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Presenting an Indigenous Model for Regeneration of Inefficient Urban Fabrics with Emphasis on Social Sustainability: Case Study of Inefficient Fabric in Region 2 of Rafsanjan City

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ABSTRACT: This study aims to present an Indigenous model for recreating inefficient urban textures, with an emphasis on social sustainability, in Region 2 of Rafsanjan. The research method employs a qualitative approach and content analysis, which involves identifying basic, organizing, and overarching themes. The DEMATEL technique was used to determine the causal relationships between the indicators. Findings revealed five themes: physical-spatial regeneration, social sustainability, economic-social regeneration, preservation of local identity and heritage, and participatory governance, comprising a total of 49 indicators. The results of the DEMATEL analysis indicate complex and multi-layered relationships between different dimensions of regeneration, such that the state of deterioration of the fabric and the quality of existing materials, as primary influencing factors, have a direct impact on other physical and social indicators. Enhancing neighborhood ties and building local social networks strengthens solidarity, encourages resident participation, and fosters social oversight and ownership of spaces. Preserving traditional architecture, vernacular features, and local symbols supports cultural continuity, residents' sense of belonging, and neighborhood identity. The proposed model follows a systemic and integrated approach that extends physical interventions to include social, cultural, economic, and managerial aspects. Economic factors, including generating local employment and developing small businesses, contribute to equitable benefit distribution, residential stability, and long-term socio-economic sustainability. Furthermore, the model offers a practical framework for sustainable urban regeneration. Its adaptability also makes it applicable to other cities with similar socio-spatial conditions, providing a pathway to integrate physical renewal with social cohesion and cultural continuity.

Keywords: *Urban regeneration, social sustainability, inefficient fabric, indigenous model, Rafsanjan.*

INTRODUCTION

Urbanization and the emergence of global cities over the past few decades have had a profound impact on human life. Currently, half of the world's population, exceeding six billion people, resides in urban areas. The pattern of migration to cities has been such that in 1800, only 3% of the global population lived in urban centers. These changes indicate the urgent need to carefully consider the needs and aspirations of citizens in the future. According to United Nations projections, by 2060, more than 66% of the world's population will be living in cities. Since cities are dynamic systems constantly influenced by geographical, social, cultural, economic, and political interactions, certain urban fabrics gradually become inefficient over time due to various reasons. Addressing these inefficiencies, urban regeneration across multiple dimensions is considered a necessity.

Inefficient urban areas are characterized by numerous deficiencies in terms of physical, functional, and collective quality of life. These areas usually suffer from defects in their physical structure or economic activities, dilapidation, and weaknesses in urban management. Inefficiency refers to a reduction in effectiveness, and when the life of certain urban areas stagnates for various reasons, the urban tissue of those areas enters a state of inefficiency. This inefficiency is not limited to physical dimensions but also includes economic, social, and environmental aspects. Such conditions have negative effects on job opportunities, public services, housing, transportation, education, health, open spaces, and air quality

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in urban areas, and are considered a serious problem.

In Iran, approximately 75 percent of the country's population resides in cities, and inefficient urban areas account for 13 percent of the urban landscape, where more than 15 percent of the population lives. In recent years, the use of the capacities of inefficient tissues has been proposed in urban planning literature as one of the strategies for achieving sustainable development. Attention to these tissues and addressing the components of unsustainability, especially social unsustainability, has become a fundamental issue; various approaches have been proposed to address these problems. The regeneration of inefficient urban tissues is considered a necessity to respond to urban needs and repair damage. Meanwhile, strengthening the components of social sustainability using local capacities is one of the principles that has not been given much importance in the country's urban planning and programming system.

The purpose of this research is to develop indicators that support social sustainability through localized urban regeneration models in the process of revitalizing deteriorated urban fabrics. This study aims to propose models that foster an interactive relationship among different components, thereby strengthening the authenticity and identity of deteriorated urban fabrics, with a focus on social sustainability. In other words, the hypothesis of this research focuses on how this interactive relationship can be established within the framework of citizen-centred indicators and feasibility components.

