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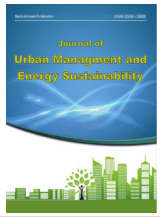

ORIGINAL RESEARCH PAPER

Explaining the livability index model in urban neighborhoods (Case study: Torghabeh, Mshahad, Iran)

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ABSTRACT

Quality of life is a broad concept whose dimensions depend on the level of development of societies. Often people have different choices while deciding upon the place to live, which makes it livable for them in neighborhoods. Indexes that define the livability might vary accordingly, but many common platforms with diverse parameters are created to measure and compare the livability of different regions but many of them depends on the locals' approaches. The current research method is analytical-descriptive, and the objective type is practical. The method of collecting information was based on library studies and field observations up to the Torghabeh region in the Mashhad city of Iran. First, the basic concepts such as livability, urban livability at the scale of localities were investigated and the research framework was extracted. After that, based on the number of factors extracted from the theoretical framework, using the fuzzy Delphi method, the factors were digitally determined by the questionnaire technique from 16 elites and experts in the research field in 3 rounds, and finally the final indexes were explained. Results show indexes of Sense of belonging, Health, Public transportation, and Housing have the highest score and as a result, the most impact in realizing the construction and working model. In a future study we can evaluate all of indexes in case studies in acute approaches to carry out the effects of the index in macro scale drives.

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INTRODUCTION

In the 20th century, the city was designed for the citizens, but with the beginning of the era of modernity and the industrialization of human societies, the increase in the urban population and the invasion of the machine age, the livability capabilities of the city declined (Elsawy et al, 2019). The increase in population density in cities led to the creation of conditions that harm the urban society and reduce urban livability (Franklin & Rurt, 2014). Therefore, urban planners are looking for a way to prioritize the role of people in cities, the term livable city (Elsawy et al, 2019:165). From this point of view, livable cities have become one of the new urban agendas of the United Nations in recent years. The quality of life in the urban environment, satisfied with the neighborhood, the vitality of the city and the livability perceived by the residents in the cities have been done (Kourtit et al, 2022). It has an urban adaptability (Yassin, 2019) and urban neighborhoods are different in livability indicators due to the differences in their cultures, attitudes, values and local structure. (Mouratidis & Yiannakou, 2022). Iran also, in recent years, with the increasing trend of urbanization and the accumulation of population in small areas, the indicators of livability have started their downward trend, and in numerous researches, problems such as worn-out fabric, overcoming the functions each other, the migration of local population, the inefficiency of urban infrastructure, high population density, the reduction of economic prosperity, the reduction of the environmental potential of cities, the reduction of the sense of belonging to the place and participation, etc. Have been discussed in the urban neighborhoods of Iran. In 1995, Ruth Vinhoun defined livability as follows: The term livability refers to the degree to which a society's necessities are provided, based on the needs and capacities of the people of that society. Despite the fact that the above-mentioned definition is related to the past two decades, but due to the importance of this definition and the fact that it is a basic definition of biological Zairi was first mentioned by Winhoven in the studies of quality of life, hence it is the basis of the work and cited (Staricco & Vitale Brovarone, 2022). Quality of life is a multi-dimensional concept that the World Health Organization defines as: a person's understanding of the life situation according to culture and value systems and its relationship with goals, expectations, interests, standards and life experiences. As can be seen in the above definition, six domains are stated in the quality of life, which include physical health, mental state, levels of independence, social relations, environmental relations, and spiritual interests (Palomo Amores et al. 2016). Quality of life is a broad concept whose dimensions depend on the level of development of societies. At first, this concept was formed against the purely economic approach to development. Livability is a general concept that is related to a number of other concepts and terms such as sustainability, quality of life and quality of place and healthy communities. A livable community is one that is safe and secure, has affordable and appropriate housing and transportation options, and supportive community features and services. (Ronald and Arundel, 2023) The measure of these indicators, as found from the empirical studies, may help the ranking of cities in different contexts. In another way, the 'desirable' construct representing a set of characteristics can also be understood as livability. (Mushtaha et al. 2018) Often people have different choices while deciding upon the place to live, which makes it livable for them. The parameters that define the livability might vary accordingly, but many common platforms with diverse parameters are created to measure and compare the livability of different regions through the livability index. (Farahi et al., 20232) Low density urban forms are often considered more livable than high density urban forms. (Giap et al., 2014) Theoretical and empirical studies suggested that the negative effects of high density living attributed to the common perception of high densities being detrimental to livability. (Liang et al. 2022) However, some studies of European cities suggest that high density doesn't have a negative impact on neighborhood

