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Original Reserch Paper

Assessment of urban resilience in residential neighborhoods (Case study: Raste-Kuche neighborhood)

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ABSTRACT: Nowadays, Urban settlements are experiencing gradual and, in some cases, sudden changes, which cause a lot of damage. However, by studying these effects before crisis occur and planning and planning to prevent these cases, it is possible to increase the tolerance of cities against accidents, which is called resilience. Resilience is a multi-dimensional concept and does not have based criteria and frameworks. In the present study, with the purpose of assessment the urban resilience of the residential neighborhood of Raste-kuche, located in District 8 of Tabriz, based on the indicators and criteria extracted from the existing theoretical foundations and frameworks. Data collection was done in the form of libraries (documentary and statistical) and survey. Measurement calculations in the form of maps and tables and assessment of social and institutional dimensions of 375 questionnaires by researcher-made method in Likert scale on ranking scale, as a sample size based on Cochran's formula with an error rate of 5% (95% confidence interval) in a simple random manner Distributed. The numerical value of the indicators in this study is expressed as a percentage to eliminate the need to normalize the indicators and by defining the optimal limit (the degree of resilience of global resilience samples) for each index, the resilience distance of each index with the optimal limit is obtained and the results indicate Due to the low level of resilience in the neighborhood, the distance from the optimal limit is very high in some indicators, and in preparing plans and plans, worse cases should be prioritized.

Keywords: Resilience, urban resilience, resilience models, optimal limit

RUNNING TITLE: Urban Resilience In Residential Neighborhoods

INTRODUCTION

The urban fabric in the pre-modern era had an organic organization and a cohesive network. After modernity and due to modern interventions, they became fragmented in all their dimensions and the process of urban revolution confronted cities with fundamental challenges in their structures (Pelling 2003). With these changes, urban communities became more and more threatened by losing their former cohesion. Occurrence of natural disasters and accidents is one of the main problems that has always threatened human societies over time, and if unaware and unprepared, irreparable damage to various aspects of human life, including residential and social, Imports economic, environmental, psychological and other fields. Natural hazards have the potential to become horrific and devastating disasters for human communities in the absence of risk reduction systems (Zhou et al. 2009). With the spread of vulnerability due to accidents in cities in recent decades, in the face of this problem, measures such as strengthening single buildings against

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the effects of accidents, unfortunately these measures are one-dimensional and multiple dimensions of urban settlements. It causes these measures to have other aspects such as physical, social, economic and cultural in their scope of action and impact, and not like some previous measures with purely physical interventions to destroy social infrastructure. To reduce the effects and threats of disasters in its pervasive dimensions, the emphasis on urban resilience to disasters is of particular importance (Mitchell 2012). The macro concept of resilience expresses an intellectual paradigm that seeks to anticipate and examine principles and strategies to minimize these changes (Evans 2001). Resilience is the degree to which a system can absorb and remain in the same state, or the degree to which a system is able to self-organize and build and increase its capacity for learning and adaptation (Carpenter & Gunderson, 2001). So that dimensions such as social and economic traditionally in some way in relation to residential neighborhoods with institutional and physical dimensions should be considered as a spatial and functional relationship (Adger 2000). In our cities, the need to address this issue is quite noticeable, and especially the intensity of this in the central textures of cities, which due to lack of attention to these textures, have a very low quality in many dimensions. Therefore, considering this important issue, it is necessary to study and study this issue, especially in our metropolises, which are facing this problem more severely. The city of Tabriz is a metropolis that has an organic texture in its central and historical core, most of which are defined as worn texture and have an unfavorable condition in all dimensions. In this study, the degree of resilience of the neighborhood of Raste-kuche, located in District 8 of the municipality (historical area) of Tabriz, has been evaluated and the resilience in its various dimensions and in relation to the current situation and conditions of the neighborhood has been evaluated. Since there is no absolute measure of resilience, so using the method used by Sayyid Aituddin at the University of Pakistan to assess resilience - in which the experiences of the United States and Japan are examined as the optimal limit. Resilience has been used - has been used and through this optimal limit, weak dimensions have been identified and used in planning to improve and eliminate these weaknesses. In this regard, after studying the literary texts in the field of resilience, criteria, indicators and various economic, social, infrastructural and institutional dimensions - each of the dimensions of the model and separate frameworks to the superiority of the model in each dimension - are extracted and the final model with the output of the measures has been compiled from the aspects of urban resilience. Based on the official statistics of the country, extraction from maps and questionnaires, the numerical number of different measures have been collected and finally, as a percentage of the total, the comparison of various dimensions of resilience of Raste kuche neighborhood with the optimal limit has been done. The present research is of deductive type and has been done by descriptive-analytical method and by collecting data in library and survey method. In the present study, we try to answer the questions that are mostly asked based on how, so that the main questions;

1-What is the appropriate model and framework for assessing urban resilience in neighborhoods?