Rafsanjan City, located in Kerman Province, boasts a rich heritage of settlements, as well as cultural and social significance. Out of the city's total area of 9,500 hectares, 442 hectares consist of deteriorated urban fabric and 410 hectares of informal settlements, housing approximately 36,000 residents. About 65 percent of this population resides in District Two, and the rest in District One. These areas face a wide range of physical, social, economic, and environmental challenges, and none of the sustainable development indicators, particularly social sustainability, are observed. Such neighborhoods require precise planning and targeted interventions to ensure their continued functionality. However, programs for organizing these areas have primarily focused on urban renewal, while other social, cultural, economic, and environmental dimensions have been largely neglected. Mere physical reconstruction cannot address the issues and needs of the residents. This research aims to demonstrate that the causes of deterioration in Rafsanjan's urban fabrics, beyond physical factors, include social, economic, environmental, and managerial dimensions. Therefore, the intervention strategies must be designed using an integrated urban regeneration approach that considers all these dimensions. For this purpose, District Two of the Rafsanjan municipality has been selected as the study area to develop localized urban regeneration models with an emphasis on social sustainability.

Deteriorated urban fabric refers to urban spaces with low economic value that have created a vulnerable environment due to social, economic, and environmental challenges, as well as inadequate urban infrastructure (Rebecca Gasper, 2011). In terms of physical characteristics, these areas exhibit features such as irregular ownership, fragile infrastructure, non-compliant structures, narrow streets (<6 meters), and small building plots (more than 50% smaller than 120 m²) (Monjezi, 2022, 24-25). Deteriorated urban fabrics are exposed to physical, environmental, and economic degradation due to structural decay, limited access to sewage and utilities, and insufficient facilities and services (Hosseini et al., 2008, 31). The existence of these fabrics is itself a source of socio-economic, physical-material, environmental, and security challenges, contributing to urban unsustainability. Due to their high vulnerability index, these areas have low residential, environmental, and economic value (Nouri, 2023).

The regeneration of inefficient fabric, as an important approach in urban planning, addresses the revival and improvement of dilapidated tissues that require changes, reconstruction, and revitalization. This process, in addition to preserving architectural and historical elements, focuses on creating suitable urban spaces with modern patterns and responding to the social needs of residents, playing a crucial role in the sustainable development of cities and enhancing the quality of life (Wu et al., 2024). This process offers a suitable opportunity to achieve sustainable development through the optimal use of resources and energy, thereby improving urban air quality and enhancing socio-economic well-being. The participation of citizens and the local community in decision-making and reconstruction plans is considered a key pillar of this process (Nouri, 2023). Social sustainability has been incorporated into the development programs of countries since the 1960s, but due to a lack of consensus on its components and status, it has been addressed in different ways in practice. Social sustainability indicators include personal lifestyle choices, satisfaction with basic needs, an efficient social security system, equal opportunities for democratic participation, empowerment in social initiatives and job selection, support for material needs, full employment, social security, and the fair distribution of pressures among generations. Mackenzie (2022) defines social sustainability as "the positive conditions in society and the process that makes it possible to achieve these conditions." Lists features for it, including equality in access to key services (health, education, transportation, housing, and leisure), intergenerational equity, broad political participation, citizens' sense of ownership of society, and the existence of a system of cultural relations that respects the positive aspects of different cultures and strengthens social cohesion.

Mohammadi Serin Dizaj and Shahamat (2024) conducted a study titled "Feasibility Study of Regeneration of Old and Deteriorated Urban Fabrics: Case Study of Tappeh and Hammam Koucheh Neighborhoods, Ajabshir City." The

results indicated that, after prioritizing findings in the QSPM, the strategy of eliminating irregularities in the urban fabric and addressing the density of physical elements was determined as the top priority for the regeneration and development management of the worn-out and deteriorated urban fabrics of Tappeh and Hammam Koucheh neighborhoods, considering their potential transformation into a commercial and tourism hub.

Rezaei Aliabadi and Mostafavi (2022) conducted a study titled "Regeneration of Deteriorated Urban Fabrics Using the Approach of Development Catalyst Projects: Case Study of Zargandeh Neighborhood, Tehran." The research highlighted that Zargandeh's deteriorated urban fabric faces significant weaknesses in its internal environment, alongside considerable opportunities in the external environment across economic, social, cultural, and tourism domains. To select the most suitable implementation site, considering the current urban context, uses with commercial, economic, cultural, and tourism themes can be integrated into the urban fabric model. By adopting adaptive strategies and mitigating existing weaknesses, the maximum utilization of available opportunities in the study area can be achieved.