satisfaction that can be considered key to the livability of a neighborhood. (Paul and Sen, 2020) Although the definition of livability is different from one community to another, social planning goals can be used to create native criteria of livability. Gal's livability is used to define the different dimensions of society and the polytheistic experiences that shape it. Sustainability focuses on the human experience of place and considers these experiences in terms of a specific time and place. Sustainability as a concept can be defined according to the context in which it is defined. It can be very wide or limited. However, the quality of life in any place is at the center of attention of this concept, and there are many different measurable indicators, which are usually density, transportation, security and stability, which form its fixed components. (Javanmardi et al., 2022) People and place are two sides of the concept of livability, but livability indicators mainly examine only place and territory and not individuals Especially since people have changed and have spatial mobility in time. No measure can provide a complete picture of livability. (Hekmati and Joodaki, 2022) In addition, relying solely on the data obtained from people or places can lead to misguidance and miss the goal. For example, an increase in income in a certain place over time may indicate an increase in economic well-being, but the reason for that is the process of gentrification, during which the low-income people left the desired place and gave their place to the rich class. (Furlan et al. 2019) By studying the livability of urban neighborhoods in different cities and countries, we came to the conclusion that with the decrease of livability indicators in urban neighborhoods and the consequent decline in the quality of life in the city, especially in the central neighborhoods of the cities, the resident population is moving towards It escapes outside the city, which causes environmental destruction and damage to the natural resources of cities and ecological instability. (Soroush et al., 2019) On the other hand, urban livability can play an important role in the direction of cities and sustainable urban development. (Xiao et al., 2022). Therefore, in most cities of Iran, the prosperous population living in the central neighborhoods of the city have fled to places with good weather outside the city, the city of Torghabeh is no exception to this rule, and due to its proximity to the metropolis of Mashhad (spiritual capital of Iran) and Its mountainous climate and good weather and the touristic conditions of the city of Torghabeh have led to the attraction of the wealthy class of Mashhad to create garden villas in the neighborhoods far from the center of Torghabeh. Towards less dense neighborhoods and far from the city center, it has led to problems regarding the provision of urban infrastructure services to the residents of these neighborhoods. On the other hand, the present research believes that a livable city can be achieved from livable neighborhoods, so the current livability status of the neighborhoods of Torghabeh city in terms of livability indicators and macro factors affecting the current livability status of the neighborhood In order to prevent the dominance of commercial functions, change of use and the destruction of the ecology of the city of Torghabeh and to preserve the natural resources of the touristic city of Torghabeh for the future generations of Iran, the present research is necessary.

MATERIALS AND METHODS

Methodology

The current research method is analytical-descriptive, and the objective type is practical. The method of collecting information was based on library studies and field observations. First, the basic concepts such as livability, urban livability at the scale of localities were investigated and the research framework was extracted. After that, based on the number of factors extracted from the theoretical framework, using the fuzzy Delphi method, the factors were digitally determined by the questionnaire technique from 16 elites and experts in the research field in 3 rounds, and finally the final indicators were explained. The type of quantitative and qualitative indicators based on the presented model can be evaluated at the sample as a test.

Research background

According to the investigation of the background of the research, the basic concepts of livability, urban livability at the neighborhood scale, and the structure of neighborhoods can be stated in the field of urban environment and livability, but domestic and foreign studies can be stated as follows:

Bandarabad and Majdi (2013) in an article entitled "Review of global and local standards of a livable city" with a descriptive-analytical method expressed more comprehensive criteria for livable cities and therefore the known criteria at the first level, micro and at the level Second, they examined the macro and came to the conclusion that the designed conceptual model can lead to the studies of the production of the third level indicator, i.e. The Iranian livable city model. Mousavi et al.(2016) in an article titled "Analysis of the effects of scattered urban growth on the livability of urban areas, a case study: Maragheh city" with the aim of investigating the scattered urban growth, investigating the livability of neighborhoods and finally measuring the impact of indicators Analyzing the livability of neighborhoods in marriage with the help of regression, he reached the conclusion that the accessibility index in weighted multivariate regression had the highest positive coefficient in predicting the livability of neighborhoods. Mohammadi (2017), in an article entitled "Study of urban livability indicators of a Kurdish city based on the position of urban management" investigated the livability index of a Kurdish city with the descriptive-analytical method and with the help of Friedman and T. The test reached the conclusion that the social index with the path coefficient of 0.22 and the economic index with the path coefficient of 0.85 had the greatest impact on the livability of the Kurdish city. Ahmadian et al.(2018) in an article titled "Measurement and analysis of indicators of Mashhad city livability from the perspective of pilgrims and tourists, a case study of Saman area of Mashhad" with descriptive-analytical method, with the help of Delphi technique and structural equations, indicators They categorized the impact on livability including 27 indicators in four groups, social, cultural, economic and environmental, where the social index had the most and the cultural index had the least impact on the livability of the region, and finally, to provide a solution to improve the livability situation. They have paid in the same area. Barzegar et al. (2018) in an article entitled "Analysis of informal settlements, with a livability approach (case study: informal settlements of Zanjan city)" analyzed the livability indicators with a descriptive-analytical method and reached this conclusion. That the physical dimension with a significant coefficient of 5.61 has the greatest impact on the prevailing situation in the livability of informal neighborhoods in Zanjan city, and the economic dimension with a significant coefficient of 0.94 is the second most influential. Ahmadian and Zafarnia (2019) in an article entitled "Comparative study of the quality of life in neighborhoods (a case study of Sajjad and Sarab neighborhoods in Mashhad)" investigated the quality of life in Sarab and Sajjad neighborhoods in the Mashhad city with a descriptive-analytical method and came to this conclusion. They found that the participation index has a positive effect on the quality of life of the residents, and there is a direct relationship between the participation index and the quality of life, and the correlation between the two indices is 0.511, and the regression coefficient B shows that the greatest impact on the quality of life in the neighborhoods is related to the environmental index with the effect is 0.125. And finally, they have provided solutions and suggestions for making the neighborhoods more livable. Hataminejad et al. (2021) in an article entitled "Measuring dimensions of livability and sustainable neighborhood development, case example: neighborhoods of Sarab" with a descriptive-analytical method to evaluate the diversity and development of neighborhoods and indicators of urban livability. They designed and used a qualitative model including 3 general indicators (diversity in construction, diverse in use and diversity in users) and 69 variables and

came to the conclusion that neighborhoods 1, 4, 7, 9, 11, 3, 5 respectively 10, 2, 6, 8, 12 have a more favorable situation in terms of diversity and development. Mafi et al. (2022) in an article titled "Evaluation and measurement of urban livability and factors affecting it (the case study of Bojnord city) investigated urban livability in Bojnord city with descriptive-analytical method and with the help of t-test The sample and linear regression in SPSS software obtained the livability status of Bojnord city as 2.75, which was in a lower than average state, and the social dimension with an average of 2.84 was the highest and the environmental dimension with an average of 2.67 was the lowest among the investigated dimensions. Another finding of this research is the positive impact of citizens' sense of security and health on the livability of the city. Saberi and Mehre Kash (2023) in an article titled "Identification of effective indicators in the livability of urban neighborhoods, a case study of neighborhoods in the 1st, 5th, and 8th regions of Isfahan Municipality" with a descriptive-analytical method to investigate the effectiveness indicators in the livability of the neighborhood. of the city of Isfahan and came to the conclusion that Jolfa and Rozmengedan neighborhoods have higher levels of livability, Kushk neighborhood has medium livability, and Sipan, Abbas Abad and Khane Isfahan neighborhoods have the lowest livability and the sub-index of the quality of the transportation system has the greatest impact on the livability or lack of livability of the neighborhoods. Kashef (2016) examined urban livability in professional and disciplinary boundaries and by examining the cities of North America, Europe and Australia, they reached the conclusion that they should improve their environment and infrastructural facilities for the livability of cities and based on multi-dimensional indicators Focus on citizens' perception and satisfaction of the city. Sofeska (2017) Understanding the livability of the city with smart solutions and urban planning, towards a livable, sustainable and developing future of the city of Skopje, and reached the conclusion that smart cities can be a very good opportunity to create a livable city. Not only with the internet and technology but also by increasing the flexibility of the city environment through the productivity and development of innovation. Elsawy et al (2019) evaluated the livability of residential streets in the three cities of Al-Atari, Alexandria, Egypt and came to the conclusion that the greater the interaction of people with the built environment, focusing on the social, cultural and psychological aspects that shape these interactions. Cao et al (2021) investigated urban livability by simulation, evaluation and factor-based interpretation of the case of Futian area, Shenzhen, and concluded that in Futian area, Shenzhen, livability indicators are effective in the direction of sustainable development of the city. Xiao et al (2022) investigated the issue of creating livable cities for healthy aging and by focusing on cognitive health in the elderly and their 15-minute walkable neighborhoods, they came to the conclusion that in order to create a livable city suitable for the elderly in Shanghai, neighborhoods with less density should be and educational and cultural facilities should be placed in positions with a 15-minute walking distance. At the end of the internal and external studies section, while summarizing the researches conducted on the topic of urban livability, we will state the difference between the current research and the researches conducted and the innovation aspect of the research. After reviewing the studies and researches done in the field of urban livability, the present research is distinguished from two aspects. First, the indicators examined in the current research, which are at the level of urban neighborhoods, are complete and more diverse than previous researches in the field of the livability of urban neighborhoods. The second is to investigate the role of macro factors in each dimension of the livability of the neighborhoods. Because in the previous researches on the subject of livability, the focus was more on the definitions of livability and the ranking of urban neighborhoods in terms of livability indicators. While in the present research,

