatial structure (Table 1) (Rezaei, 2020).

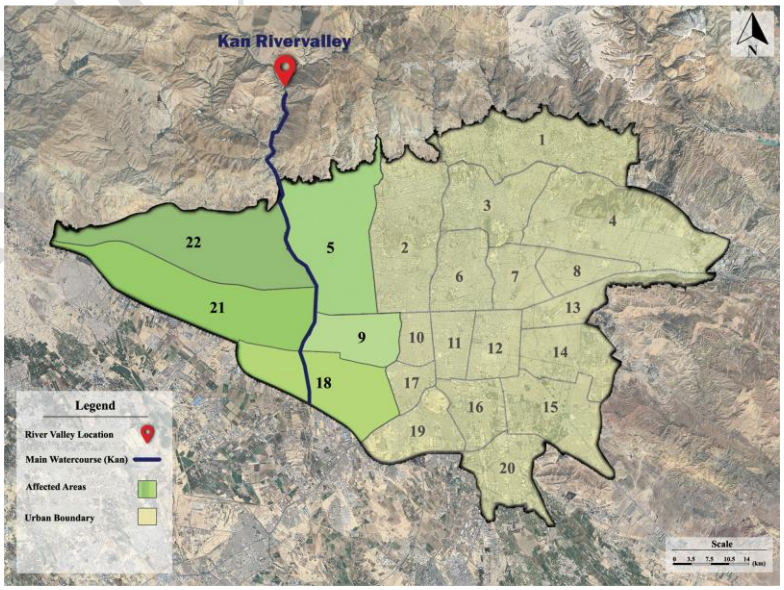

Figure 2. Location of the Kan River-valley, the extension of the main waterway, and directly affected areas (Poorhasan Mehrzanjani, 2025)

Table 1. Summary of recognition studies on Tehran's Kan River-valley (Poorhasan Mehrzanjani, 2025)

Study Type	Explanation
Axis Route	The Kan axis starts from Sulqan and, passing through Chahardangeh, Shatreh, the Aftab Complex, and Imam Khomeini's Mausoleum, extends to the south of Tehran; its prominent elements include Kan Gardens, Azadi Stadium, Eram Park, and Mehrabad Airport (Tehran Comprehensive Plan, 2008).
History	The main river of this area has been known by names such as Kan, Sulqan, and the Great River, with a history dating back over two thousand years; the discovery of ancient artifacts and early Islamic coins indicates long-standing settlement in this region (Aghabalazadeh, 2019).
Culture and Society	The people in the upper reaches of the region, especially in the Kan village area, speak the Tati dialect; their occupation has conventionally been traditional agriculture and animal husbandry, and the Muharram religious rituals hold a special cultural identity (Aghabalazadeh, 2019).
Land Uses	Diverse land uses are observed in this area, including residential towns (Ekbatan, Olympic Village), recreational spaces (Eram Park, Persian Gulf Lake), sports complexes (Azadi Stadium), transportation infrastructure (Mehrabad Airport, subway, freeways), as well as industrial and pilgrimage uses (Imamzadeh Davood) (Aghabalazadeh, 2019; Tehran Comprehensive Plan, 2008).
Prominent Feature	The Kan channel is the only axis without a highway along its stretch; it contains remnants of Tehran's last traditional gardens and Azadi Stadium, and it enjoys favorable air quality due to the relative absence of industries and polluting factors (Aghabalazadeh, 2019; Tehran Comprehensive Plan, 2008).
Climate	The average annual temperature is $17.5°C$, with a minimum of $-10°C$in winter and a maximum of $48.5°C$in summer; annual rainfall is 240 mm, primarily occurring in winter, and the dry period lasts for about 8 months (Aghabalazadeh, 2019).
Watershed Basin	The watershed feeding Kan covers an area of approximately 200 km^2, and its main river flows for nearly 20 km(Gholami et al., 2020).
Flood Risk Studies	Severe floods in the years 1373 (1994), 1391 (2012), and 1398 (2019) caused significant damage in this region, indicating that the area has a high flood potential (Aghabalazadeh, 2019; Jihad Research Company of Water and Watershed Management, 2005).
Water Resources	The Kan River is the second largest river in the Tehran-Karaj plain; it has an average maximum discharge of 5 $m^3/$sand an annual volume of 70 million m^3, which is used in some parts for irrigating gardens (Aghabalazadeh, 2019; Engineers Hamkar Pars Boom, 2016).
Vegetation (Flora)	Main species include willow, poplar, pine, maple, Judas tree, and black locust; fruit trees such as grape, walnut, and persimmon; and wild and medicinal plants like alfalfa, wild rue (Espand), and wild poppy are also present (Aghabalazadeh, 2019; Kamanroodi Kajori et al., 2021).
Soil and Geomorphology	The geology of the area includes Eocene volcanic and sedimentary formations and Quaternary deposits; the riverbed is mainly composed of uniform coarse-grained particles with an average slope of