2-To what extent are urban resilience indicators in neighborhoods conceptually and functionally related to physical, social, institutional and economic dimensions? And

3-What is the relative condition of the optimal level of resilience in terms of social, economic, institutional and physical-spatial equilibrium in the order of Raste-kuche?

In general, the questions raised try to explain how to evaluate urban resilience in residential areas in a deductive way so that after examining the macro concept of resilience, its formative dimensions can be explained in a conceptual and practical way and the degree of resilience The basis of the mentioned criteria is evaluated and adapted to the optimal limit. Therefore, the main purpose of explaining the structure of research lies in examining the sources and extracting the optimal model from the perspective of urban resilience that can

analyze residential neighborhoods in the most appropriate way at a comparative level with successful global examples and measure the urban resilience of residential neighborhoods. After analyzing the findings, provide the necessary strategy and policy along with the necessary system structure to be mandatory in urban and strategic plans.

Urban resilience

Urban resilience also encompasses a wide range of methods, and urban change spreads over a variety of time disciplines. Years of studies on urban resilience have shown that in cases such as sudden deformations - such as earthquakes, hurricanes or terrorist attacks (Coaffee 2009) (Pelling, M. 2003) (Savitch 2008) and economic transformation processes, Community and environmental contexts, these concepts are of particular importance in the structure of the city. (Müller 2010) Researchers who focus on how cities respond to damage in the concept of restoration, (Prasad, et al. 2009) (Vale & Campanella 2005) (Clark et al. 2010), usually to identify the properties of urban systems Which shows the least "resilience", have explained the most intellectual foundations and approaches. Change can have alternating effects in a variety of ways, usually involving spatial scales and social organizations that do not include a specific scale (Müller 2010). It's difficult, so there is an urgent need to use flexible analysis methods at different scales.

In contrast, the Resilience Alliance analytical organization emphasizes the importance of the following four aspects, which include the life and performance of cities.

Metabolic flows: production, supply and consumption chain that cities need to maintain Urban functions, human welfare and quality of life.

Government Networks: Institutions that demonstrate the ability to learn, adapt, and reorganize in response to urban challenges.

Social dynamics: demographics, human capital and inequality of citizens, communities and consumers

Built environment: Physical patterns of urban form and spatial relations and communications

It is clear that urban resilience may be classified as a feature in the relationships between spatial, physical, social and cultural, environmental and economic aspects of the city, in a variety of patterns. Nevertheless, dimensions of resilience such as "economic resilience", "social resilience" or "environmental resilience" are more fully overshadowed by the focused gains of resilience, durability and adaptability in certain aspects of the city.

Conceptual model

To express the resilience of communities, there are several frameworks that examine the reducing characteristics of communities' vulnerability to risk outcomes. Given that there is no framework or general assessment for how to measure resilience or how to assess resilience, several conceptual models and frameworks have been proposed (Kulig 1996; Tobin 1999; Adger 2000; Buckle 2007; Foster 2006; Tierney 2009; Mayunga 2007; cutter 2007).

In general, most of these frameworks are based on similar factors such as; They focus on economic resources, capital, skills, information and knowledge, support and support networks, access to services and shared community values (which can reduce vulnerability and increase community resilience to threats such as natural disasters. Therefore, most of the limitations of these frameworks are the focus on one or more dimensions of resilience and do not address this concept on a larger scale (Rezaei 1389).