the causes and process of the existence of existing livability conditions and its consequences will also be investigated.

DISCUSSION AND FINDINGS

Case Study

Targaba city located in Khorasan-Razavi province is not an exception to this rule and livability in the neighborhoods of Torghabeh city has declined and the level of livability varies from one neighborhood to another, permanent or temporary migration in the form of a second home (villa garden) Residents of Mashhad to Torghabeh city due to the suitable ecological conditions and its healthy climate, as a result of the increase in population density, the drying of and agricultural lands in order to convert them into commercial-villa use and the predominance of tourism. -Commercial over other functions and its influence in the residential and garden context and as a result of many changes of use at the neighborhood level, the inappropriateness of urban infrastructure for neighborhoods with a high tourist population and the movement of the population from the central neighborhoods to the neighborhoods far from the city center. , the risk of an earthquake, due to the location of a part of the neighborhoods of Torghabeh city on a fault and the earthquake-proneness of the region, the weakness of the urban transportation network, especially during the peak time of the weekend, the weakness of the continuity of the road network, causing the abundance of worn-out fabric in Many neighborhoods of the city have been destroyed. According to the belief of the present research, urban neighborhoods can play an essential role in the development of the city, and with urban planning, a livable city can be obtained from livable neighborhoods. Therefore, with the aim of investigating the current situation of the livability of the neighborhoods of Torghabeh city and providing solutions to make them more livable, the unit of study of this thesis is the neighborhoods of Torghabeh city. (Tab. 1)

Based on this, the number of factors affecting the issue of urban livability in neighborhoods can be stated as follows according to the type of case includes, job opportunities, job satisfaction, income, price of land, Investment, garbage collection, quality of surface water collection, sound tranquility, environment quality, land-use, green space, policy and planning, participation, accessibility, housing, public spaces, public transportation, health, services, education, functions, Security, sense of belonging.

Delphi method applies

In this research, first, the initial model is developed based on the theoretical foundations and the use of existing models around the concepts of the urban livability as well as the structural factors in neighborhoods. After the initial design, this model was tested and developed through the Delphi method. The use of open-ended questions in the Delphi questionnaire and their analysis in the next stages was the judgment of reaching a consensus among the experts and reaching theoretical saturation of the qualitative methods used in the analysis of the data obtained in the present research. The collection of field data in the current research started with the collection of questionnaires in the first stage of the research and the extracted data were analyzed through descriptive statistics and qualitative analysis. In this research, urban landscape dimensions and green roof components are used as a default in the first stage, extracted from the theoretical foundations of the subject, and then the livability dimensions and its factors are presented according to the research hypothesis. These factors have been expressed based on the estimation of the awareness dimension of specialists and also the perceptual process of citizenship with consideration. These factors are set as a package of suggestions in the panel of experts and elites so that the Delphi method can be planned and applied. A total of 23 factors that were tested with this method to reach the final indexes.