Javanmardan Park: Javanmardan Iran Park is located on the border of Districts 5 and 22 of Tehran, between the Shahid Hemmat and Shahid Hakim highways (Ahmadi et al., 2019). This park was developed in line with the policies of the 2006 Tehran Comprehensive Plan, and its first phase began with the municipality's support in 2011 and was inaugurated in the summer of 2012 (Figure 3). This was an important step towards restoring Tehran's river-valleys; however, instead of following a five-year plan, the project's execution was completed under client pressure in less than two years, which brought about consequences (Alehashemi et al., 2015).

Figure 3. Before and after river-valley restoration and the construction of Javanmardan Park (Poorhasan Mehrzanjani, 2025)

Although the plan's objectives were based on improving spatial legibility, creating national identity, and paying attention to natural elements, the time constraint reduced spatial quality. The design process focused more on physical interventions, and the park's connection to the Kan River was severed. While details and spatial diversity are visible at the entrances, a simplistic approach utilizing stone walls and cement channels was applied in the valley sections and adjacent to the floodway, destroying the project's cohesion (Alehashemi et al., 2015). The lack of periodic supervision has also caused sedimentation, sludge buildup in channels, and damage to the paving (Figure 4).

Figure 4. Lack of proper periodic maintenance of pathways and the riverbed in Javanmardan Park (Poorhasan Mehrzanjani, 2025)

Regarding detailing, urban furniture such as benches and gazebos were placed haphazardly, reducing visual quality. The designers' poor understanding of Kan's landscape values and a lack of technical experience in river landscape design have erased the region's natural and cultural identity, turning the park into an urban space devoid of connection to its natural context (Alehashemi et al., 2015). Field findings also show that cultural and identity elements lack continuity, and some damaged furniture is practically unusable (Figure 5).

Figure 5. Inefficiency and severe damage to urban furniture in Javanmardan Park (Poorhasan Mehrzanjani, 2025)

One of the main missions of the project was seasonal flood management, but the river organization was done without sufficient hydrological studies. Allocating land uses in sensitive flood zones reduced safety. Regular terracing, stone walls, and hard surfaces have transformed the natural appearance of the riverbed into a concrete channel, removing native elements. These actions brought environmental and cultural consequences, including exacerbated sedimentation and a reduction in natural and cultural cohesion (Ahmadi et al., 2019). Furthermore, the failure to respect upstream buffer zones and dense constructions within the project area have polluted the river-valley landscape with soulless urban structures. The lack of land-use organization and appropriate green space design has seriously challenged the realization of the primary mission—restoring the vibrant and natural landscape of the river-valley (Figure 6).

Figure 6. A view of the landscapes in Javanmardan Park (Poorhasan Mehrzanjani, 2025)

4.Findings

To identify the mechanisms affecting the semantic-social system of the space, this section integrates data from structured field observations with quantitative results from the expert questionnaire (with acceptable reliability and a Cronbach's alpha coefficient of 0/70). In this mixed approach, field data were used as a basis to "explain" and deepen the quantitative findings.

Field investigations in the physical-functional layer show that the interventions carried out in Javanmardan Park, such as stone walling and concreting the channels, have severed users' organic connection to the river-valley's natural bed. In the social interactions layer, the improper placement of urban furniture and the lack of continuity in pedestrian paths have prevented the formation of a vibrant public realm. However, in the semantic layer, the presence of historical and religious elements (such as upstream rural fabrics and Imamzadehs) continues to inject a powerful identity weight into the space. To explain these mechanisms more accurately, the extracted factors were evaluated in the form of a SWOT analytical matrix and weighted by experts (n=30).

During the quantitative analysis process, a total of 24 items were evaluated across the four SWOT components by the experts. However, to avoid verbosity and focus on the most decisive variables in the semantic-social system of the space, 12 key items (including the top 3 variables in each category that obtained the highest scores) were extracted. These 12 items, serving as the primary foundation, carry a higher analytical weight and form the core of the strategy formulation. Table 2 shows the most important identified items based on the highest obtained scores.