Hekmatnia (2020), in "Investigating the Role of Public Participation in the Renovation of Fahadan Neighborhood's Worn-out Urban Fabric, Yazd," concluded that variables such as residents' trust in municipal authorities via feedback and voting, the supportive attitude of staff and managers, and increased motivation through special financial facilities had the highest positive and significant correlation with participation. Conversely, requiring residents to bear all renovation costs showed the highest negative and significant correlation with participation.

Nikpour and Hassanalizadeh (2020), in "Analysis of the Alignment of Worn-out Urban Fabric Zones with Poverty Zones," examined the overlap between worn-out urban fabrics and poverty zones in Qaemshahr. The study showed that approximately 10 percent of the area and population of the worn-out fabric zone overlapped with poverty zones. These findings underscore the need to review worn-out fabric plans, identify new areas using more accurate methods, and address urban poverty issues in the planning process.

Veisi et al. (2020), in their study titled "Comparison of Sustainable Urban Regeneration Capacity in Neighborhoods with Worn-out and Informal Urban Fabrics," conducted in Marivan, Kurdistan province, found that, based on overall indicators, the sustainable urban regeneration capacity of worn-out urban fabrics is higher than that of informal urban fabrics. This finding should be taken into account by practitioners in urban regeneration programs. Vahidifar et al. (2020), in "Analysis of Indicators and Effective Factors for Achieving a Livable City in Worn-out and Non-worn-out Urban Fabrics: Case Study of District 10, Tehran," identified and evaluated key factors influencing urban livability. Their results indicate that District 10 of Tehran is in an unfavorable condition regarding urban livability, with a significant difference between worn-out and non-worn-out urban fabrics in terms of livability indicators and contributing factors.

Hashemzadeh Ghalehjugh et al. (2020), in an article titled "Identification and Prioritization of the Most Effective Factors in Advancing Urban Management Programs in the Field of Worn-out Tissue (Case Study: Maku City)," have evaluated the key factors effective in the planning process in this field. The findings indicate that 11 factors, including management methods, organizing, renovation, and modernization plans, expert managers and human resources, infrastructures, coordination of executive bodies, housing and land, economic and environmental capacities, environment and ecological resources, public and private investment, research and development, and participation, have been identified as key and driving factors of the planning process. Abouzari and Ziyari (2019), in an article titled "Explaining the Effects of Renovation and Modernization Policies for Worn-out Urban Tissues (Case Study: District 12 of Tehran Municipality)," have examined the effects of intervention policies in worn-out tissue. The results show that the policies implemented for the renovation and modernization of the worn-out tissue in this district have led to unstable conditions. There is also a significant relationship between social, cultural, economic, physical, and environmental components and the implementation of these policies. Pourahmad et al. (2019), in a study titled "Prioritizing the Impact of Social Capital Components on Residents' Participation in the Modernization of Worn-out Urban Tissues," have examined the impact of social capital on the willingness to modernize among residents of worn-out tissues in District Three of District 10 of Tehran Municipality. The results show that the components of satisfaction, neighborhood relations, social participation, and institutional trust had the most impact on the willingness to modernize, respectively.

Salimi Yekta et al. (2019) in an article titled "Investigating the Renovation and Modernization of Worn-out Tissues in District 12 of Tehran with an Emphasis on the Regeneration Approach," considered the weak correlation between the community and the physical body as one of the main factors of the economic, social, and environmental structural dilapidation of the district. Moridsadat and Mohammadian (2018), in an article titled "Participation in the Renovation and Modernization of Worn-out Urban Tissues (Case Study: Kheirabad Neighborhood of Birjand City)," have examined the factors affecting public participation. The findings show that respondents had the most willingness to participate in decision-making and the least inclination for financial participation. Components such as a sense of belonging, trust, social cohesion, access to services, supportive plans and measures, and institutional development and capacity building were effective in promoting public participation. Babarafkan and Roshanayibadr (2017) in an article titled "Investigating

