

Original Article

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Urban neighborhood regeneration model with emphasis on improving the livability (Case study: Sirous neighborhood, District 12, Tehran municipality)

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Abstract

Unbalanced urban development has led to physical, economic, social, environmental, and managerial imbalances, as well as the failure of the regeneration model in urban neighborhoods. One of the negative consequences of such a process is the degradation of areas, which decreases the level of livability. The research objective is to study the significance of the Sirous neighborhood regeneration pattern in District 12 of Tehran Municipality, with a focus on improving livability. Research is applied in terms of purpose and qualitative-quantitative in terms of method. The statistical community consisted of 50 experts. The non-probabilistic and snowball sampling methods were employed. Research information was collected through a library method. The data were collected using closed-ended questions and analyzed through the Delphi panel model. The results revealed the unfavorable conditions for the physical criteria in four indicators of housing and wear, transport network, access, and transport; for the environmental criteria in two indicators of pollution/climate and green spaces; for the social and cultural criteria in three indicators of participation/interaction/communication, identity, and sense of belonging to the place; for the economic criteria in three indicators of budget and investment, facilities and infrastructure, and activity and employment; and for the management criteria in three indicators of integration, design and plan, and undesirable regulations. This indicated that the redevelopment plans prepared for the revitalization of degraded areas had not been implemented with an integrated approach to all physical, environmental, economic, social, and managerial dimensions, reducing the livability of the Sirous neighborhood.

Keywords

Regeneration
model
livability
upgrading
Sirous neighborhood

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1. Introduction

Advancements in information technology and the transformations resulting from the Industrial Revolution led to a significant increase in urban populations. This population growth often exceeded the physical capacity and tolerance of cities, with a large proportion of residents settling in central urban areas. As a result, imbalances emerged in physical, economic, social, and environmental dimensions. Uneven urban development had considerable impacts on historical and old urban fabrics as well as cultural heritage. The majority of the population, often consisting of migrants settled in the historical cores and central areas of cities, leads to physical changes, deterioration, and the gradual destruction of central urban fabrics. Over time, and due to the lack of effective regeneration and renewal programs, deteriorated urban fabrics emerged, which was accelerated by technological developments. These areas that once met the needs of their residents cannot meet their needs today, either structurally or functionally (Pourahmad, 2010:74). Deteriorated urban fabrics contribute to a decline in livability and quality of life across physical, environmental, social, economic, and managerial dimensions. Livability refers to the enhancement of the quality of life and the realization of sustainable urban planning. A livable city is characterized by a desirable natural environment free from pollution, a resilient physical structure, social harmony, and sustainable social and economic participation (Aref Hosseini, 2019: 137).

On the other hand, declining livability and the expansion of deteriorated urban fabrics, along with their impacts on residents' quality of life, have drawn increasing attention to the concepts of livability and urban regeneration in urban planning discourse. Over recent decades, various approaches to organizing and revitalizing deteriorated urban areas have been adopted. The reconstruction approach emerged in the 1950s, aiming to rebuild old urban areas based on approved urban master plans at a regional scale, with national and local governments acting as the main stakeholders. The revitalization approach gained prominence in the 1960s, emphasizing the development of urban peripheries, in addition to the reconstruction goals of the 1950s approach. The spatial focus remained regional, and public sector institutions were considered the primary stakeholders. During the 1970s, the urban renewal approach became dominant, with an emphasis on implementing development programs at the neighborhood scale and

encouraging private-sector participation. In the 1980s, the urban redevelopment approach focused on major projects within and around cities, highlighting neighborhood-scale interventions and involving private sector actors and civil institutions as key stakeholders. Since the 1990s, the urban regeneration approach has gained increasing attention, aiming to implement urban development programs in an integrated manner. This approach emphasizes neighborhood-scale interventions, the revision of strategies, and the formulation of new urban visions, with local communities identified as essential stakeholders (Izadi, 2014: 11). The primary objective of this research is to examine the significance of the urban regeneration model in the Sirous neighborhood, located in District 12 of Tehran Municipality, with an emphasis on improving livability.

The evolution of approaches to organizing deteriorated urban fabrics from the 1950s to the 1990s is clearly observable in the central areas of Tehran. In District 12, the inability to meet residents' needs within the historical core encouraged the population's movement to other parts of the city. This shift led to negative population growth rates in the district and in the Sirous neighborhood. Additionally, the decline in residential land use and the expansion of commercial and workshop activities contributed to reduced levels of safety. Sirous neighborhood, as the central area of District 12, is predominantly characterized by commercial land uses with supra-regional functions, while service, green, and recreational land uses have received limited attention. Furthermore, due to the low durability and instability of building materials, along with the absence of effective regeneration initiatives, the share of deteriorated urban fabric in the neighborhood remains high. These conditions have accelerated the outmigration of residents and replaced long-term families with single individuals. Many newcomers to the neighborhood, in some cases affected by social disorders such as addiction, have contributed to declining security, increasing crime rates, and the emergence of various social challenges. These factors have directly impacted the livability and quality of life in the Sirous neighborhood. Consequently, most developers and investors prefer to transfer their investments away from Tehran's central areas. According to this study, these conditions are the result of criteria and processes shaped by Tehran's metropolitan policies and the environmental, physical, economic, social, and managerial frameworks governing District 12 (Dezhban, 2024: 12).

Due to its distinctive cultural and economic characteristics, the Sirous neighborhood was selected as the spatial focus of the present research. This neighborhood is parallel to Rey Street on the east; it reaches Mostafa Khomeini Street on the west, the bazaar and Panzdah Khordad Street on the north, and Mohammadieh Square on the south. The highest percentage of buildings with historical and cultural characteristics is located in this neighborhood. Most of the textures in the aforementioned neighborhood, whether historical or residential, are old and worn out. Given the important urban indicators in the neighborhood, numerous physical, environmental, socio-cultural, economic, and management problems are observed. As a result, the level of livability, living conditions, and the realization of the regeneration pattern in this neighborhood are low, considering the various issues and problems in the Sirous neighborhood ([Sirous Neighborhood Development Document, 2016: 7](#)).

As the aforementioned problems continue in the Sirous neighborhood, the importance of the neighborhood's historical and economic characteristics as a central part of Tehran will diminish. On the other hand, due to the presence of deteriorated structures, the local population will decrease, and the level of social interactions and security in the neighborhood will reach its lowest point, causing a crisis in the neighborhood's sustainability. The core research problem is "Under what factors has the Sirous neighborhood in District 12 of Tehran Municipality, with its historical, cultural, and economic characteristics, experienced a decrease in livability, and why has the regeneration pattern not been realized in this neighborhood?"

2. Theoretical and practical background of the research

2.1. Theoretical background

Urban regeneration is an integrated approach that addresses problems, opportunities, strategies, and actions across physical, environmental, social, and economic domains. According to Roberts, urban regeneration is a comprehensive and integrated process consisting of a set of interrelated actions to resolve urban problems and achieve sustainable improvements in the economic, social, physical, and environmental conditions of a defined area ([Roberts, 2000:17](#)). Documentary reviews indicate that although the term urban regeneration was initially used as a near-equivalent to urban renewal and did not carry a

distinct meaning, it gradually acquired a positive connotation in contrast to the negative consequences of conventional urban renewal practices.