Table 2. Evaluation Matrix of Internal and External Factors (SWOT) affecting the semantic-social system (Derived from field and survey findings)

Component	Code	Layer Type	Most Important Identified Propositions Based on Physical, Social, and Semantic Dimensions	Total Scores by Questionnaire
Strength	S1	Semantic - Significative	Biological dynamism caused by the natural and continuous flow of the river and its role in inducing a sense of life and freshness in the urban structure.	145
	S2	Physical - Spatial	Existence of favorable microclimates and ecosystem services (such as air purification) that, as a natural attraction, enhance the spatial presence/sociability.	139
	S3	Semantic - Significative	Existence of a historical-cultural background in the upstream rural fabrics (Kan and Sulqan) as a source of identity and symbolic capital.	130
Weakness	W1	Physical - Spatial	Physical-perceptual disconnection between humans and nature due to the concrete channeling of the riverbed and the destruction of its organic landscape.	138
	W2	Social - Activity	Existence of indefensible urban spaces and blind spots at intersections with traffic arteries, leading to insecurity and a reduced sense of belonging.	130
	W3	Physical - Spatial	Rupture and discontinuity in the spatial-functional continuity of the river-valley due to interference with urban infrastructure and heterogeneous land uses.	125
Opportunity	O1	Physical - Spatial	The possibility of formulating landscape design criteria and control regulations to prevent destructive construction and protect the natural skyline of the river-valley.	135
	O2	Social - Activity	High capacity of the river-valley to define a network of urban watershed parks and continuous green corridors at the regional scale.	132
	O3	Semantic - Significative	Potential for defining and developing sustainable urban ecotourism relying on natural-historical attractions and strengthening the local economy.	131
Threat	T1	Physical - Spatial	Physical vulnerability to natural hazards (flash floods) due to the specific topography and unprincipled manipulations in the riverbed.	133
	T2	Social - Activity	Vandalistic behaviors and environmental destruction by some users due to a weak sense of belonging and lack of social monitoring.	130
	T3	Semantic - Significative	Dominance of the “artificial design” approach over “nature-centricity” and, consequently, inducing a sense of alienation and lack of authenticity in the spatial experience of users.	127

The integration of the scores indicates that the highest weight among the weaknesses and threats is attributed to the “physical-spatial” layer (artificialization and concretization) and its reflection on the “social” layer (insecurity and vandalism). In contrast, the greatest capacities lie within the “semantic” layer (natural vitality and cultural background).

Therefore, to determine the overall orientation and strategic position of the study area, the quantitative data obtained from the expert questionnaire underwent integrated analysis. In the first step, to assess the impact of the identified variables, the average coefficient of importance was calculated. Considering a statistical population of 30experts and the evaluation of 24statements based on a five-point Likert scale, the maximum possible theoretical score was calculated to be $3600(24 \times 30 \times 5 = 3600)$. Given the total actual scores achieved in the four components of strengths (795), weaknesses (762), opportunities (775), and threats (762), which aggregate to 3094points, the total importance coefficient of the variables was calculated to be 85.94% $(3094 \div 3600 = 85.94)$. This demonstrates a high consensus and confirmation among experts regarding the strategic importance of these factors in the reproduction

of the river-valley space. In the second step, to determine the position within the Strategic Position and Action Evaluation Matrix, the coordinates of the strategic vector were extracted. The resultant of the internal factors as the horizontal axis ($X = S - W$) was calculated as $+33(795 - 762 = +33)$, and the resultant of the external factors as the vertical axis ($Y = O - T$) was calculated as $+13(775 - 762 = +13)$. Finally, based on the logic of the SWOT matrix analysis, since $S > W$ and $O > T$, the macro-orientation of the region in the strategic position evaluation matrix falls into the "Aggressive or Developmental (SO)" quadrant. This quantitative finding proves that despite physical damages and managerial weaknesses, the internal capacities (semantic and historical layers) and external opportunities (ecotourism and buffer zone regulations) are so powerful that the primary research strategy should not solely focus on resolving damages (defensive). Instead, it should be organized around the "active development and reproduction of spatial identity" (maximizing the utilization of strengths to attract spatial-semantic opportunities).