In terms of operationalization, the proposed models show more of the conceptual aspect of resilience than measurement, frameworks such as; Berneo Framework (Brurneau et al. 2003), Sustainable Living Framework (DFID 2005), Capital Oriented Framework (Mayanga 2007), SERRI Framework (Rezaei 1389) and models such as; Tobin model (Tobin 1999), linear-temporal model (Davis 2006), spatial model

DROP, BRIC baseline index model (Cutter et al. 2010) and CBDM community-based accident management model, some of which are They look at certain aspects of resilience, such as sustainable, linear, temporal, and capital-based livelihood models, but are necessary given the multidimensional nature of resilience (social, economic, institutional, and physical-environmental).

There is a scientific consensus in this field, models should be presented and proposed that in addition to considering all these dimensions, also pay attention to the role of local communities through participation. A combination of BRIC, DROP and CBDM has been used to evaluate resilience, in which resilience is measured and evaluated in social, economic, institutional and physical-spatial dimensions, creating a set of indicators and then Examining it in the real example is the next step of this model. To complete the dimensions and indicators of the conceptual model, the physical dimensions of the model, the economic and institutional dimensions of the BRIC and the social dimensions Derived from CBDM and finally, this model provides the output to determine the type and extent of social, institutional and physical interventions in order to improve overall resilience.

By studying the researches and studies done in the field of resilience and extracting the dimensions, variables and measures used in these studies, among the obtained indicators, to consider the classical dimensions of resilience and to examine the effects and direct relations with Urban resilience and its proposed dimensions, and of course, taking into account the possibility of access and collection of information and data generation for each of the measures, indicators and final measures to examine the degree of urban resilience of residential areas were researched and selected. (Table 1)

Regarding the relevance of these indicators with resilience, availability, sensitivity, strength, reproducibility, availability price, simplicity and relationship between them and different dimensions of the subject, are justified and selected based on existing texts (Ainuddin S. 2012). Selected indicators and the relationship of each case with the dimensions of resilience and urban resilience, how the impact of the indicator on resilience and the measurement of each indicator are expressed in Table 1.

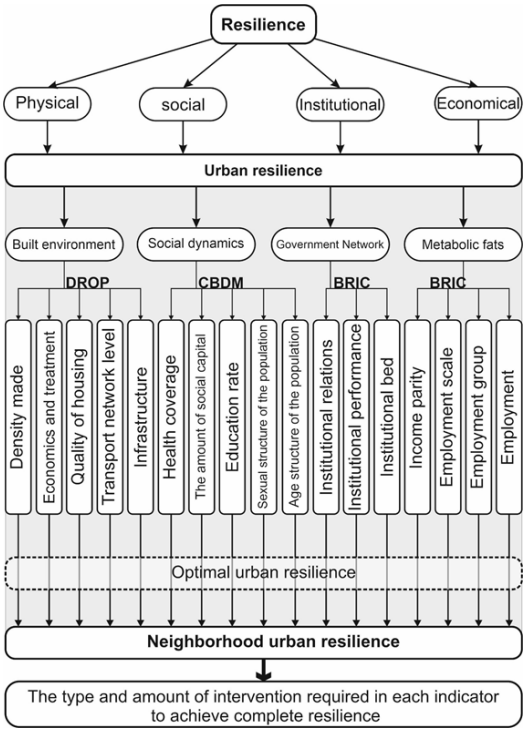

Fig 1: Conseptual model of neighborhood urban resilience

Tab 1: Selected indicators and measures to assess the urban resilience of residential areas