Alongside the evolution of conservation policies and planning approaches, renewal and improvement programs have become increasingly flexible and comprehensive over time. Urban regeneration represents an evolutionary policy approach that extends beyond the goals, ideals, and achievements of large-scale physical reconstruction programs of the 1950s, revitalization and improvement initiatives of the 1970s, and redevelopment strategies of the 1980s, which were largely focused on land development and commercial centers. While regeneration programs in the 1980s were primarily based on land and real estate development within a centralized and physical planning framework, often targeting abandoned industrial and port areas, this approach gradually evolved into a holistic perspective that, in addition to paying attention to the physical characteristics of the environment and its improvement, is committed to transformation in economic, social, and cultural structures ([Hadavi, 2017:197](#)).

According to John Blewith, urban regeneration has had a significant impact by incorporating multiple interrelated components through an anchor-based approach. Parikneson emphasizes the necessity of adopting broader perspectives and developing comprehensive planning packages to secure resources, education, capacity building, investment development, and social requirements ([Kamanrudi, 2022:12](#)).

Since the late 1990s, urban policies in developed countries, particularly in Europe and North America, have increasingly focused on urban regeneration through the qualitative enhancement of urban spaces and fabrics. Key policy documents in this field include France's national planning framework (2000), Germany's Social City program, England's Towards an Urban Renaissance document, and the Netherlands' Big Cities Policy. Although Western European countries have adopted different legal frameworks, planning systems, and intervention models based on their political and administrative structures, official documents consistently highlight environmental improvement, economic development, and social inclusion as the three fundamental pillars of regeneration policy ([Yazdani, 2021: 445](#)).

From the late 1990s onward, integrated regeneration approaches have been increasingly emphasized, focusing on the strategic integration of social, economic, and environmental objectives. This

integrated approach to regeneration, while preserving/improving/reusing historic buildings, paying special attention to cultural/artistic/sporting events and diverse leisure activities, emphasizing on quality and innovation in new plans, enhancing cooperation and collaboration among all stakeholders, places special emphasis on increased employment opportunities, poverty reduction, social exclusion, and social participation as essential components of urban regeneration to improve the citizens' quality of life.

Livability encompasses the reconstruction and reconsideration of urban planning processes to create environments that support employment opportunities and recreational activities. It involves providing appropriate infrastructure, public services, and basic needs such as food, clothing, housing, and access to employment opportunities, as well as improvements in environmental quality to enable residents to experience a higher quality of life (Zanella, 2015:3).

Peter Evans (2002) conceptualizes livability differently across developed and developing countries. In developing contexts, livability is closely linked to the fulfillment of basic needs, such as food, clothing, housing, and relative welfare; whereas in developed countries, these needs are often met through individual economic capacity. Consequently, livability in developed contexts is associated with higher-order needs. This distinction aligns with Maslow's hierarchy of needs, where developing countries continue to prioritize basic needs, while developed societies increasingly focus on secondary and higher-level needs (Evans, 2002:96).

According to Pearson et al., the components of residential livability include access to high-quality neighborhood services, such as transportation systems, schools, universities, training centers, and healthcare facilities; walkable and accessible pathways; demographic characteristics, including age and gender composition; ethnic diversity; physical, social, cultural, and economic conditions; safety; sustainability; and opportunities for citizen participation in urban development plans. Additional factors include privacy in private spaces, a sense of place attachment and ownership, unique identity, economic stability in commercial and administrative land uses, housing affordability, attention to suburban and rural

surroundings, lifelong learning opportunities, environmental quality, employment opportunities, neighborhood design, urban aesthetics, air quality, connectivity with surrounding neighborhoods, dependence on historical and cultural characteristics, civic participation, political participation, and volunteer activities (Fang et al., 2011).

"Urban regeneration," aimed at "improving cities' livability," goes beyond the objectives and outcomes of urban renewal, urban development, and urban revitalization. Unlike urban renewal, which is often defined as a process of fundamental physical transformation, or urban development, which lacks clearly defined and comprehensive goals, and revitalization approaches that emphasize empowerment without offering concrete implementation mechanisms, urban regeneration stresses the necessity of long-term, strategic objectives and policies to address urban challenges at both local and metropolitan scales (Cesarona, 2024:25).

Fundamentally, the urban regeneration theory is interested in organizational movement in urban change management to enhance the livability of cities. In any case, these organizational and institutional dimensions of urban regeneration theory also reflect several important characteristics that define the roles, contents, and ways of functioning of urban regeneration. Although the operational domain of urban regeneration is more practiced than theoretical, there is always an expectation for a high degree of similarity between the outcome in theory and the outcome in practice. The final element of urban regeneration theory, to improve the livability of cities, is the "strategic process" or, in Hickling's words, "decision-making management through strategic methods". With the acceptance of the broad spectrum of topics related to urban change management and the agreement that many unique activities have limited scope and contain short-term and unsustainable solutions, the implementation of urban regeneration, according to a "strategic agenda", gains fundamental importance (Udounwa, 2024:101). Table 1 describes the features, components, and needs of urban regeneration theory to enhance the citizens' quality of life.

Table 1. Characteristics, components, and needs of urban regeneration theory to enhance livability (Izadi et al, 2014:20)

Features	Components	Needs
Interventionist activity	Industrial restructuring, with an emphasis on the greatest possible return to the previous situation	Clearly and transparently outline the expected results
An activity that encompasses various sectors from government to private and public	Constraints, including the availability of land and buildings	Providing a policy that can plan and implement predetermined goals
Appropriate response to economic, social, environmental, and political changes	The real or perceived beauty of urban areas	Establishing and maintaining linkages between related policy systems
A method for mobilizing collective efforts and paving the way for agreement on appropriate solutions	Social composition of urban areas	Defining the responsibilities of each actor and organization involved in the regeneration operations
A method for determining policies and activities designed to improve conditions in urban areas	Becoming one and joining together (various elements involved)	Creating a general sense of shared goals and collaborative performance

2.2. Experimental background

Numerous studies have been conducted on recreation and sustainability, as follows:

Roberts et al. (2000), in their study entitled «Urban regeneration,” describe regeneration as a form of interventionist urban policy. They argue that when traditional approaches to organizing old urban fabrics, such as reconstruction and renewal, were widely used, urban planners gradually recognized the need for a new model to address the problems that had emerged from previous interventions. However, they emphasize that achieving urban regeneration is not solely dependent on public acceptance; rather, urban management organizations must operationalize regeneration models within their formal programs and create the necessary institutional conditions for collective action and broad societal participation (Roberts et al., 2000: 12).

Mirath Dinardi (2012), in a study titled “Cultural planning strategies and urban regeneration in Buenos Aires,” highlights the critical role of cultural elements in urban regeneration models. The primary objective of this research is to enhance socio-cultural capacities in support of cultural heritage-based development programs. The study adopts a culture-oriented perspective, focusing on the interaction between physical form, culture, and the sense of place that citizens experience. These three factors are identified as key drivers in the organization and regeneration of old and deteriorated residential fabrics. The research process involves three stages: Developing a strategy for improving deteriorated fabrics, examining residents’ perceptions of urban spaces over time, and analyzing various urban spaces in relation to regeneration programs in central areas. The findings

demonstrate the significant impact of cultural elements on improving urban conditions and achieving effective regeneration (Dinardi, 2012: 10).

