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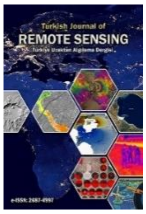

Determination of the Quality of Life using Hybrid BWM-TOPSIS Analysis: Case study of Tabriz (District 1, 2, 3 and 8), Iran

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ABSTRACT

The quality of life in cities is one of the most attractive research cases for researchers and urban planners. The Best-Worst Method (BWM) is one of the most recent multi-criteria decision-making methods (MCDM). In this study, we have tried to rank the quality of life in districts 1, 2, 3 & 8 of Tabriz city by using a combination of BWM and TOPSIS methods and Geographic Information System (GIS) capabilities. Twenty criteria have been considered for this study. At first, criteria map was prepared by using Remote Sensing processes and GIS. Then criteria weighting was determined by using the BWM method. After that, by combining the acquired weights by the TOPSIS method, the ranking of the districts was discovered. The results of BWM showed that the most effective criteria in quality of life is paying attention to the future of the city (%12.33). As a result of the quality of life analysis, it was revealed that district 2 has the best quality and district 3 has the worst quality. According to the prepared map of the quality of life, the best districts were Elahi-parast, Mirdamad 2 and Rajaea Shahr 2. On the other hand, the worst districts were Zangouleh Abad, Islam Abad 1 and Islam Abad 2.

Hibrit BWM-TOPSIS analizi kullanılarak Yaşam Kalitesinin Belirlenmesi; Tebriz (Bölge 1-2-3-8) Iran Örneği

Anahtar Kelimeler:
BWM
CBS
Tebriz
TOPSIS
Yaşam Kalitesi

ÖZ

Şehirlerdeki yaşam kalitesi, araştırmacılar ve şehir plancıları için en dikkat çeken araştırma konularından biridir. En iyi- En kötü yöntemi (Best Worst Method-BWM), en yeni, çok kriterli karar verme (ÇKKV) metotlarından biridir. Bu çalışmada, BWM ve TOPSIS yöntemleri ve Coğrafi Bilgi Sistemleri (CBS) bir arada kullanılarak, Tebriz şehrinin 1,2,3 ve 8. bölgelerindeki yaşam kalitesi sıralanmaya çalışılmıştır. Bu çalışma için yirmi kriter dikkate alınmıştır. Öncelikle, Uzaktan Algılama ve CBS teknikleri kullanılarak kriter haritaları hazırlanmıştır. Daha sonra BWM yöntemi kullanılarak kriter ağırlıklandırması yapılmıştır. Elde edilen ağırlıklar TOPSIS yöntemi ile analiz edilerek bölge sıralaması ortaya çıkarılmıştır. BWM sonuçları, yaşam kalitesindeki en etkili kriterin, şehrin geleceğine önem veren kriterler olduğunu ortaya koymuştur (% 12,33). Yaşam kalitesi analizleri sonucunda 2. bölgenin en iyi yaşam kalitesine sahipken, 3. bölgenin ise en kötü yaşam kalitesine sahip olduğu ortaya çıkmıştır. Hazırlanan yaşam kalitesi haritasına göre Elahi Parast, Mirdamad 2 ve Rajaea Shahr 2 semtleri en iyi yaşam kalitesine sahiptir. Buna karşın, Zangouleh Abad, İslam Abad ve İslam Abad 2 semtleri ise en kötü yaşam kalitesine sahip semtler olarak ortaya çıkmıştır.

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1. INTRODUCTION

Today, cities are the most attractive place to live for people, especially the people of the Middle East. Population growth has led to much research on the effects of population growth; Includes Surface Urban Heat Island (SUHI) (Hashemi Darebadami et al., 2019), resilience (Leitner et al., 2018), land use change (Maleki et al., 2020), crime (Fox, 2019), quality of life (Soares Rossi Cordeiro, 2020). On the one hand, we are witnessing economic, social and cultural development. On the other, there is a hand, traffic jam, crowdedness, shortage of access to public services, pollution, etc., in cities that affect citizens' daily lives (Dameri, 2016). Worldwide, the urban population is increasing and it is predicted that by 2030 more than %60 of the global population will live in cities (Akande et al., 2019 & United Nations, 2014). It is predicted that the growth of cities creates challenges for infrastructure and the environment (Dodman, 2017; Estevez et al., 2016; Han et al., 2017). Expansion of urban areas increases public access to modern facilities and urban infrastructure; however, the quality of life has declined because of the lack of social equilibrium in big cities (Gavrilidis et al., 2016).

Urbanization imposes some changes in the environment, among which we can point to direct change in landscape in human residential areas and indirect change in biophysical features, which in total, cause numerous environmental effects in various time and space scales (Alberti and Marzluff, 2004; Seto and Shepherd, 2009; Grimm et al., 2008; Han et al., 2017). There are many studies which show that natural environment including greenery and open spaces, provide vast interests for urban population which are called ecosystem services (Lafortezza et al. 2009; Francis et al. 2016; Lennon and Scott 2014: Douglas et al. 2019).