The main concept	Dimensions	Sub-concept	Aspects	Criteria	Impact on the dimensions of urban resilience	Type of impact	Criteria measurement
Resilience	Economic resilience	Urban resilience	Metabolic currents	Employment	Stable and secure employment has a significant impact on resilience and will increase resilience as the percentage of employed people increases.	Direct	Percentage of employed population relative to total population
				Employment group	In this criterion, the basis or bordination of employment is considered. In the aftermath of a crisis, jobs in the grassroots sector will be stronger and safer resources for rebuilding the region›s economy than jobs in the service sector. The closer employment is to the industrial and agricultural sectors, the more resilient the region will be.	Direct	Percentage of employment in industrial and agricultural sectors anufacturing) Relative to total employment
				Employment scale	The scale of business is the large or small business units of the region. Large-scale businesses in the region, in the event of a crisis, cause more damage to the region and make it difficult and delayed to return to the pre-crisis situation in the region. Larger-scale business units, more household economies are affected. Also, the impact of this center on the economy of the whole region is far greater than small-scale units. In other words, the percentage of large-scale units in the region is inversely related to its resilience and reversibility.	Reverse	Percentage of large-scale business units relative to the total number of business units
				Equality of income in society	The higher the number of people living above the poverty line in the region, the more resilient society is.	Direct	Percentage of people with incomes above the poverty line relative to the total population
Resilience	Institutional resilience	Urban resilience	Government Networks	Institutional bed	Awareness of the existence of institutions related to crisis management, the existence of volunteer groups in the neighborhood, the degree of adherence to legal guidelines for crisis prevention, the degree of participation in decision-making for the neighborhood, the existence of financial or technical incentives to prepare through participation With the municipality about the rehabilitation and renovation of housing and the responsibility of institutions.	Direct	Percentage of people who answered above-average questions related to this section.
				Institutional performance	Satisfaction of neighborhood residents with the functional status of institutions effective in reducing the effects of the crisis	Direct	Percentage of people who answered questions related to this section above the average.
				Institutional Relations *	Status of neighborhood residents› relations with local institutions such as councils and municipalities, cooperation of institutions in facilitating laws, giving credits, loans, etc. for the construction of durable housing, necessary training for appropriate and rapid response from institutions and the level of response of service institutions in case Occurrence	Direct	Percentage of people who answered questions related to this section above the average.

Resilience	Social resilience	Urban resilience	Social dynamics	Age structure of the population	The purpose of examining the age structure of the population is to reach the vulnerable population in the age groups (under ٦ years old and over ٦٥ years old). The higher the percentage of the population in the age of acceptance, the lower the resilience rate.	Reverse	Percentage of population over ٦٥ and under ٦ in the area
				Sexual structure of the population	Various experiences have shown that women are far more accepting than Asian men in times of crisis. The higher the percentage of women in the population, the lower the rate of resilience.	Reverse	Percentage of female population To the total population
				Level education	Populations with higher levels of knowledge and awareness are less affected by the crisis. The higher the percentage of people with higher education, the higher the resilience.	Direct	Percentage of the population with a diploma or higher than the total population
				Amount of social capital *	Based on the relationship between reversibility and resilience of individuals with the social capital between them and according to the variables of neighborhood bond among individuals in times of crisis, the degree of their trust in each other during the crisis, the existence of social networks and male organizations Related to crisis management and relief in the region and participation Their civility is an indicator of the amount of social capital, it can be said that the higher the amount of social capital, the more productive it will be in times of crisis.	Direct	Percentage of people with capital Social above average Social capital
				Health coverage	It refers to the proportion of the population of the region that is covered by insurance (social security). As the percentage of people covered by insurance increases, the amount of prosperity in the region will increase.	Direct	Percentage of people covered by social security insurance relative to the total population
Resilience	Infrastructure resilience	Urban resilience	Built environment	Infrastructure	Pipes, facilities and equipment related to gas, oil, water, electricity and telecommunications in the region. The greater the critical facilities and equipment associated with this infrastructure in the region, the greater the potential for vulnerability in the region. In the absence of alternative facilities for this infrastructure, the rate of resilience will decrease. The greater the main lines of critical infrastructure in logic, the less resilience.	Reverse	Percentage of length of main oil, gas, electricity, fiber optic and water pipes in relation to the total surface
				Transport network level	Existence of more main and arterial roads and the possibility of communicating with adjacent areas increases the possibility of regional resilience. The level of the transportation network is directly related to the level of reliability.	Direct	Percentage of the level of the network of passages with the arterial function of the region relative to the total level
				Quality of housing	The more prosperous the existing buildings, the more resilient the area. Since the useful life of buildings in Iran is ٣٠ years, the percentage of buildings under ٣٠ years was considered.	Direct	Percentage of buildings under ٣٠ years of age in relation to total buildings
				Relief and treatment	The more medical and relief centers there are, the more likely they are to be reversible and to be trusted.	Direct	Percentage of the level of medical centers and relief to the total level
				Density made	The higher the level built, the more vulnerable the area will be.	Reverse	The ratio of the built-in level to the total level