Zhang et al. (2023) in a study titled “Unravelling urban governance challenges: Objective assessment and expert insights on livability in Longgang District, Shenzhen” found that most cities in the region exhibit relatively high levels of livability, while some cities experience low livability due to unfavorable environmental conditions such as pollution and flooding. The study reveals spatial inequalities in livability, with levels declining from central areas toward peripheral zones. Based on interviews with 12 experts, the authors identify three key factors influencing livability: Ineffective management in reducing environmental risks such as flooding, the absence of long-term and decade-based planning frameworks, and weak urban management in cities, particularly those with rural–urban characteristics where livability levels are low (Zhang et al., 2023: 21). Antolín-López et al. (2024), in their research titled “How to make our cities more livable? Longitudinal interactions among urban sustainability, business regulatory quality, and city livability” conclude that ensuring urban livability and sustainability is one of the major social challenges of the twenty-first century. Their study analyzes the causal relationships between the three dimensions of urban sustainability and city livability, while also examining the moderating role of business regulatory quality. The findings indicate that when regulatory quality is low, the positive impact of economic sustainability on livability weakens, and environmental sustainability may even undermine livability. This study offers new insights into the complex interactions among urban sustainability,

regulations, and livability, providing valuable implications for enhancing livability in cities (Antolín-López et al., 2024, p. 358).

Ziaei (2013), in a study entitled "Neighborhood regeneration with a community-based approach in achieving sustainability (case study: Hassanabad Zargandeh Neighborhood, Tehran)", emphasizes the role of public participation in improving urban livability through social capacities at the neighborhood level. This approach is more commonly observed in cities of developed countries. The primary objective of the research is to enhance citizens' skills for participating in regeneration programs targeting deteriorated urban fabrics. Participation is examined at two levels: Individual and neighborhood scales, as well as broader urban and metropolitan scales. Using questionnaires and interviews, the findings reveal limited active participation by residents in regeneration programs. The study suggests that trusted individuals with strong social and religious characteristics can play a significant role in encouraging citizen participation. Moreover, discrepancies are observed between the perspectives of urban managers and experts, on the one hand, and those of residents, on the other, regarding neighborhood capacities and challenges, highlighting the need for collaborative regeneration processes (Ziaei, 2013: 5).

Motalebi et al. (2023), in their study "Recreating the deteriorated urban riverside textures (case study: Deteriorated texture of the Abshuran riverside in Kermanshah city)," conclude that neglecting environmental regulations in urban management and simplifying natural systems within urban contexts, such as river corridors, can alter natural processes and cause serious damage to ecological systems. The study notes that many urban riverbanks are surrounded by deteriorated and old urban fabrics, underscoring the importance of environmentally sensitive regeneration strategies (Motalebi, 2023: 79).

Makari et al. (2024), in their study titled "An analysis of the factors influencing the re-creation of the basic culture in the southern zone of informal settlements of Tabriz city," conclude that Tabriz city is the center of economic, commercial, and cultural exchanges in the northwest of the country and is considered the sixth largest city in the country in terms of population. The proximity of a significant portion of Tabriz's informal settlement neighborhoods to historically valuable contexts such as the Yousef Abad-Abasi neighborhoods (adjacent to Robe Rashidi), the historical neighborhoods of Maralan, Sheshgolan, Aref, Taleghani, Dohchi, Sorkhab, etc., indicates high

cultural-historical potential in a large portion of Tabriz's informal settlement context. Based on the research findings, the factors affecting the culture-based re-creation of informal settlements in the south of Tabriz are divided into four indicators: social, cultural, economic, and infrastructural. Among these indicators, the social index explains 41%, the cultural index 27%, the economic index 11%, and the infrastructure index 7% of the total variance. Among social factors, the security has the highest factor load (969), and the ethnic minority rights have the lowest factor load (567) among the indicators (Makari, 2024: 222).

Rasti et al. (2025), in their research entitled "Evaluating sustainable urban development indicators and examining their effectiveness in achieving regeneration goals (case study: Hamadan city)," argue that what is always neglected in the process of improving and renovating deteriorated textures of the country at various levels is mainly issues related to qualitative or physical content changes in the texture. The concern of this research is the functional characteristics of the sustainable development approach in dealing with such issues, which distinguish it from the usual perspectives of renovation or regeneration in terms of their application. It concludes that urban development plans create a positive outlook for sustainable development. In other words, the development of urban areas directly improves the performance of the fabric through the general design of the sustainability process, and through this, the regeneration process responds to these changes. The spatial structure of Hamedan city is the result of natural conditions, population settlement, and activity systems, social and economic structures, and movement systems, reflecting the connection and order between the main elements of the city, such as residential and activity areas, centers, axes, and movement networks, and open spaces (Rasti, 2025: 123).

This research is distinguished from other studies in that, for the first time, it analyzes both the concepts of reframing patterns and bio-feasibility and their mutual impact, which has not been conducted before.

In addition, the measures taken based on regeneration plans and documents to promote livability have been based on physical, social, and environmental criteria; however, in this research, with a comprehensive and integrated perspective, all dimensions, such as environmental, physical, social, economic, and managerial, have been addressed in studying and analyzing the status of the Sirous neighborhood regeneration pattern to promote livability. Ultimately,

based on the aforementioned five dimensions, the proposed model is presented.

The present study, at the national and supranational levels, can serve as a model for the 12th District Municipality and other municipalities in Tehran. Considering the proposed initiatives, other neighborhoods in District 12 and other Districts in Tehran can implement regeneration documents using the strategies and improve the level of livability of cities. In addition, this study can serve as a comprehensive model for others engaged in research and study on regeneration and sustainability in the five dimensions of environmental, physical, social, economic, and managerial.

3. Methodology

3.1. Research method

This research is applied in nature and analyzes the relationships between the primary variables of the study (viability and regeneration pattern) to add a new conclusion to the field of urban planning. The study employed a mixed-method approach, combining both quantitative and qualitative data collection and analysis techniques. The data collection method was library-based, and a closed-ended questionnaire was used for data collection. The statistical population consisted of 50 experts and employers from the municipality and the local development office in District 12 and the Sirous neighborhood, and professors in urban planning. The research sampling method was the non-probability and snowball method. In this method, current participants in the study attempt to bring along potential participants as well. This helps find participants who belong to a specific population who would not otherwise volunteer. The sampling initially starts with a small group and gradually snowballs into a larger sample. Since the statistical community did not reach 384

individuals, Morgan's sample size method was used.

The data collection method was library-based using documents, theses, and articles. In the subsequent stage, relevant data for quantitative analysis were extracted through a structured questionnaire, rated by experts and specialists on a scale of 1 to 5, based on the Likert scale. To analyze the regeneration status of deteriorated fabrics in the Sirous neighborhood with an emphasis on improving the livability, a Delphi panel team was utilized to score environmental, physical, social, economic, and managerial indicators extracted from theoretical foundations and limited documents of the study area. The indicators obtained in the first step were provided to the panel members within a semi-structured questionnaire for initial screening in the physical criteria with 40 indicators in the form of six indices, environmental criteria with 10 indicators in the form of three indices, socio-cultural criteria with 30 indicators in the form of five indices, economic criteria with 25 indicators in the form of five indices, and management-political criteria with 12 indicators in the form of five indices.

After receiving the first round of responses and suggestions, the information was collected, summarized, and categorized, ultimately leading to the creation of a second questionnaire based on physical criteria with 32 indicators in the form of four indices, environmental criteria with five indicators in the form of two indices, socio-cultural criteria with 20 indicators in the form of three indices, economic criteria with 15 indicators in the form of three indices, and management-political criteria with seven indicators in the form of three indices. The number and composition of Delphi panel groups are described in Table 2. The factors influencing the pattern of regeneration for enhancing livability quality are observable in Figure 1.