Survival, welfare, life quality; are all the concepts that have become the center of increasing attention by industries and states (Woszczyk, & Spanakis, 2018). Qualitity of Life (QoL) is an important measurement for life and residence in cities (Gou et al., 2018). World Health Organization (WHO) defines QoL as “an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (The Whoqol Group, 1998). In internationally accepted practices, several urban indicators are applied, some of which are: Monocle's Quality of Life Survey, Quality of Life Index (QLI), Indicators for Sustainability, European Green City Index, City Blueprint etc. (Kaklauskas et al., 2018).

Approaches for measurement of the QoL are based on secondary analysis of subjective data from public perception of quality of life and statistical data acquired through measurement of certain comparative features (Marans & Stimson, 2011). The quality of life is considered as the amount of public consent concerning different needs, especially material, spiritual and security needs and life aspirations, which in a general sense, are notable economic, special, environmental and cultural aspects (Nowak, 2018). Research on quality of life and increasing focus on the quality of urban life is a response to the growth of urbanization around the world. However, applied studies are mostly disinclined to conceptualization of the quality of urban life and are more functional (Murgaš & Klobučník, 2018). Many parameters can affect the quality of urban life, but their importance is not the same; Therefore, using a multi-criteria decision system in such cases is necessary.

Multi Criteria Decision Making (MCDM) is a subordinate discipline of research in operation, which has grown enormously since inception (Mohammadi, & Rezaei, 2019). TOPSIS is one of MCDM tactics that deals with the optimum solution from among a lot of alternatives that have the longest distance from the negative ideal solution and the shortest distance from the positive ideal solution. In TOPSIS tactic, all the external factors are classified under suitable (higher) features or unsuitable ones (Srinivasan et al. 2020). On the other hand, Best and Worst Method (BWM) is a multi-criteria decision making that finds the optimal weight of a cluster of criteria on the basis of just a Decision Maker (DM) (or evaluator). However, it cannot integrate the preferences of several decision makers/ evaluators on the so-called issue of group decision making (Mohammadi, & Rezaei, 2019). Considering the criteria in the traditional format is not very efficient, while using GIS, the criteria can be turned into maps and combined these (Xu & Li, 2014).

There has been a lot of research in this regard. Lotfi et al. in a study considered several different factors and using the AHP method to examine the quality of life in the city of Babolsar, which showed that the city is in a moderate position in terms of quality of life (Lotfi et al., 2011). In another study, the quality of urban life was assessed using the integration of methods fuzzy multi-criteria decision analysis (FMCDA), The fuzzy Delphi method (FDM) and extent analysis method on fuzzy AHP (EAFAHP). The results of the research can turn the abstract concept of sustainability into an evaluation of specific city-life operations and serve as a guide for self-examination of the current situation and the development of future policies (Wang & Peng, 2020). Gholi Motlagh and Darvishi in a study with use of European cities quality of life measuring (European barometer), a survey of residents of Qazvin and exploratory factor analysis, the reliability of six factors by Cronbach's alpha was found. Then, the quality of life in this city was determined using t-test (Gholi Motlagh and Darvishi, 2021).

Ranking the neighborhoods in Tabriz districts of 1, 2, 3 & 8 is the objective of this study, which can help those in search of housing to find the best neighborhood and provide a guidance for the city managers to recognize which neighborhoods on which criteria need more attention. Therefore, by using the capacity of TOPSIS and BWM methods and also GIS analysis, we tried to determine the condition of effective criteria in the quality of life and also the neighborhoods` quality of life.

2. STUDY AREA

Tabriz, is a city in East Azerbaijan province in North West of Iran and is situated in the geographical position (38.08° N and 46.25° E). This setting is composed of 9 urban districts with an area of around 24559.13 hectares (Alizadeh et al. 2018). According to 2021 statistics the population of the city is up to 1,643,960people (Iranian Statistics Center, 2021). Tabriz's altitude ranges between 1,350 and 1,600 meters above sea level. The average annual temperature and precipitation is respectively 12.6 °C and 280 millimeters. According to De Martonne aridity index, this area`s climate has changed from semi-arid to arid (Baghanam et al. 2019). The area under study is composed of districts 1, 2, 3&8 of Tabriz municipality. According to 2021 statistics, these districts have 813267 population and 97 neighborhoods. Figure 1 shows the districts map case study.