5.Discussion and Interpretation of Findings

When analyzed in light of Lefebvre's theoretical framework of the production of space and the three-layer conceptual model (physical, social, semantic), the findings of this research go beyond a simple evaluation and present a critical picture of the failure mechanisms in regenerating collective identity. The core of the crisis in Javanmardan Park lies not in a lack of facilities, but in a "systemic rupture" among the three layers of space.

5.1.The Dominance of "Conceived Space" over "Lived Space" and the Disruption in Spatial Production

According to Lefebvre's theory, space is the product of interaction among "representations of space" (the conceived space of designers and managers), "spatial practices" (physical and perceptual space), and "representational spaces" (the lived space full of meaning for users). The findings clearly show that in the Javanmardan Park revitalization project, the "representations of space" have heavily dominated the other two dimensions. Statements W1 (concrete canals) and T3 (artificial design features) are prime examples of an engineering-centric, control-oriented "conceived space" that views nature not as a living system, but as a visual element to be framed in concrete. This approach has reduced "spatial practices" to predetermined paths and controlled interactions and, most importantly, has prevented the formation of an authentic "lived space." Lived space is where collective memories, spontaneous interactions, and emotional bonds are formed. When the natural riverbed (the strongest semantic source) is canalized and made inaccessible, the primary raw material for producing "lived space" is destroyed. Consequently, the space transforms from a dynamic "place" into a static, consumptive "landscape" where collective identity loses its ability to reproduce itself.

5.2.Comparative Analysis of Findings with Research Literature (Domestic and International)

Comparing this study's results with previous literature reveals significant convergences and divergences that highlight the analytical novelty of this article. At the domestic level, while confirming previous findings, the current research adds a new interpretive layer. For instance, while Bozorgi et al. (2005) and Ahmadi et al. (2019) emphasized the ecological dimensions and flood management of the Kan river-valley, this research shows that purely technical and structural solutions for flood control (like concrete retaining walls - W1) have themselves become primary obstacles to forming a sense of belonging and collective identity. In other words, "ecological sustainability" is incomplete and ineffective without "socio-semantic sustainability." Furthermore, aligning with studies like Ghashghaei et al. (2016) and Maroufi (2021) that emphasize the role of environmental quality in the sense of belonging, this study, by highlighting statement S3 (historical background), argues that "environmental quality" in the context of the Kan river-valley does not merely mean visual or physical quality, but also relies on narrative and historical continuity with upstream contexts—an aspect ignored in the current design of Javanmardan Park.

At the international level, this research addresses a critical gap. Studies like Kirillov et al. (2020) in Russia or Arif et al. (2022) in Pakistan analyze river-valleys primarily from the perspective of tourism management and infrastructure development. The findings of this research suggest that such an approach, if not accompanied by a deep understanding of the users' "lived experience," can lead to the commodification of space and the weakening of local identity. Threat T2 (harmful user behaviors) and weakness W2 (social insecurity) are not merely managerial problems; they are symptoms of a deeper ailment: the user's alienation from a space they do not perceive as their own.

Unlike managerial approaches that emphasize control and surveillance, the theoretical framework of this research roots the problem in the "discursive gap" between the formal, engineered language of designers and the informal, emotional language of users' everyday lives. From this perspective, the solution lies not in increased control, but in returning the "right to produce space" to users through participatory and nature-based designs (Table 3).

Table 3. Comparative Analysis of Research Findings with Domestic and International Literature

Comparison Dimension	Key Findings of Current Research	Convergence with Previous Research (Confirmation/Extension)	Divergence or Analytical Gap (Novelty)
Relationship between Physicality and Identity	Structural physical interventions (W1) are the main cause of rupture in the semantic system and an obstacle to identity building.	Confirms research by Ghashghaei (2016) and Fotouhi (2024) regarding the importance of physical quality in forming a sense of place.	Divergence: This study shows that the "type" of physical intervention is decisive. An engineering-structural approach, even if technically correct, can become anti-identity. Novelty lies in identifying this dialectical contradiction.
Role of Nature and Ecology	Ecological capacities (S2) only transform into social capital when linked with the semantic layer (S3).	Aligns with Bozorgi (2005) in emphasizing the importance of protecting natural structures.	Gap: Unlike a purely ecology-centric view, this research sees ecology not as the "goal" but as the "context" for meaning production. Novelty lies in framing the river-valley as a "Cultural Ecosystem."
Space Management and Participation	Insecurity (W2) and vandalism (T2) are rooted in user alienation and a weak sense of belonging.	Aligns with international research like Omosutsi (2019) emphasizing the importance of local community participation.	Divergence: This study moves beyond mere "management participation" and analyzes the problem at the level of "spatial production" (Lefebvre). The solution is not just participation in maintenance, but in meaning-making and initial design.
Strategic Approach	The strategic position is "Aggressive" (SO); meaning physical weaknesses must be reconstructed based on semantic-historical strengths.	Aligns with general SWOT analyses seeking to extract strategies.	Novelty: This research defines "aggression" not merely as physical development, but as "semantic aggression": reclaiming the engineered conceived space through an authentic cultural and natural narrative, which may have been considered during the initial stages, planning, and even the naming of the Javanmardan Park project (where "Javanmardan" translates to selfless heroes and chivalrous warriors in Persian), yet remained neglected and was inefficiently executed during the implementation phase.