Table 2. Sample size of specialists

Organizations	Gender		Abundance	Percentage
	Man	Woman		
Tehran Urban Regeneration Company	7	5	12	24%
Tehran Urban Renewal Organization	6	4	10	20%
Tehran Municipality, District 12	6	5	11	22%
Sirous Neighborhood Development Office	3	2	5	10%
Universities	5	7	12	24%
Total	28 (56%)	23 (46%)	50	100%

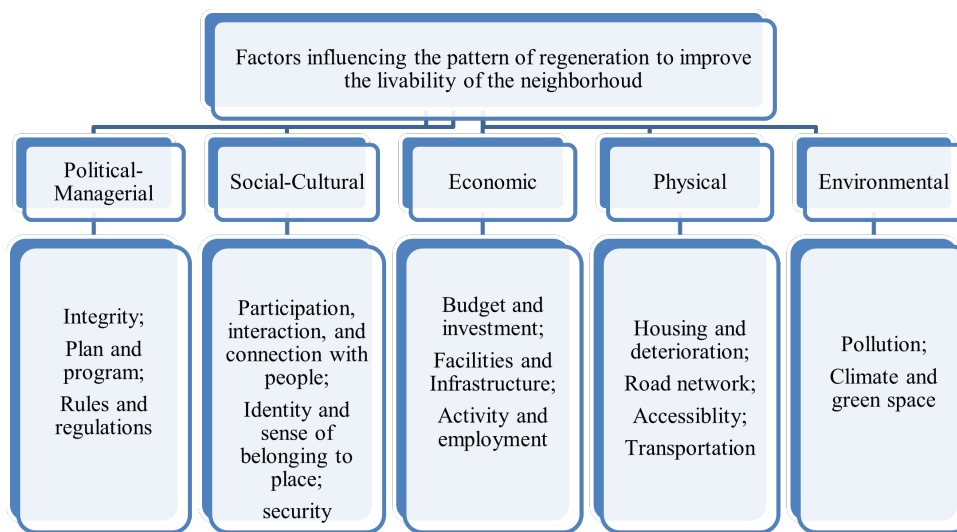


Figure 1. Research conceptual model

3.2. Spatial domain of research

The Sirous neighborhood is part of the old Tehran, situated in District 12 of the current urban division of Tehran, and together with the Tehran Bazaar, it forms a part of the Bazaar neighborhood. The overall shape of the neighborhood is an irregular trapezoid, with the longest side along 15 Khordad Street and the shortest side along Rey Street. The Sirous neighborhood is bordered by 15th of Khordad Street to the north, Molavi Street to the south, Rey Street to the east, and Mostafa Khomeini Street to the west. While this

neighborhood features historic architecture, it is classified by the Tehran Municipality as a degraded and unstable area, based on the architectural-urban planning characteristics of the Tehran Municipality (Sirous Neighborhood Development Document, 2016). The geographical location of the Sirous neighborhood in District 12 of Tehran Municipality is seen in Figure 2. The proposed user levels in the rehabilitation and renovation plan of the Sirous neighborhood are also described in Table 3.

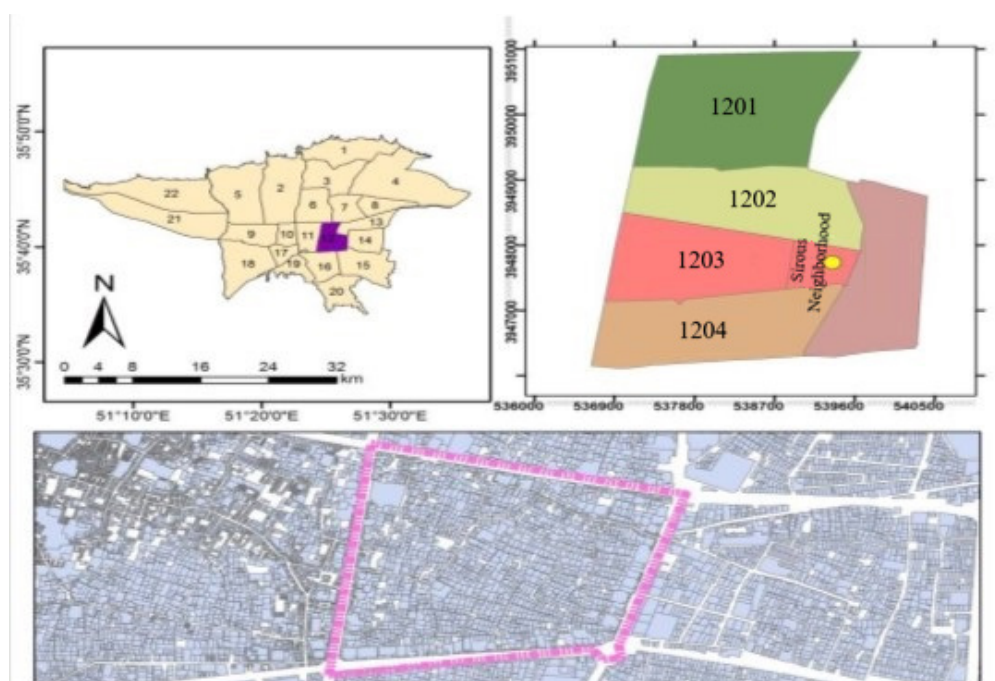


Figure 2. The geographical location of the Sirous neighborhood in District 12 of Tehran Municipality (Sirous Neighborhood Development Document, 2016)

Table 3. Characteristics of deteriorated fabric of the Sirus Neighborhood (Sirous Neighborhood Development Document, 2016)

Worn texture specifications	Unit
Area of deteriorated texture	37 hectares
Population located in a deteriorated texture	3923 people
Percentage of ownership in deteriorated texture	28%
Average residential units in deteriorated textures	64 square meters
The area of the region	43 hectares
Population of the area	4042 people

The priority implementation measures in the Sirus neighborhood in 2015 include environmental improvement of Naib al-Saltaneh and Gozar al-Agha markets, establishing a service center in the Sirous neighborhood (Mousavi Kiani), organizing the undefended urban space in the Sirous neighborhood, improving the front of Imam Hassan Mosque, developing and equipping Abu Hossein Park, improving Sadeghpour Avenue, improving Balagar Alley, improving Moradkhani Alley, improving Masjed Agha Alley and Molla Jafar Square, improving Rey Street, improving the front of Lavasani Mosque and Hajj Musa

Bathhouse, improving the existing Sabats in Majid Abbasi Alley, organizing the wall of Mostafa Khomeini Avenue from Sirous Crossroads to Molavi Crossroads, constructing the Farhoud local multi-storey parking lot, restoring and revitalizing Hajj Musa Bathhouse, revitalizing Golshan Bathhouse, and improving the Mousavi Kiani Avenue from the beginning of the park under construction to the intersection of Saadi Alley (Sirous Neighborhood Development Document, 2016). The priority actions for implementation within the Sirous neighborhood in 2015 are seen in Table 4.