MATERIALS AND METHODS

The present research is a descriptive-analytical-comparative method and is applied in terms of purpose and the research strategy is retrospective. The method of data collection is library (statistics and documents) and survey (questionnaire). In this research, according to the type of problem and the intended purpose, the urban resilience assessment scale is proposed in the residential neighborhood dimension and in relation to the dimensions extracted in the table 1 which includes measurement calculations in the form of maps and tables and also To evaluate the social and institutional dimension, 375 questionnaires were conducted by researcher-made method in the form of Likert scale on a ranking scale, as a sample size based on the Cochran's formula with an error level of 5% (95% confidence interval). District 8 of Tabriz is distributed in a simple random manner. Upon entering the data into SPSS software environment, Cronbach's alpha coefficient for 30 sample questionnaires was calculated equal to 0.934, which indicates its high reliability and the validity of the above questionnaire, using the content analysis method by experts in the subject and confirmed Is located. In order to integrate the indicators, Seyed Ainuddin's's method, the average of the total distances from the optimal resilience limit, has been used. The numerical value of the indicators in this study is expressed as a percentage to eliminate the need to normalize the indicators, and by defining the optimal limit for each index, the resilience distance of each index with the optimal limit is obtained. In RFI, the optimal level obtained from the experiences of Japan and California for each index (in percent) is divided by the actual amount of each index (in percent). For data that are inversely related to resilience, the RFI will be inverted and will be: The actual rate of each index (in percent) divided by the desired level obtained from the experiences of Japan and California for each index (in percent). The amount of resilience in each dimension of the alley order is calculated by summing the distances obtained for each indicator of the optimal value in that dimension (economic, social, spatial and institutional). Based on this, we calculate the amount of resilience in different dimensions with CRIT, where n is the number of indicators, and finally, to calculate the final resilience, we calculate the average number calculated for different dimensions by ARI. Where we take the dimensions of resilience equal to 4.

Case study

Raste-Kuche neighborhood

Raste-kuche neighborhood, one of the ten historical neighborhoods located in District 8 of Tabriz Municipality (historical-cultural area), with an area of about 36.5 hectares, is located in the northeast of the area and covers about 9% of its area. According to the division of neighborhoods in the detailed plan of the historical-cultural region of Tabriz; This neighborhood is from the north to Mehran River and Chay-kenar route and Shams Tabrizi neighborhood; From the south to Tohid Street (continuation of Jomhouri) and Shariati neighborhood (Passage); It is bounded on the east by Palestine Street (United Nations) and Vijoyeh neighborhood, and on the west by Motahhari Street (row alley) and the historical bazaar of Tabriz (Naghsh Jahan Pars Consulting Engineers, 2007). According to the 95th census, District 8 of Tabriz Municipality, with 28,700 people, accounts for 2% of the city's population. The predominant use of the neighborhood is in the residential alley and is part of the worn-out fabric of Tabriz.

RESULT AND DISCOTION

As can be seen in the table 1 and figure 1 the results obtained from the study, the total amount obtained is 0.53, indicating the low resilience of the residential neighborhood of Raste-kuche compared to the optimal limit is. Among these, institutional resilience with 0.83 and social resilience with 0.70 are closer to the optimal resilience level and the neighborhood is in a better position institutionally and socially than other dimensions. The worst situation is the infrastructure dimension with a CRI of 0.23 and then the economic dimension with 0.38, so in planning to improve the resilience of the neighborhood of Raste-kuche, the most important dimension is the infrastructure dimension of resilience and in the next stage, the economic dimension.

Dimensions	Measures	Actual rate (percentage)	The optimal limit (Percentage)	FRI	CIR	AIR
Economic resilience	Employment	25.16	55	0.45	0.38	0.53
	Employment scale	0	0.8	0		
	Employment group	31.6	36	0.87		
	Equality of income in society	18	89	0.20		
Institutional resilience	Institutional bed	49.33	50	0.98	0.83	
	Institutional performance	47.20	60	0.78		
	Institutional Relations *	40.80	55	0.74		
Social resilience	Age structure of the population	19.04	22	1.15	0.70	
	Sexual structure of the population	50.87	51	1		
	Education Level	26.63	60	0.44		
	Amount of social capital *	60.80	90	0.67		
	Health coverage	21.06	81	0.26		
Infrastructure resilience	Infrastructure	1.49	0.6	0.40	0.23	
	Transport network level	9.11	30	0.30		
	Quality of housing	5.8	40	0.14		
	Relief and treatment	1.46	29	0.05		
	Density made	79	5.02	0.06		

The ratio of the distance between each of the resilience dimensions to the proposed optimal limit indicates the amount of attention required in the plans and programs to improve the current situation.