Effective Methods for the Revitalization of Worn-out Tissue in Tabriz City," have analyzed the effective factors in the development of dilapidation and have formulated appropriate intervention methods. The results show that the old tissue of Tabriz, while possessing historical value, faces components of dilapidation, and its organization should encompass various aspects. Li et al. (2025), in an article titled "Priorities for resilient regeneration of old lands based on public satisfaction: a case study of Beijing, China," found that spatial texture is a fundamental factor, environment and emotional experience are exciting factors, and infrastructure and management of operation and maintenance are considered performance factors. Al-Nasser et al. (2024), in a study titled "Thriving Tissue Regeneration: Challenges and Skills," have concluded that planning for the improvement of inefficient urban tissues is accompanied by strengthening the skills of urban planning experts. Nazi et al. (2024) in a study titled "Investigating the Role of Public and Local Capacities in the Regeneration of Inefficient Urban Tissue (Case Study: The Worn-out Tissue of Urmia)," have shown that public participation and guiding them to improve the physical condition of worn-out tissues have significant effects. Mahdavi et al. (2024), in a study titled "Analysis of the Regeneration of Inefficient Tissues from the Perspective of Urban Branding Using Structural Equations (Case Study: The Worn-out Tissue of Shahrekord City)," have concluded that the use of important indicators of each worn-out tissue plays a significant role in identifying scientific and cultural brands. Jin et al. (2023), in an article titled "Identifying Inefficient Urban Lands for Urban Regeneration Considering the Distinction in Land Use," found that spatial distribution patterns are effective on different types of inefficient lands. Inefficient residential lands are concentrated towards the city center, especially in central areas.

MATERIALS AND METHODS

This study employed a sequential-exploratory mixed-methods approach in two stages: qualitative and quantitative, conducted between 2024 and 2025 in the inefficient tissue of District Two, Rafsanjan City. In the qualitative stage, an exploratory thematic analysis with an inductive approach was used. The statistical population for this stage consisted of 17 executive and academic experts with at least 10 years of experience and a minimum of a master's degree in urban planning, urban regeneration, urban sociology, or social development. Purposeful sampling of the criterion and snowball type was performed to select experts familiar with the issues of regeneration and social sustainability in inefficient tissues, and data were collected through in-depth semi-structured interviews lasting 45 to 90 minutes.

The qualitative data analysis followed the six-step thematic analysis method by Braun and Clarke, which involves familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. This process was carried out using MAXQDA software to identify the basic, organizing, and overarching themes related to the localized model for regenerating inefficient urban tissues, with an emphasis on social sustainability. The validity of the qualitative data was ensured through member checking, peer debriefing, and source triangulation.

In the quantitative stage, the DEMATEL (Decision-Making Trial and Evaluation Laboratory) technique was used as a multi-criteria decision-making method to analyze the causal relationships and determine the relative importance of the regeneration model components extracted from the qualitative stage. The statistical population for this stage consisted of 30 urban regeneration experts, including senior staff of Rafsanjan municipality, city council members, urban planning consultants, experts in the regeneration of worn-out tissues, and university professors specializing in urban renewal with at least 15 years of work experience in Rafsanjan, who were selected by purposeful sampling. The data collection tool was a DEMATEL pairwise comparison questionnaire, designed based on the themes and components of the regeneration model from the qualitative stage, using a five-point scale (from 0 = no influence to 4 = very high influence). The quantitative data analysis included calculating the direct influence matrix, the total influence matrix, and the values of R+C (influencing power) and R-C (receiving power) to determine the causal relationships among the effective factors in sustainable social regeneration. The causal relationship map and the importance ranking of the regeneration model components were calculated based on DEMATEL indicators.

Data processing was performed using Excel software, and to ensure the accuracy of the results, the consistency ratio of the pairwise comparison matrices was checked. Additionally, to account for the indigenous and local characteristics of the study area, field observations of the inefficient tissue in District Two of Rafsanjan were conducted to incorporate the existing physical, social, and economic conditions into the model design process. Throughout all stages of the research, ethical considerations were consistently observed, including obtaining written consent, maintaining the confidentiality of personal information, and respecting participants' right to withdraw.

RESULTS AND DISCUSSION

An analysis of the demographic characteristics of the participants revealed that among the 17 experts who participated in both the thematic analysis and DEMATEL technique stages, 11 (64.7%) were male and 6 (35.3%) were female, indicating an appropriate gender diversity within the group of urban regeneration experts. In terms of age, 4 (23.5%) were in the 25-35 age group, 8 (47.1%) in the 35-45 age group, and 5 (29.4%) in the 45-55 and above age group. This distribution demonstrates the presence of experts with diverse experience in urban interventions and the regeneration of inefficient tissues across different age groups.