Table 4. Priority of implementation measures for regeneration in the Sirous neighborhood in 2015 (Sirous Neighborhood Development Document, 2016)

Row	Actions	Trustee institution	Dimensions
1	Environmental improvement of Naib al-Saltaneh Bazaar and Gozar al-Agha	Regional Municipality; Beautification Organization; Renovation Services Office; Tehran City Technical and Engineering Consulting Organization; and Cultural Heritage	Physical
2	Establishing a service center in the Sirous neighborhood (Mousavi Kiani)	Regional Municipality, Tehran Urban Development and Improvement Company, Beautification Organization, and Neighborhood Renovation Services Office	Social
3	Organizing the defenseless urban space of the Sirous neighborhood	Regional Municipality; Beautification Organization; Water, Electricity, and Gas Company; and Tehran Urban Development and Improvement Company	Environmental
4	Renovation of the front of Imam Hassan Mosque	Regional Municipality	Physical
5	Development and equipping of Abu Hossein Park, improvement of Sadeghpour Avenue	Regional Municipality	Environmental
6	Improvement of the Sadeghpour axis	Regional Municipality; Beautification Organization	Physical
7	Improvement of Balagar Alley	Regional Municipality; Beautification Organization	Physical
8	Renovation of Moradkhani Alley	Regional municipality; Beautification Organization	Physical
9	Environmental improvement of Masjed Agha Alley and Molla Jafar Square	Regional Municipality; Beautification Organization	Physical
10	Environmental improvement of Ray Street	Regional Municipality; Beautification Organization	Physical
11	Environmental improvement of the front of the Lavasani Mosque and the Hajj Musa Bathhouse	Regional Municipality	Physical

Row	Actions	Trustee institution	Dimensions
12	Environmental improvement of existing Sabats in Majid Abbasi Alley	Regional Municipality	Physical
13	Organizing the wall of Mostafa Khomeini Avenue from Sirous intersection to Molavi intersection	Regional Municipality; Beautification Organization	Physical
14	Construction of a local multi-storey parking lot in Farhoud	Regional Municipality	Physical
15	Restoration and revitalization of the Hajj Musa Bathhouse	Regional Municipality; Cultural Heritage Organization	Physical (Historical)
16	Reviving the Golshan Bathhouse	Regional Municipality; Cultural Heritage Organization	Physical (Historical)
17	Environmental improvement of Mousavi Kiani Avenue from the beginning of the park	Regional Municipality; Tehran City Technical and Engineering Consulting Organization; and Water, Electricity, and Gas Company	Physical

4. Data analysis

4.1. Three-stage Delphi process

First stage: The indicators obtained in the first stage (initial indicators obtained through literature review of components and indicators and field visit) were provided to the panel team members in the form of a semi-structured questionnaire for initial review. After receiving the responses and suggestions of the first round, the information was collected, summarized, and categorized, and the second questionnaire was prepared.

Second stage: The questionnaire was distributed

among the members in a structured and tabulated form. Members were asked to indicate the degree of correlation of the indicator with the criteria, the degree of correlation of the indicator with the research topic, and the degree of importance of evaluating the indicators to regenerate deteriorated textures of the Sirous neighborhood, with an emphasis on improving the livability using a 1 to 5 Likert scale (Table 5). Additionally, they were asked to mention the criteria and indicators that are not mentioned in this research or may overlap with one another.

Table 5. Likert scale

1	2	3	4	5
Very weak	Weak	Medium	Good	Excellent

Third stage: To summarize the opinions of the respondents, the mean and standard deviation of each indicator for each calculation stage were provided to the Delphi team members in the subsequent stages, and they were asked to review the responses received, revise their opinions and judgments if necessary, and state their reasons in cases of disagreement. The goal of the third stage or any subsequent stage is to reach consensus or stability among the group members. When consensus or stability is achieved, the Delphi method is complete. Therefore, given the unanimity among the Delphi members, i.e., the convergence of

their opinions, there was no need to repeat the opinion-seeking in the third stage, and this stage was chosen as the final stage.

Development and validation of physical dimension indicators:

In the physical criteria, during the first stage, 40 criteria with six indicators were provided to the panel team members. With the scores, corrections, and integrations made by the panel team members in the second and third stages, 32 criteria in the form of four indicators were used to measure and evaluate the members.

Table 6. Scoring of physical indicators and criteria for the regeneration of deteriorated textures in the Sirous neighborhood, with an emphasis on improving the quality of life, by the Delphi panel team members

Physical dimension					
Indicator	Criteria	Average	Deviation criteria	Coefficient changes	Status according to points
Housing and deterioration	Area and square footage of residential buildings	1/70	0/9	0/53	-
	The amount of measures taken to improve, rebuild, renovate, and recreate deteriorated structures	3/39	0/99	0/29	+
	Buildings with a height of more than four or five floors	2/84	1/39	0/49	-
	Balance between the function of the residential neighborhood and some of the activities existing in the context	2/16	1/07	0/49	-
	Neglect of the valuable historical context in the Sirous neighborhood	3/48	0/93	0/26	+
	Very little attention to the fragility and oldness of the buildings and the risk of destruction	3/9	0/98	0/25	+
	Fine-grainedness, impermeability, and instability of the Sirous neighborhood textures	3/77	0/8	0/21	+
	The nobility of other houses to the housing of individuals	0/03	1/33	0/44	-
Road network	Designate routes for cyclists	2/93	1/21	0/41	-
	Disorganization and discomfort of pedestrian movement and interference with riding	4/61	0/67	0/14	+
	Greater penetration into the sub-neighborhood fabric and public spaces	2/61	1/1	0/51	-
	Appropriate design of the environment and landscape in the road network	2/29	1/07	0/47	-
Accessibility	Access to schools and educational institutions	2/16	1/07	0/49	-
	Availability of health and medical services, such as doctors, pharmacies, and medical centers	2/61	1/17	0/45	-
	Availability of social services	2/87	1/15	0/4	-
	The size of chain stores	2/97	1/45	0/49	-
	Variety of goods and services	2/32	1/19	0/51	-
	Local arcades and markets	4/48	0/81	0/18	+
	Providing daily necessities in the neighborhood	3/13	0/88	0/28	+
	Access to the highway	2/84	0/73	0/26	-
	The degree of accessibility from the residential unit to the workplace	2/32	1/19	0/51	-
	Access to the bank	3/58	0/99	0/28	+
	Accessibility to other neighborhoods of the city	3/87	0/88	0/23	+

Physical dimension					
Indicator	Criteria	Average	Deviation criteria	Coefficient changes	Status according to points
Accessibility	The level of access to appropriate recreational and leisure facilities in the neighborhood	2/9	1/22	0/42	-
	The level of access to sports facilities in the neighborhood	2/1	1/01	0/48	-
	Quality of water, electricity, and gas	3/8	0/98	0/26	+
	The level of access to restaurants and grocery stores in the neighborhood	3/9	0/98	0/25	+
	The level of access to safe and suitable play spaces for children	2/66	0/580	0/218	-
	Access to museums and historical monuments	4/61	0/67	0/14	+
	The level of access to leisure classes in the neighborhood	3/89	0/518	0/133	-
Transportation	Cost of public transportation in the neighborhood	3/68	0/422	0/114	+
	Distribution of public transport stations	4/58	0/76	0/17	+
	Plural	98/71	30/06	61/01	(-)18 (+)14

The condition of physical criteria in the four indicators of "housing and deterioration," "road network," "accessibility," and "transportation" in the regeneration of the deteriorated texture of the Sirous neighborhood, with an emphasis on improving the livability, is undesirable, and most criteria have received a score less than the average of 3. In total, out of 32 criteria, 18 criteria are in an undesirable state, and 14 criteria are in a desirable state. On the other hand, in the "housing and deterioration," the criterion of fine-grainedness, impermeability, and instability of the Sirous neighborhood textures has the highest score with an average of 3.77; in the "accessibility," the criterion of access to museums and historical monuments has an average of 4.61; in the "road

network," the criterion of Disorganization and discomfort of pedestrian movement and interference with riding have received the highest score with an average of 4.61; and in the "transportation," the criterion of distribution of public transport stations has received the highest score with an average of 4.58. Development and validation of environmental dimension indicators:

In the socio-cultural criteria, in the first stage of Delphi, 10 criteria within the three indicators were provided to the panel team members. With the scores, corrections, and integrations made by the panel team members in the second and third stages of Delphi, five criteria within two indicators were measured and evaluated by the members.