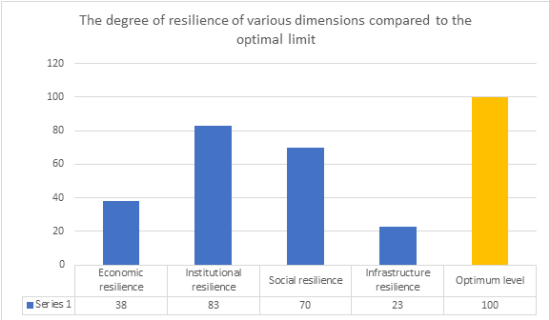

Fig 2: The degree of resilience of various dimensions compared to the optimal limit

In the detailed analysis of the findings, we also see that the employment scale is in the worst possible condition and, considering the active business edge that covers a considerable environment of the neighborhood, requires basic measures and programs in order to achieve an acceptable level of resilience. The quality of housing is another important factor in the area, which is in a very bad situation with a small distance from the employment scale. It can also be seen that against the employment scale, the criteria of the employment group are acceptable and close to the optimal level, while the two factors of employment and income equality are close to each other and correspond to about 20% of the optimal limit. Institutional resilience is in the best condition compared to other dimensions and among its measurement criteria, the institutional context has the highest rate. The age and sex structure of the population are in optimal social condition, but health coverage and education need to be addressed and improved. The weakest dimension among the four assessed dimensions is the infrastructure dimension, which has the lowest quality of housing among its constituent criteria, and the other two are much lower than the acceptable level of acceptance. Finally, in the figure ??? by comparing all the criteria, it can be seen that the employment scale is in the worst condition and with a short distance from it, relief and treatment and the quality of housing.