5.3.Inhibitory Socio-Spatial Mechanisms in the Formation of Collective Identity

1) Mechanism of "Dominance of Conceived Space over Lived Space" (Physical Determinism):
The dominance of the engineering-technocratic perspective in the river-valley design (such as concrete walls and rigid geometric paths) has caused designers' "conceived space" to overpower citizens' experience and "lived space." This physical determinism has eliminated the space's flexibility for spontaneous social interactions and prevented spatial belonging.

2) Mechanism of "Contextual Disconnection and Morphological Rupture":
The implemented plans have developed Javanmardan Park as a "spatial island," independent of the surrounding historical and cultural context (especially the Kan neighborhood). This discontinuity in access and visual networks has severed the natural flow of social life and prevented the neighborhood's historical identity from extending into the park.

3) Mechanism of "Semantic Depletion and Production of Artificial Landscape":
Ignoring the natural ecology of the river-valley and replacing it with artificial, standardized elements (incompatible street furniture, non-native vegetation, and hardscaping) has erased signs of collective memory. This depletion has reduced the river-valley from a "cultural ecosystem" to a soulless, consumptive promenade.

4) Mechanism of "Decline of Natural Surveillance and Production of Defenseless Spaces":

Poor landscape design, creation of visual blind spots, and unbalanced distribution of population-attracting land uses have disrupted the mechanism of "public surveillance." This has led to defenseless urban spaces, increased insecurity (and perceived insecurity), and consequently the exclusion of sensitive social groups (women, children, and the elderly), which is the biggest obstacle to a stable social system.

Following the inhibitory socio-spatial mechanisms, the following strategies based on the SWOT matrix have been formulated to provide specific, measurable actions linked to the analytical findings.

1. Aggressive Strategies (SO): Utilizing Semantic Capital to Reconstruct the Physical Space: Creating the "Kan Cultural-Natural Corridor"

- Actions: Design and implement a continuous pedestrian and bicycle path connecting Javanmardan Park to the historical fabric of Kan village and Imamzadeh Davood via green, legible edges. Use Interpretive Signage along the route to narrate the region's history, culture, and ecology—fully aligning with the park's nomenclature, which honors selfless heroes and warriors.
- Justification: This strategy directly employs strengths S1 (natural vitality) and S3 (historical background) to exploit opportunity O3 (ecotourism potential).
- Evaluation Indicators: Noticeable increase in public presence and use of the connecting path; elevated visitor awareness regarding history, culture, and ecology (measurable via qualitative user experience surveys); increased quantity and quality of cultural/natural events; improved sense of belonging and semantic connection.

2. Defensive Strategies (ST): Securing Space against Threats by Relying on Strengths: Replacing "Hard Engineering" with "Bioengineering"

- Actions: Review the design of concrete river walls (W1) and gradually replace them with Nature-Based Solutions such as green walls, stabilizing vegetation, and natural terracing.
- Justification: Uses ecosystem capacity (S2) to counter flood hazards (T1) and artificiality (T3), while addressing weakness W1.
- Evaluation Indicators: Improved user perception of natural beauty and authenticity (via qualitative satisfaction surveys); reduced negative feedback regarding artificiality; observed ecological improvement through field documentation; increased psychological comfort; enhanced social acceptance of nature-based flood management.