A review of the experts' educational levels shows that 12 (70.6%) held a master's degree and 5 (29.4%) held a doctoral degree in urban planning, urban regeneration, urban sociology, and social development. This educational background indicates the high level of expertise of the participants in fields related to the regeneration of inefficient tissues and social sustainability. In terms of work experience in urban and regeneration issues, 3 (17.6%) had 5-10 years of experience, 6 (35.3%) had 10-15 years, 5 (29.4%) had 15-20 years, and 3 (17.6%) had 20-30 years of work experience. This diversity in work experience enabled the collection of varied perspectives from experts with different experiences in urban tissue regeneration and renewal, at both stages of the research. Using the same group of experts in both the qualitative and quantitative stages ensured the cohesion and integrity of the research results and improved the possibility of adapting and completing the findings from both stages.

In this research, employing the thematic analysis method, we have explored the localized model for regenerating inefficient urban tissues, with a focus on social sustainability in the inefficient tissue of District Two in Rafsanjan City. The regeneration of inefficient tissues with a social sustainability approach, as a new solution in urban planning, has a significant impact on the various physical, economic, social, and cultural dimensions of vulnerable urban neighborhoods. The primary objective of this analysis is to identify and analyze the key components of the localized regeneration model, with an emphasis on preserving social identity, strengthening social capital, and enhancing the quality of life for residents in underperforming areas.

For this purpose, qualitative data were collected through in-depth interviews with urban regeneration experts, city managers, social development specialists, and experts familiar with the local characteristics of Rafsanjan City. These data were then analyzed using the Braun and Clarke thematic analysis method. In this process, initial codes were first extracted from the interview transcripts, and then the basic, organizing, and overarching themes related to the regeneration of inefficient tissues, social sustainability, and the indigenous characteristics of Rafsanjan were identified. The results of this analysis provide a systematic framework for understanding the complex relationships between the various factors influencing the localized model for sustainable social regeneration in the specific tissue of District Two of Rafsanjan, which can serve as a basis for more informed decision-making in the regeneration and renewal policies of this area.

The hierarchical structure presented in the table reflects an integrated approach to urban regeneration, which is based on modern theories of sustainable urban development and urban sociology studies. The overarching theme of "physical-spatial regeneration," as a foundational platform, includes three main components: identifying limitations and potentials, improving infrastructures, and enhancing spatial quality. This is consistent with the theories of Kevin Lynch and Jane Jacobs, which emphasize the determining role of the physical environment in shaping social behaviors and urban life patterns. The "social sustainability" theme, with its focus on social capital, participation, and justice, reflects the theories of James Coleman and Robert Putnam regarding the importance of social networks and mutual trust in the sustainable development of local communities. These dimensions are directly related to the "socio-economic regeneration" theme, which emphasizes the local economy, improving quality of life, and empowerment, and confirms the theory of endogenous development and the neighborhood-centered approach in urban planning.

The themes of "preservation of local identity and heritage" and "participatory governance" represent a paradigm shift from top-down approaches toward participatory planning and the preservation of indigenous values, which are known in contemporary urban planning literature as "communicative planning" and "place-based development." The classification of cultural identity into architectural elements, social heritage, and sense of place is consistent with Marc Augé's theories on "place" and "non-place," as well as Edward Relph's studies on "placeness." Finally, institutional coordination and participatory planning, as the pillars of participatory governance, reflect the theories of good urban governance and the network approach in urban management, which emphasize collaboration among various governmental, private, and civil society sectors in the process of decision-making and the implementation of urban development projects (Table 1).

Analysis of Causal-Effect Relationships of Urban Regeneration Indicators in Rafsanjan District Two Using the DEMATEL Method

The analysis of the set of indicators presented for urban regeneration in Rafsanjan District Two, using the DEMATEL technique, reveals complex and multi-layered relationships among the different dimensions of this process. In the physical-spatial dimension, the condition of tissue dilapidation and the quality of existing materials, as primary influential factors, pave the way for fundamental changes in other indicators and have a direct impact on the reconstruction of the street network, the improvement of urban infrastructures, and physical development capacities. The topographical and geographical conditions of the area also serve as a background factor, defining the limitations and opportunities for physical development and influencing decisions related to creating green spaces, standardizing residential units, and enhancing urban façades. Strengthening water, sewage, electricity, and telecommunications networks as vital infrastructures has a direct impact on the welfare of residents, access to urban services, and the improvement of environmental conditions, ultimately leading to the creation of suitable public spaces and fostering local economic activities.