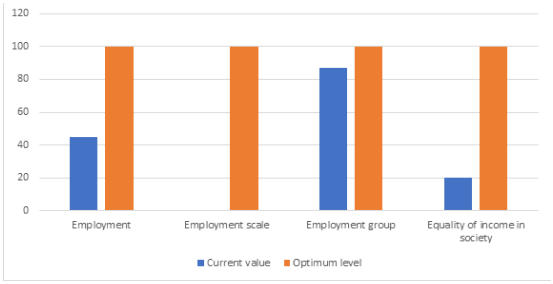

Fig 3: The degree of economic resilience compared to the optimal level

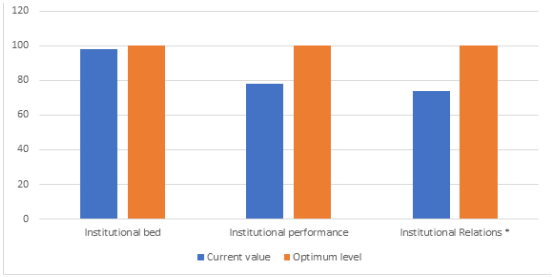

Fig 4: The degree of institutional resilience compared to the optimal level

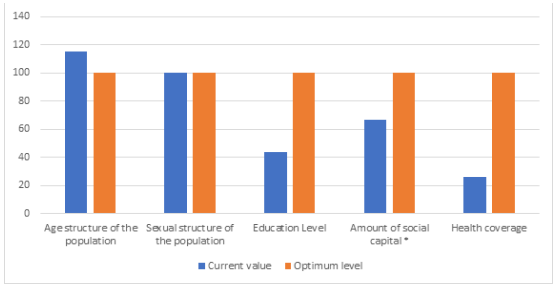

Fig 5: The degree of social resilience compared to the optimal level

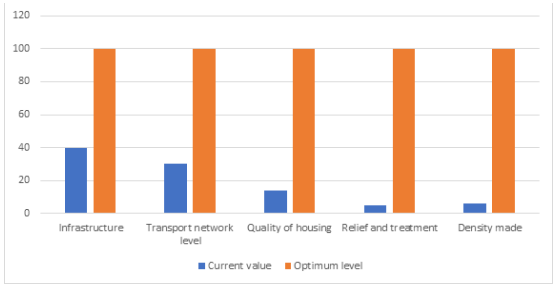

Fig 6: The degree of infrastructure resilience compared to the optimal level

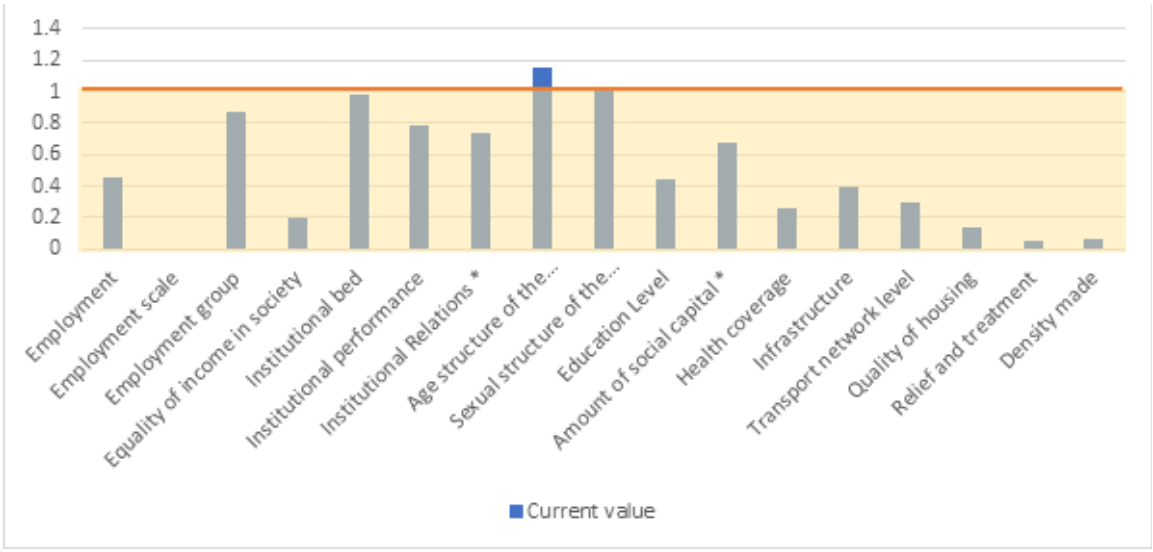

Fig 7: Comparison of the general rate of urban resilience criteria in Rasht neighborhood of Tabriz alley

CONCLUSION

The main purpose of this study is to evaluate the indicators of urban resilience in the order of Raste-kuche and compare the values obtained with the optimal level of these indicators on a global scale. The optimal limit is equal to the numerical value of each index in regions of the world (such as Japan and California) that have faced and withstood numerous crises. The results show that in Raste-kuche of Tabriz, in evaluating the resilience of different dimensions, in the infrastructure resilience dimension with 0.77 distance from the optimal limit and in the economic dimension with 0.62 distance from its optimal level, It is in the worst condition and in both social and institutional dimensions, resilience is at a distance of 0.30 and 0.17 from the optimal size, respectively. With a detailed examination of the indicators, it was concluded that except for the age and

sex structure from the social dimension, the former is above the optimal limit and the other corresponds to the optimal level, the institutional context from the institutional dimension with 0.2 distance from the optimal limit and the employment group from the dimension Economic with 0.17 distance, have the least differences compared to other cases from the optimal limit, the rest of the indicators are in unfavorable conditions and with significant distances from the optimal limit. Among these, the zero-employment scale and the relief and treatment and density built with a gap of 0.95 and 0.94, have the worst conditions and should be given priority in planning. According to the results, it is expected that in planning, decision-making and decision-making and allocation of resources in order to improve and improve the current situation, special attention and attention to indicators with a greater distance is optimized. Finally, to increase resilience in the study neighborhood, the following is suggested:

• Establishment and proper distribution of large-scale business centers in the neighborhood to increase the scale of this scale in order to increase economic resilience

• Establish and strengthen relief and treatment centers in the neighborhood to achieve the optimal level

• Prevent the increase of density in the area and if possible, reduce the amount of density by moving some blocks to other areas and freeing the land

• Provide concessions and facilities to encourage quality improvement and texture remodeling

• Reviewing the insurance status of people outside of social security coverage

• Strengthen the hierarchy of access and add routes with more arterial application to increase the efficiency of roads and access in times of crisis

• And other cases that can be arranged by referring to the detailed chart and table of numerical results and take the necessary measures according to the existing priorities.

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