Findings of implementing the Delphi method

First round

In this round, the panel members identified 19 factors out of 23 factors that were extracted from successful research as having moderate,

high, and very high influence in developing a sustainable urban landscape framework based on the green roof concept. The detailed and extended results related to the implementation of the first stage of questionnaire distribution are given in the following table. Factors of Price of land, Investment, Quality of the surface water collection and Sound tranquility have been removed from the Delphi process due to their average importance of less than 2.5. (Tab.2)

After the implementation of the first stage of assessment and evaluation of the opinion of the experts of the panel regarding the factors proposed and extracted from the theoretical bases and also receiving the suggestions of the panel members, in this round, to observe caution, all the factors extracted from the theoretical bases are again together with the average opinion of the members in the first round and the previous opinion of the same member, it was provided to all the experts of the panel. The panel members recognized 15 factors out of the 19 factors that were presented in the second round as having a high and very high impact (with an average greater than 3.5) on the research framework. The detailed and extended results related to the implementation of the second stage of questionnaire distribution are given in the table below. Kendall's coordination coefficient for the answers of the members of the order of the 9 factors that had a high and very high influence in this round was 0.775. (Tab. 3)

Third round

In the third round of compiling the research framework, the final indicators, along with the average opinion of the members in the second round and the previous opinion of the same member, were provided to all panel experts. The detailed and extended results related to the implementation of the third stage of questionnaire

Table 2: Phase one of the fuzzy method in compiling the final indexes of the livability of urban neighborhoods second round

No.	Factors	Response	Average	Standard Deviation	Min.	Max.
1	Job opportunities	16	3/15	0/45	1	5
2	Job satisfaction	16	3/10	0/62	1	5
3	Income	16	3/10	0/41	1	5
4	Garbage collection	16	2/98	0/31	1	5
5	Environment quality	16	3/68	0/54	1	5
6	Land-use	16	3/55	0/45	1	5
7	Green space	16	3/04	0/55	1	5
8	Policy and planning	16	3/98	0/40	1	5
9	Participation	16	3/22	0/25	1	5
10	Accessibility	16	3/25	0/65	1	5
11	Housing	16	3/41	0/39	1	5
12	Public spaces	16	3/90	0/58	1	5
13	Public transportation	16	3/75	0/45	1	5
14	Health	16	3/85	0/50	1	5
15	Services	16	2/89	0/45	1	5
16	Education	16	3/25	0/26	1	5
17	Functions	16	3/95	0/23	1	5
18	Security	16	3/65	0/42	1	5
19	Sense of belonging	16	3/44	0/55	1	5

distribution are given in the table below. Kendall's correlation coefficient for the members' answers about the order of the 12 factors was 0.789 (Tab. 4).

Reasons for stopping polling

The results of the three rounds of implementing the Delphi method in the research show that a consensus has been reached among the panel members for the following reasons and the repetition of the rounds can be ended:

1- In the second round, more than 50% of the members chose 15 influential factors in urban livability in neighborhoods up the case study, who had an average greater than 3 among their factors.
2- The standard deviation of the members' answers about the importance of the factors in the third round has changed significantly compared to the previous rounds.
3- Kendall's coordination coefficient for members' answers about the order of factors in the third round is 0.789. Considering that the number of panel members was more than 10 people, this amount of Kendall's coefficient is considered quite significant.

Table 3: Phase two of the fuzzy method in compiling the final indexes of the livability of urban neighborhoods second round

No.	Factors	Response	Average	Standard Deviation	Min.	Max.
1	Income	16	3/85	0/35	2	5
2	Environment quality	16	3/90	0/45	2	5
3	Land-use	16	3/75	0/35	2	5
4	Green space	16	3/95	0/42	2	5
5	Policy and planning	16	3/90	0/35	2	5
6	Participation	16	3/75	0/20	2	5
7	Accessibility	16	4/10	0/50	2	5
8	Housing	16	4/05	0/45	2	5
9	Public spaces	16	3/20	0/35	2	5
10	Public transportation	16	4/10	0/25	2	5
11	Health	16	4/20	0/26	2	5
12	Education	16	3/75	0/30	2	5
13	Functions	16	3/95	0/25	2	5
14	Security	16	3/15	0/20	2	5
15	Sense of belonging	16	4/30	0/25	2	5

Table 4: Phase three of the fuzzy method in compiling the final indexes of the livability of urban neighborhoods second round