3. Conservative Strategies (WO): Addressing Weaknesses using External Opportunities: Implementing "Crime Prevention Through Environmental Design (CPTED)"

- Actions: Formulate landscape design guidelines (Opportunity O1) to eliminate blind spots and defenseless urban spaces, increase night lighting, and locate population-attracting uses (like small cafes and cultural kiosks) in sensitive spots to boost natural and public surveillance.
- Justification: Leverages legal/planning opportunities (O1) to resolve key weaknesses W2 (insecurity) and W3 (spatial disconnection).
- Evaluation Indicators: Significant reduction in perceived insecurity; increased diverse user presence at various hours; reduction of visual blind spots; increased public satisfaction with landscape quality; enhanced natural/social surveillance.

4. Competitive Strategies (WT): Fundamental Reconstruction to Simultaneously Counter Weaknesses and Threats: Executing the "Integrated River-Valley Landscape Regeneration Plan"

- Actions: Define a comprehensive redesign project prioritizing the removal of artificial/low-quality elements (countering T3), revising furniture placement, connecting fragmented paths (resolving W3), and defining diverse, sociable land uses to counter vandalism (countering T2).
- Justification: A fundamental strategy to address intertwined weaknesses and threats rooted in the project's initial design.
- Evaluation Indicators: Notable decrease in negative user feedback regarding artificial design; improved physical-spatial continuity of pedestrian paths; elevated social participation and positive feedback toward redesigns; reduced vandalism and increased social responsibility; increased multifaceted use of the redesigned space.

Notably, the indicators provided in this section are proposed criteria for monitoring and evaluating the effectiveness of strategies during implementation.

6.Conclusion

This research aimed to analyze the socio-spatial mechanisms affecting the regeneration of collective identity in the Kan river-valley revitalization plans (Javanmardan Park area). In response to the primary question, "What mechanisms have hindered the regeneration of collective identity?", this study achieved key results based on Lefebvre's theoretical framework and SWOT analysis. Findings showed that despite significant natural, historical, and social potentials, the physical interventions failed to strengthen place identity and instead fueled a "triple rupture" between humans and the environment:

1) Physical-Ecological Rupture: Concrete canalization and engineering-centric interventions severed citizens' organic connection with the river-valley ecosystem.
2) Socio-Functional Rupture: The dominance of homogenized commercial and recreational uses over authentic social functions led to users' alienation from the lived space.
3) Semantic-Identity Rupture: Ignoring collective memories and historical narratives created a rootless space lacking semantic depth, unable to reflect the identity of surrounding residents.

Within the spatial production theory, the root of these ruptures lies in the dominance of engineers' and designers' "Conceived Space" over citizens' "Lived Space." The governing paradigm was "engineering-physical," treating space as a neutral container for placing functions and equipment, failing to grasp the dialectical interaction between humans, nature, and meaning. Ultimately, it reduced the river-valley from a dynamic "socio-semantic system" to a static, inauthentic "spatial product."

The core novelty of this article is formulated in two aspects:

1. Operationalizing Lefebvre's framework for urban regeneration pathology: This study demonstrated that SWOT analysis, when combined with concepts like "conceived space" and "lived space," transforms from a descriptive tool into an explanatory-critical one. It reveals failure roots not at the symptomatic level (like vandalism), but at deep discursive and paradigmatic layers.
2. Framing the river-valley as a "Cultural Ecosystem": This concept moves beyond one-dimensional views (purely ecological or recreational), emphasizing the inseparable intertwining of nature, history, collective memory, and social practices. Thus, any physical intervention ignoring this continuity destroys both natural and social capital, disrupting identity formation.

Strategically, this research showed that reviving collective identity in Javanmardan Park requires a "semantic reconstruction" rather than adding more infrastructure. The proposed strategies, especially the selected Aggressive strategy (SO), are based on the principle that symbolic and natural capital (strengths) must be used to correct the over-engineered physicality (weaknesses). This prioritizes ecological authenticity, historical continuity, and human experience over purely functional and structural considerations.

Therefore, this research paves the way for future studies in several key areas:

- Comparative evaluation of river-valley organization projects in other Iranian metropolises using the "cultural ecosystem" framework.
- Quantitative and survey-based analysis of the impacts of physical interventions based on the "cultural ecosystem" approach on social capital and citizens' sense of belonging.
- Research on institutional barriers to transitioning from the "engineering-physical" paradigm to the "socio-ecological" paradigm in Iran's urban management system.

Ultimately, it is hoped that these findings will help make urban development projects in the country more human-centric and context-oriented, contributing to the creation of more sustainable, meaningful, and memorable spaces.

Author Contributions

The first author contributed 34%, the second author 33%, and the third author 33%.

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Conflict of Interest

According to the authors, there is no conflict of interest related to this article.

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