In the social-cultural dimension, strengthening neighborhood

Table 1: Determining overarching themes from organizing themes

Overarching Theme	Organizing Theme	Basic Theme
Physical-Spatial Regeneration	Physical Limitations and Potentials	Condition of worn-out tissue in Region 2 of Rafsanjan
		Quality of existing materials and structures
		Development capacities of the built environment
		Topographical and geographical conditions of the site
	Infrastructure Improvement	Reconstruction of street networks and access routes
		Improvement of water and sewage networks
		Strengthening electricity and telecommunications networks
		Creation of neighborhood green spaces
	Spatial Quality Enhancement	Improvement of urban façades
		Creation of public spaces
		Standardization of residential units
		Preservation of local architectural identity
Socio-Economic Regeneration	Strengthening Social Capital	Strengthening neighborhood relations
		Creating local social networks
		Neighborhood collective activities
		Social cohesion of residents
	Social Participation	Resident involvement in the regeneration process
		Participatory decision-making
		Social monitoring of projects
		Social ownership of spaces
	Social Justice	Fair distribution of regeneration benefits
		Right of original residents to stay
		Equal access to services
		Prevention of forced displacement
	Local Economy and Employment	Creation of local job opportunities
		Development of small businesses
		Utilization of local capacities
		Creative economy and handicrafts
	Quality of Life Enhancement	Improvement of environmental conditions
		Access to urban services
		Social security
		Residents' well-being
	Social Empowerment	Education and skill development
		Strengthening local capacities
		Social self-sufficiency
		Local leadership

Continiue of Table 1: Determining overarching themes from organizing themes

Overarching Theme	Organizing Theme	Basic Theme
Preservation of Local Identity and Heritage	Cultural Identity	Preservation of traditional architectural patterns
		Local construction features
		Local symbols and signs
		Neighborhood life traditions
	Social Heritage	Traditional neighborhood patterns
		Local customs
		Collective memory of place
		Historical social networks
	Place Attachment	Sense of belonging of residents
		Neighborhood identity
		Continuity of family presence
		Emotional values of the place
Participatory Governance	Participatory Planning	Participation in plan development
		Bottom-up planning
		Considering the real needs of residents
		Flexibility in implementation
	Social Monitoring	Citizen monitoring of projects
		Transparency in decision-making
		Accountability of executive bodies
		Continuous performance evaluation
	Institutional Coordination	Cooperation among different agencies
		Integration of resources and facilities
		Coordination across management levels
		Integration of actions

relations and creating local social networks as key indicators will have a direct impact on the social cohesion of residents, their involvement in the regeneration process, and participatory decision-making, ultimately leading to the reinforcement of social supervision over projects and the creation of social ownership of spaces. Preserving local architectural identity, traditional architectural patterns, and local symbols has a close relationship with neighborhood life traditions, local customs, and the collective memory of the place, ultimately affecting the residents' sense of belonging, neighborhood identity, and the emotional value of the place. Economic indicators such as creating local job opportunities, developing small businesses, and a creative economy are, on the one hand, influenced by the improvement of infrastructures and access, and on the other hand, will play an effective role in the fair distribution of benefits, the right of residence for original residents, and preventing forced displacement. Finally, participation in plan formulation, bottom-up planning, transparency in decision-making, and the accountability of executive institutions as managerial-institutional indicators will influence all other dimensions and will ensure the overall success of the urban regeneration process.

Discussion

Comparing the results from the thematic analysis with the research background findings reveals a significant alignment between the identified dimensions and the real challenges of dilapidated urban areas. The research by Nikpour and Hassanalizadeh (2020), which emphasizes the limited overlap between worn-out tissue and poverty zones in Qaemshahr, underscores the importance of the "social justice" theme in the presented theoretical framework. This finding has a direct connection with the identified basic themes, including "fair distribution of regeneration benefits" and "prevention of forced displacement," and confirms the necessity of considering the socio-economic conditions of residents in the regeneration process. Furthermore, the findings of Veisi, Moradi, and Divani (2020), which state a higher regeneration capacity in worn-out tissues compared to informal tissues, are consistent with the organizing theme of "physical limitations and potentials"