No.	Factors	Response	Average	Standard Deviation	Min.	Max.
1	Income	16	3/95	0/30	3	5
2	Environment quality	16	3/95	0/40	3	5
3	Land-use	16	3/85	0/32	3	5
4	Green space	16	4/05	0/35	3	5
5	Participation	16	3/85	0/15	3	5
6	Accessibility	16	4/20	0/40	3	5
7	Housing	16	4/25	0/35	3	5
8	Public transportation	16	4/25	0/20	3	5
9	Health	16	4/25	0/16	3	5
10	Education	16	3/95	0/25	3	5
11	Functions	16	4/05	0/18	3	5
12	Sense of belonging	16	4/40	0/20	3	5

4- Kendall's coordination coefficient for the arrangement of the 12 influential factors in developing the research framework in the third round compared to the second round only increased by 0.025, which indicates a significant growth in this coefficient or the degree of consensus among the panel members in two consecutive rounds. Does not show

5- The points given to the factors by the experts and elites indicate that the characteristic indexes of Sense of belonging, Health, Public transportation, and Housing have the highest score and as a result, the most impact in realizing the construction and working model.

RESULT AND CONCLUSION

Research model explanation

Based on this, the following research framework can be presented as the result of studies, theoretical framework, and Delphi method (Tab.5):

The proposed research model is based on the convergence of researchers' ideas and methods that can investigate the urban livability in the way it affects quality of life in neighborhoods, in addition to improving the urban environment, can contribute to the sustainability of the urban settlements in a larger perspective. And help in the middle scale as well. (Fig.1)

Table 5: Proposal research model

The dimensions, indicators, and indexes in explaining the urban landscape quality mechanism based on the green roof concept			
Dimension	Index	Index type	Measurement
Economic	Income	Quantity	Questionary
Environmental	Environment quality	Qualitative	Questionary
	Green space	Qualitative	Questionary
Managerial	Participation	Qualitative	Questionary
	Functions	Qualitative	Questionary
Services and infrastructure	Education	Qualitative	Questionary
	Public transportation	Qualitative	Questionary
	Land-use	Qualitative	Questionary
	Housing	Qualitative	Questionary
	Health	Qualitative	Questionary
	Accessibility	Qualitative	Questionary
Social	Sense of belonging	Qualitative	Questionary

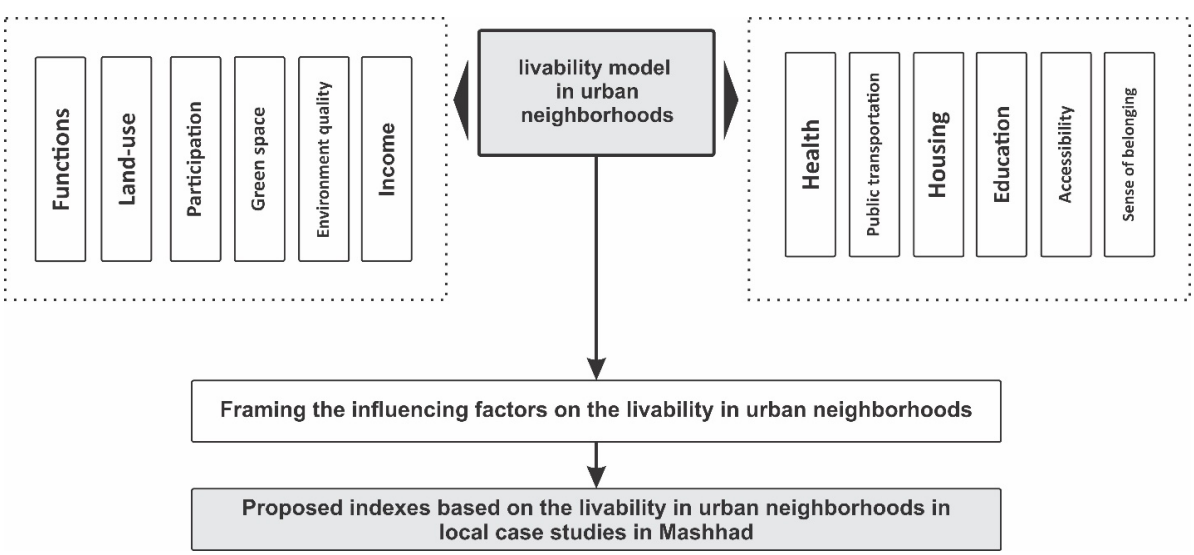

Figure 1: Proposal evaluation model of the fuzzy method in compiling the final indexes of the livability of urban neighborhoods second round

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