Table 7. Scoring of environmental indicators and criteria for the regeneration of deteriorated textures in the Sirous neighborhood, with an emphasis on improving the livability, by members of the Delphi panel team

Environmental dimension					
Indicator	Criteria	Average	Deviation criteria	Coefficient changes	Status according to points
Pollution	Air and noise pollution due to workshops in the neighborhood	2/89	0/85	0/29	-
	Regular, continuous, and appropriate collection of waste in the neighborhood	2/77	0/63	0/23	-

Environmental dimension					
Indicator	Criteria	Average	Deviation criteria	Coefficient changes	Status according to points
Climate and green space	The extent of changes in the use of green space	2/87	3/61	0/53	-
	The proportion of green space and natural elements in and around the neighborhood	3/47	3/79	0/42	+
	The degree of attention to the region's climate in construction	2/66	0/58	0/21	-
	Plural	14/66	10/32	1/70	(-)4 (+)1

The status of environmental criteria in the two indicators of "pollution" and "climate and green space" is undesirable, and most criteria have received a score less than the average of 3. In total, out of the five criteria, four criteria have been in an undesirable state, and one criterion has been in a desirable state. On the other hand, in the "pollution," the criterion of air and noise pollution due to workshops in the neighborhood, with an average of 2.89, in the "climate and green space," the criterion of the share of green space and natural elements in and around the

neighborhood, with an average of 3.47, has received the highest score.

Development and validation of socio-cultural dimension indicators:

In the socio-cultural criteria, in the first stage of Delphi, 30 criteria within five indicators were provided to the panel team members. With the scores, corrections, and integrations made by the panel team members in the second and third stages of Delphi, 20 criteria within three indicators were measured and evaluated by the members.

Table 8. Scoring of socio-cultural indicators and criteria for the regeneration of deteriorated textures in the Sirous neighborhood, with an emphasis on improving the livability, by members of the Delphi panel team

Socio-cultural dimension					
Indicator	Criteria	Average	Deviation criteria	coefficient changes	Status according to points
Participation, interaction, and communication with people	The level of citizen participation in organizing deteriorated structures	2/78	0/883	0/317	-
	The spirit of teamwork among the old residents	3/06	0/135	0/044	+
	The level of citizens' awareness of deterioration characteristics and quality of life	3/48	0/471	0/135	+
	Membership in neighborhood groups and associations	2/69	0/563	0/209	-
	Residents' acceptance of responsibility in the neighborhood	2/72	0/508	0/186	-
	Solidarity between residents and city managers	2/48	0/529	0/213	-
	Degree of trust in neighbors, institutions, and local representatives	2/32	0/655	0/282	-
	Residents' respect for each other	3/3	0/98	0/29	+
	Existence of NGOs and social networks	2/35	0/510	0/217	-
	The level of skill acquisition in the field of reactions and appropriate behavior during a crisis	2/31	0/381	0/164	-

Socio-cultural dimension					
Indicator	Criteria	Average	Deviation criteria	coefficient changes	Status according to points
Identity and sense of belonging to place	The possibility of the complete departure of the indigenous and native population and the arrival of the immigrant population	4/58	0/76	0/17	+
	Participation and cooperation of neighborhood residents in educational programs with a deterioration characteristic	2/27	0/584	0/257	-
	Recognition and communication with neighbors and fellow residents	2/12	0/381	0/179	-
	The level of hope for improving living conditions and neighborhood development	1/87	0/243	0/129	-
	Passionately holding religious celebrations in the neighborhood	2/28	0/307	0/134	-
Security	The degree of residents' sense of belonging and attachment to the neighborhood	2/31	0/147	0/063	-
	The level of security for vehicles parked in the neighborhood	3/8	0/98	0/26	+
	The level of security for residents, especially women and children, in the neighborhood around the clock	3/9	0/98	0/25	+
	The level of conflict and tension between natives and newcomers to the neighborhood	3/45	0/59	0/17	+
	The level of social disorder at the neighborhood level	4/55	0/72	0/16	+

The status of socio-cultural criteria in the three indicators of "participation, interaction, and connection with people," "identity and sense of belonging to place," and "security" in the regeneration of deteriorated textures of the Sirous neighborhood, with an emphasis on improving the livability, is undesirable, and most criteria have obtained a score less than the average of 3. In total, out of 20 criteria, 12 criteria are in an undesirable state, and eight criteria are in a desired state. On the other hand, in the "participation, interaction, and connection with people," the criterion of the possibility of the complete departure of the indigenous and native population and the arrival of the immigrant population has obtained the highest score, with an average of 4.58. In the "identity and sense of belonging to place," the

criterion of the degree of residents' sense of belonging and attachment to the neighborhood, with an average of 2.31, and in the "security," the criterion of the degree of social disorder at the neighborhood level, with an average of 4.55, have obtained the highest scores.

Development and validation of economic dimension indicators:

In the economic criteria, in the first stage of Delphi, 25 criteria in the form of five indicators were provided to the panel team members. With the scores, corrections, and integrations made by the panel team members in the second and third stages of Delphi, 15 criteria in the form of 3 indicators were used for the members' assessment and evaluation.

Table 9. Scoring of economic indicators and criteria for the regeneration of deteriorated textures in the Sirous neighborhood, with

Economic dimension					
Indicator	Criteria	Average	Deviation Criteria	Coefficient Changes	Status according to points
Budget and investment	Possibility to buy or rent housing at a reasonable price in the neighborhood	2	0/68	0/24	-
	The existence of financial incentives from the municipality and other organizations for organizing the deteriorated infrastructure	2/81	0/98	0/35	-
	The level of willingness to invest in the neighborhood	2/61	1/31	0/5	-
	Lack of budget allocation to organize the deterioration of neighborhood textures	4/9	0/4	0/08	+
	Economic returns after organizing deteriorated structures	3/16	0/82	0/26	+
	The amount of use of bank loans and facilities for the reconstruction and renovation of deteriorated infrastructure	2/61	1/23	0/51	-
	Financial ability of residents of deteriorated areas to rebuild and renovate	2/52	1/41	0/56	-
Facilities and infrastructure	The level of access to water, electricity, and telecommunications services within the deteriorated area	3/1	0/83	0/27	+
	The amount of vital lines and infrastructure (main oil, gas, electricity, fiber optic, and water pipes) in the neighborhood	2/84	1/37	0/48	-
	The level of residents' access to relief from the Water, Electricity, and Gas Company during a crisis	1/74	0/85	0/49	-
	The level of access to the Internet by residents of deteriorated urban areas	2/16	0/93	0/43	-
Activity and employment	Unemployment rate among the job-seeking population, especially women in the neighborhood	2/64	1/23	0/5	-
	Income level of neighborhood residents	2/13	0/88	0/41	-
	A variety of job opportunities in the neighborhood	2/58	1/41	0/54	-
	The number of active and employed people in the neighborhood	2/42	1/1	0/47	-
Plural		68/22	15/53	6/04	(-)12 (+)3