and confirm the importance of a precise evaluation of the "condition of tissue dilapidation" and "physical development capacities" as basic themes. The research by Vahidifar et al. (2020) on the unfavorable livability of District 10 in Tehran and the significant difference between worn-out and non-worn-out tissues confirms the importance of the overarching theme of "improving quality of life" in the presented theoretical framework. These findings align with the basic themes of "improving environmental conditions," "access to urban services," and "residents' welfare," indicating the necessity of a comprehensive approach to urban regeneration that focuses not only on physical renovation but also on improving residents' quality of life. Overall, this comparative analysis demonstrates the validity of the theoretical approach adopted and the necessity of simultaneously attending to physical-spatial, socio-economic, cultural, and managerial dimensions in the urban regeneration process. The reviewed research background indirectly confirms the importance of themes such as "participatory governance" and "preservation of local identity and heritage." It demonstrates that success in urban regeneration requires integrating technical and engineering approaches with socio-cultural requirements and the active participation of residents.

The results from previous studies demonstrate significant convergence with the findings of the DEMATEL analysis regarding the causal-effect relationships of urban regeneration indicators, confirming the validity of the network structure among the variables. The research by Hashemzadeh Ghalehjugh et al. (2020), which identified 11 key factors including management style, coordination of executive bodies, participation, and infrastructures, is precisely consistent with the DEMATEL findings, demonstrating the central role of participatory governance, institutional coordination, and infrastructure improvement in the network of causal-effect relationships of urban regeneration. This alignment shows that managerial and institutional variables, as primary influential factors, will pave the way for changes in other physical and social dimensions. The findings of Abouzari and Ziyari (2019) regarding the unsustainability of renovation and modernization policies and the existence of a significant relationship among different components are consistent with the DEMATEL results regarding the complexity of relationships among social, cultural, economic, and physical indicators, and emphasize the necessity of a systemic approach to urban regeneration.

The study by Pourahmad et al. (2019), which emphasizes the role of satisfaction, neighborhood relations, social participation, and institutional trust in the willingness to modernize, confirms the DEMATEL findings regarding the key position of social capital and participation in the network of causal-effect relationships. The DEMATEL results show that these variables not only have a reciprocal effect on each other but also influence economic, physical, and even managerial variables. The research by Salimi et al. (2019), which identified a weak correlation between community and physical structure as a primary factor of dilapidation, is precisely consistent with the DEMATEL findings, which show strong relationships between social and physical-spatial indicators. Finally, the study by Moridsadat and Mohammadian (2018), by emphasizing the importance of a sense of belonging, trust, social cohesion, and access to services in public participation, confirms the key role of indicators related to the preservation of local identity and heritage, social sustainability, and socio-economic regeneration in the DEMATEL relationship network. This alignment demonstrates that the complex and multidimensional structure of causal-effect relationships identified in the DEMATEL analysis accurately reflects the practical and empirical realities of the urban regeneration process in Iran's deteriorating urban areas.

The present study, aimed at providing a localized model for regenerating inefficient urban tissues with an emphasis on social sustainability in District Two of Rafsanjan City, has developed a comprehensive and practical framework based on a qualitative approach and the analysis of causal-effect relationships using the DEMATEL method. The proposed model includes five overarching themes: "physical-spatial regeneration," "social sustainability," "socio-economic regeneration," "preservation of local identity and heritage," and "participatory governance," which interact with each other within a complex network of two-way and multi-directional relationships and ensure the success of the regeneration process. The research findings indicate that the sustainable regeneration of inefficient urban tissues cannot be based solely on physical-material interventions but requires a systemic and integrated approach that simultaneously considers social, economic, cultural, and managerial dimensions. This model, by considering the indigenous and local characteristics of Rafsanjan City and adapting to the climatic, cultural, and socio-economic conditions of this area, provides a practical and implementable solution for regenerating inefficient urban tissues that can serve as a model for other cities with similar conditions.

In the physical-spatial dimension, the research results highlight the importance of prioritizing interventions correctly, so that evaluating tissue dilapidation and identifying physical development capacities at the initial stage will pave the way for infrastructure improvement and the enhancement of spatial quality. In this regard, the reconstruction of the street and access network, the improvement of water and sewage networks, the strengthening of electricity and telecommunications networks, and the creation of neighborhood green spaces play a crucial role in enhancing residents' living conditions and will set the stage for achieving other regeneration goals. In the field of social sustainability, the findings highlight the central role of strengthening social capital, social participation, and social justice in the success of the regeneration process. To this end, enhancing neighborhood relations and creating local social

networks are considered prerequisites for residents' involvement in the regeneration process and participatory decision-making. Furthermore, the fair distribution of regeneration benefits and the prevention of forced displacement of original residents will guarantee the social sustainability of the interventions and prevent the occurrence of social tensions.