The status of economic criteria in the three indicators of “budget and investment,” “facilities and infrastructure,” and “activity and employment” in the regeneration of the deteriorated fabric of the Sirous neighborhood, with an emphasis on improving the livability, is undesirable, and most criteria have obtained a score less than the average of 3. In total, out of 15 criteria, 12 criteria are in an undesirable state, and three criteria are in a desirable state. On the other hand, in the “budget and investment,” the criterion of not allocating budget towards the

maintenance of the deteriorated fabric of the neighborhood has obtained the highest score, with an average of 4.9. In the facilities and infrastructure,” the criterion of access to water, electricity, and telecommunications services within the deteriorated fabric has obtained the highest score, with an average of 2.84; and in the “activity and employment,” the criterion of unemployment among the job-seeking population, especially women in the neighborhood, has obtained the highest score, with an average of 2.64.

Development and validation of management dimension indicators:

In the management criteria, in the first stage of Delphi, 12 criteria within five indicators were provided to the panel team members. With the scores, corrections,

and integrations made by the panel team members in the second and third stages of Delphi, seven criteria within three indicators were used to measure and evaluate the members.

Table 10. Scoring of indicators and management criteria for the regeneration of deteriorated textures in the Sirous neighborhood, with an emphasis on improving the livability, by members of the Delphi panel team

Management dimension					
Indicator	Criteria	Average	Deviation Criteria	Coefficient Changes	Status according to points
Integrity	Concentration of power in management organizations	3/09	0/87	0/29	+
	Integration and coordination between management organizations	2/92	0/55	0/19	-
	The level of participation of stakeholders and residents in programs to organize deteriorated structures to improve livability	2/61	1/33	0/51	-
Plan and program	Failure to implement neighborhood regeneration plans and executive measures limited to improvement and reconstruction	3/13	0/640	0/20	+
Rules and regulations	The degree of flexibility in approving and changing laws for regenerating deteriorated structures to improve livability	2/89	0/519	0/17	-
	Laws in the field of protection of historical monuments	3/9	0/94	0/24	+
	The existence of appropriate control tools for building retrofitting	2/61	0/386	0/14	-
Plural		21/15	5/24	1/74	(-)4 (+)3

The status of management criteria in the three indicators of “integrity,” “plan and program,” and “rules and regulations” in the regeneration of the deteriorated fabric of the Sirous neighborhood, with an emphasis on improving the livability, is undesirable, and the highest score is less than the average of 3. In total, out of seven criteria, four criteria are in an undesirable state, and three criteria are in a desirable state. On the other hand, in the “integrity,” the criterion of concentration of power in management organizations, with an average of 3.09, in the “plan and program,” the criterion of failure to implement neighborhood regeneration programs and executive measures limited to improvement and reconstruction, with an average of 3.13, and in the “rules and regulations,” the criterion of laws in the field of protection of historical monuments, with an average of 3.9, have obtained the highest scores.

5. Discussion and interpretation

Based on the analysis of the research data, the regeneration status of the Sirous neighborhood, with emphasis on livability, is undesirable in all

environmental, physical, economic, social, and management dimensions. A similar condition can be observed in most neighborhoods of District 12 of Tehran Municipality. Although in general, the regeneration status of neighborhoods in District 12, with emphasis on livability, is at a low and undesirable level, some neighborhoods have a better situation than others. The livability status of the Sirous neighborhood, concerning regeneration measures in District 12 of Tehran Municipality, is presented in Figure 3.

The reason for the difference in the status of neighborhoods’ regeneration in District 12 is the type of distribution of uses at the neighborhood level and the degree of residents’ access to various services. The distribution of workshop, warehouse, and commercial uses in the neighborhoods such as Bazaar, Sirous, and part of Harandi is higher than that in other neighborhoods. In general, residents of the southern part of the region have less access to medical, educational, recreational, etc., services than those in the northern part of the region. Thus, the desirability of the region decreases from north to south. The spots

of desirable conditions in the northern part of the region are very limited and scattered. However, in comparison with the general conditions of the region in its southern half, the northern part is in better condition than the southern half of the region. Regarding neighborhoods, the concentration and density of blue color, indicating a favorable livability status (except in very limited and minor cases), is observed in the west of the region and in the Sanglaj

neighborhood and parts of the Pamnar neighborhood. The highest concentration of undesirable conditions, which is almost uniform, is observed in the Kowsar neighborhood, followed by the Shahid Harandi neighborhood. The uniformity and spread of this condition in the mentioned neighborhoods indicate the lowest level of livability in these neighborhoods. The Sirous and Bazaar neighborhoods also experience similar conditions to these two neighborhoods.

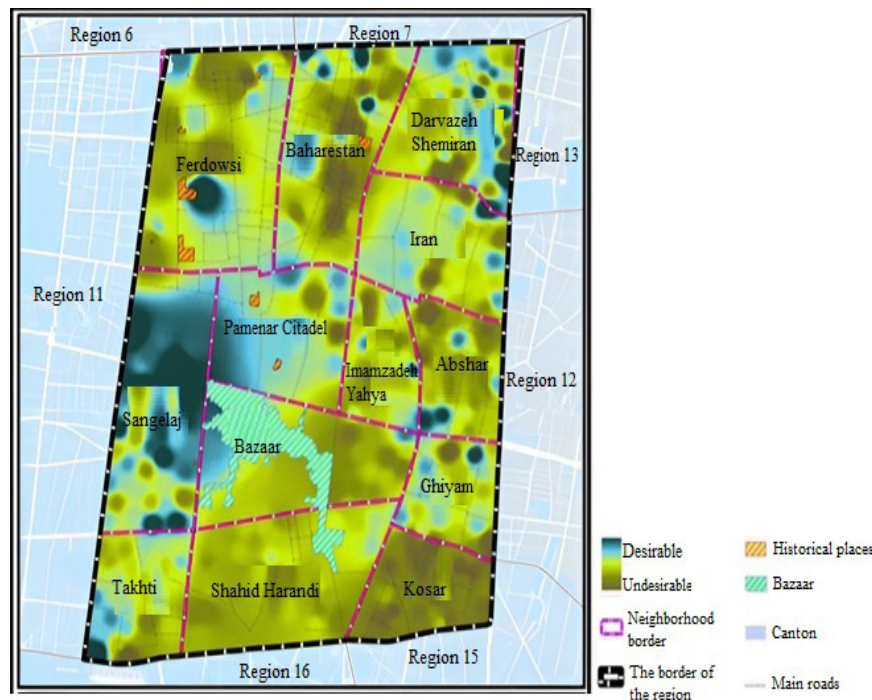


Figure 3. Liveability status of the Sirous neighborhood, according to regeneration measures in District 12 of Tehran Municipality

The proposed model must have “content integrity”, meaning attention to all physical, environmental, economic, social-cultural, and political-management dimensions, as well as “procedural integrity,” meaning

the use of participatory planning and attention to the interests of all stakeholders. Implementing the regeneration programs in the Sirous neighborhood based on this model will improve the level of livability.

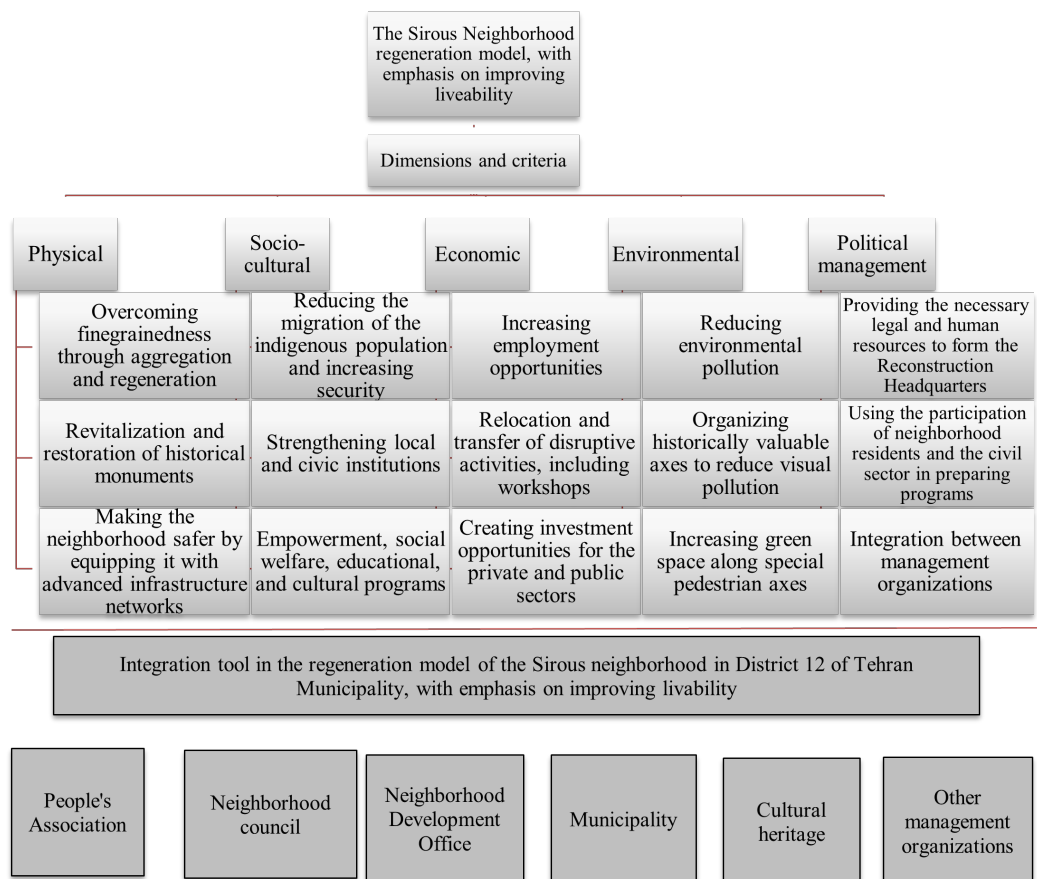


Figure 4. Proposed model for realizing the regeneration of the Sirous neighborhood in District 12 of Tehran Municipality, with an emphasis on improving livability

6. Conclusion

Identifying the most important physical, environmental, economic, socio-cultural, political, and managerial characteristics of the Sirous neighborhood to assess its regeneration capacities for improving livability is a prerequisite for neighborhood development in District 12 of Tehran Municipality. The textures of this neighborhood are associated with wear and tear and inefficiency, leading to increased social anomalies, economic stagnation, and instability due to the age, fine-grained texture, lack of investment incentives, desire for immigration, and continuous changes in the local social texture.

The present study is close to the study of Roberts et al. (2000) entitled "Urban regeneration". He argues that to achieve regeneration and improve the quality of life for citizens, it is beneficial for the urban management system and society to have an integrated view of all environmental, physical, economic, and social factors. This study differs from others in that it analyzes the regeneration pattern considering both the impact of regeneration and the impact on livability, rather than

examining each concept separately. In contrast, previous studies have typically analyzed the concepts of regeneration and livability independently.

Within the theoretical framework and intellectual system of the present study, in relation to the regeneration pattern of the Sirous neighborhood, with an emphasis on enhancing the livability, the regeneration perspective has been selected to improve the quality of life of citizens. The urban regeneration model is an integrated approach to organizing old textures within urban areas, addressing problems, opportunities, strategies, and actions in the physical, environmental, social, and economic domains. Regeneration is an integrated and comprehensive approach, as well as a set of related actions, that leads to the resolution of urban problems and seeks to sustainably improve the economic, social, physical, and environmental conditions of an area subject to change. On the other hand, liveability is a subset of sustainability that directly affects people's lives in terms of access to jobs and economic opportunities, durable housing (resilient to natural disasters),

drinking water, electricity, information and communication technology, quality schools, reliable health services, etc. Liveability is also a set of human requirements that contribute to the social welfare, health, and well-being of people, and encompasses individual and societal well-being.

In relation to the research question of which factors influence the regeneration status of the Sirous neighborhood, with an emphasis on the livability approach, we can conclude that physical, environmental, economic, social, and managerial factors are influential. The results of data analysis using the Delphi panel model show that the status of physical criteria in the four indicators of "housing and deterioration," "road network," "accessibility," and "transportation" in the regeneration of deteriorated textures of the Sirous neighborhood is undesirable. The status of environmental criteria in two indicators of "pollution" and "climate and green space" is undesirable; the status of socio-cultural criteria in the three indicators of "participation, interaction, and connection with people," "identity and sense of belonging to place," and "security" is undesirable; the status of economic criteria in the three indicators of "budget and investment," "facilities and infrastructure," and "activity and employment" is undesirable; and finally, the status of management criteria in the three indicators of "integrity," "plan and program," and "rules and regulations" is undesirable.

Also, in response to the question of why the Sirous neighborhood regeneration model, with an emphasis on the livability approach has not been realized, we can conclude that the regeneration plans prepared to organize deteriorated textures have not been prepared and implemented with an integrated approach to all physical, environmental, economic, social, and managerial dimensions and with the participation of all stakeholders, including the private, civil, and public sectors. Therefore, the livability level for the residents of the Sirous neighborhood has decreased. Considering the theoretical foundations, relevant documents of the Sirous neighborhood regeneration model, data analysis through the Delphi panel model, and the research question, we argue that the physical, environmental, economic, socio-cultural, and political-management dimensions have not received integrated attention in the Sirous neighborhood regeneration program in District 12 of Tehran Municipality to improve livability. Although the documents and programs have paid attention to participatory planning, the participation of the private, civil, and

public sectors (residents of the Sirous neighborhood) has been ignored in implementation. Therefore, the lack of integration and equal attention to all dimensions and the lack of non-governmental partnerships have resulted in the failure to realize the Sirous neighborhood regeneration model to improve livability. To realize the model, it must have "content integrity," meaning attention to all physical, environmental, economic, social, cultural, and political dimensions of management, and "procedural integrity," meaning the use of participatory planning and attention to the interests of all stakeholders.

Authors' Contributions

First author: 70%; and other authors: 30%.

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Conflict of Interest

The authors declare that there is no conflict of interest in conducting this research.

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