The socio-economic dimension of the model emphasizes creating local job opportunities, developing small businesses, and utilizing indigenous capacities. With a focus on the creative economy and handicrafts, it provides the basis for the economic and social self-sufficiency of residents. In this regard, training and skill-building, strengthening local capacities, and empowering local leadership play a key role in improving the quality of life and access to urban services. The preservation of local identity and heritage, as one of the distinguishing dimensions of the localized model presented, emphasizes the preservation of traditional architectural patterns, indigenous building features, local symbols, and signs, and by strengthening neighborhood life traditions, local customs, and the collective memory of the place, it provides the basis for the continuity of family presence, strengthening residents' sense of belonging, and preserving the emotional values of the place. Finally, participatory governance, as the overarching dimension of the model, emphasizes participatory planning, social supervision, and institutional coordination, and by adopting a bottom-up approach, considering the real needs of residents, transparency in decision-making, and the accountability of executive bodies, it ensures the implementability and sustainability of the proposed model.

CONCLUSION

The present study, despite achieving valuable results in providing a localized model for regenerating inefficient urban tissues, has faced limitations that should be considered when generalizing the results and applying the proposed model in practice. The first limitation is related to the geographical scope of the study, which focuses solely on District Two of Rafsanjan City, thereby limiting the possibility of directly generalizing the results to other cities and areas with different climatic, cultural, and socio-economic characteristics. The qualitative nature of the research is also considered a methodological limitation, which, although it has allowed for a deep understanding of the phenomenon under study, has reduced the statistical generalizability of the results. Furthermore, the study's time constraint, which was conducted within a specific timeframe, has not allowed for the examination of long-term changes and developments in the studied tissue, and has limited the examination of the temporal dynamics of the regeneration process. Limited access to some specific information and statistics related to the socio-economic status of residents, the lack of full cooperation from some relevant institutions in providing the necessary data, and financial and time constraints in conducting more extensive field studies are among the other limitations of this research. Based on the results of this research, various practical recommendations are presented for different relevant institutions. For the Rafsanjan Municipality, it is suggested that to achieve the localized regeneration model, it should proceed with the formation of a Participatory Regeneration Committee that includes representatives from residents, experts, and urban managers, and adopt a bottom-up planning approach as the primary strategy for formulating regeneration plans. In the physical-spatial dimension, prioritizing interventions based on the condition of dilapidation and development capacities is essential. This involves formulating a comprehensive infrastructure improvement program with an emphasis on water, sewage, electricity, and telecommunications networks, as well as creating neighborhood green spaces in accordance with the area's indigenous and climatic patterns. Non-governmental organizations (NGOs) and local associations should also work to strengthen social capital, establish active neighborhood councils, organize collective neighborhood activities, and foster strong social networks among residents. It is suggested that the region's economic and financial institutions design and implement special support packages to foster the development of small businesses, create local job opportunities with an emphasis on handicrafts and the creative economy, and provide appropriate financial facilities for the renovation of residential units.

In the area of preserving local identity and heritage, it is suggested that cultural and heritage institutions, in collaboration with indigenous architects and urban planners, should develop design and construction guidelines that align with the area's traditional architectural patterns. Additionally, they should provide necessary training on preserving indigenous building features to local contractors and builders. Finally, for supervisory and controlling bodies, it is suggested that they establish a system of continuous monitoring for the implementation of regeneration plans, with a focus on citizen participation, periodic evaluation of the performance of the interventions carried out, and ensuring transparency and accountability at all stages of the regeneration process.

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AUTHOR CONTRIBUTIONS

K. Zayyari performed the literature review, experimental design, analyzed and interpreted the data, prepared the manuscript text, and edited the manuscript edition. A. Jafari performed the experiments and literature review, compiled the data, and prepared the manuscript. V. Arash helped in the literature review and manuscript preparation.

CONFLICT OF INTERESt

The authors declare no potential conflict of interest regarding the publication of this work.

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