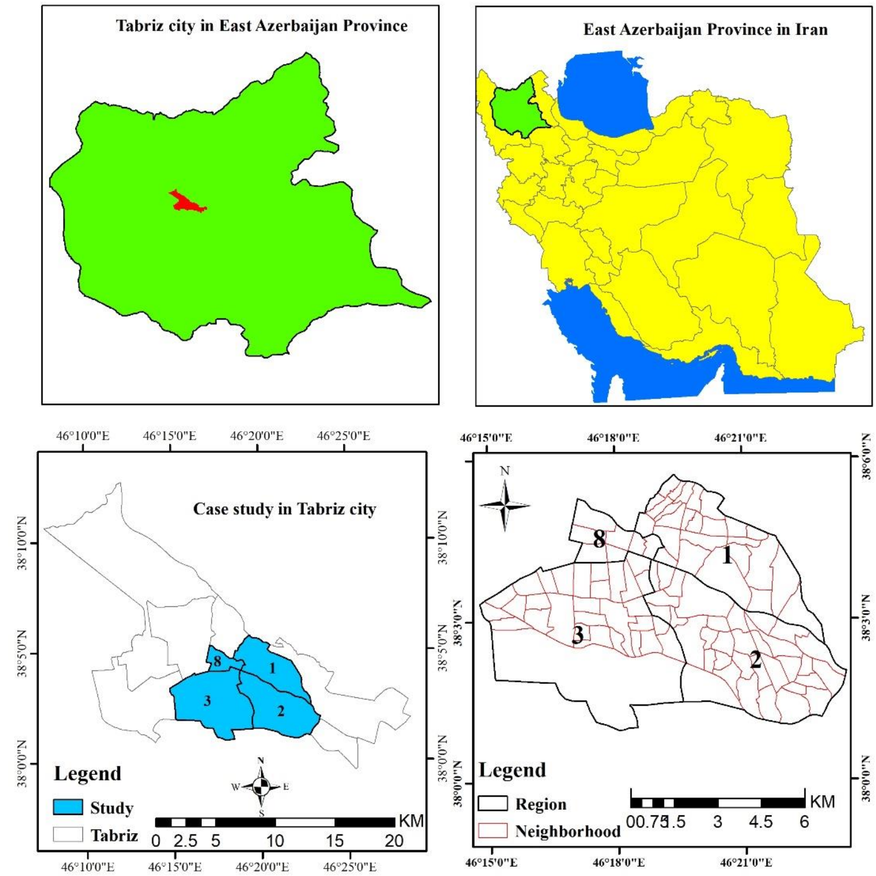

Figure 1. The case study

3. METHODOLOGY

In this study in order to determine the ranking of Tabriz districts 1, 2, 3 & 8, 20 criteria have been used including: land surface temperature, air pollution, population density, land slope, access to service centers, distance to recreational centers, density of delinquency, school density, distance to health clinics, distance to public offices, employment rate, quality of services, housing price, per capita green space, change of temperature, urban futurism, the amount of income, quality of housing, population aging and youth population. According to past studies, effects of each variable (positive or negative) has been determined. For positive effect we use the symbol of "+" and for negative the symbol of "-". The name of criteria, effectiveness, explanation for each one, extraction method and source for every index is available in Table1.

Table 1. List of used criteria (Adopted from; Haghighi Fard & Doratli, 2022)

Criterion	Explanation	Extraction method	Effectiveness	Source
Land surface temperature	In order to extract land surface temperature, Thermal Infrared Sensor (TIRS)	$T_s = T_i + C_1(T_i - T_j) + C_2(T_i - T_j)^2 + C_0 + (C_3 + C_4 w)(1\text{-}\varepsilon)(C_5 + C_6 w)\Delta\varepsilon$	+	Jimenez - Munoz et al., 2014
Air pollution	Aerosol optical depth (AOD) estimates based on Simplified Aerosol Retrieval Algorithm (SARA) by using satellite products and images of MODIS sensors.	$\tau_{a,\lambda} = \frac{4\mu_s\mu_v}{\omega_0 \, P_{a\{\theta_x,\theta_y,\emptyset\}}}$	-	Bilal et al., 2013
Population density	The number of inhabitants per hectare	$Pop_{density} = \frac{Pop_{tot}}{Area_{(ha)}}$	-	
Land slope	Land slope is used for setting the amount of comfort in the living area. it also affects the quality of access	$Slop - Angle = (\frac{\delta f}{\delta f})$	-	Klee, 2011
Access to service centers	Distance to service centers like market, station etc. which is calculated by using Euclidean distance	$dist(p,q) = \sqrt{(x_p - x_q)^2 + (y_p - y_q)^2}$	+	Klee, 2011
Distance to recreational centers	Distance to recreational centers which is calculated by using Euclidean distance	$dist(p,q) = \sqrt{(x_p - x_q)^2 + (y_p - y_q)^2}$	-	Klee, 2011
Density of delinquency	Kernel function estimate of density in crime occurrence points	$\int_{-\infty}^{\omega} \hat{f}(t)dt = \frac{1}{n}\sum_{j=1}^{x}\int_{-\infty}^{\omega} K(x_j,t)dt = 1$	-	Węglarczyk, 2018
School density	Kernel function estimate of density in schools	$\int_{-\infty}^{\omega} \hat{f}(t)dt = \frac{1}{n}\sum_{j=1}^{x}\int_{-\infty}^{\omega} K(x_j,t)dt = 1$	+	Węglarczyk, 2018
Distance to health clinics	Distance to health clinics which is calculated by using Euclidean distance	$dist(p,q) = \sqrt{(x_p - x_q)^2 + (y_p - y_q)^2}$	-	Klee, 2011
Distance to public offices	Distance to state agencies which is calculated by using Euclidean distance	$dist(p,q) = \sqrt{(x_p - x_q)^2 + (y_p - y_q)^2}$	-	Klee, 2011
Employment rate	The employment-to-population ratio		+	
Quality of services	Ranking of neighborhoods in terms of public services quality (like out-of-date or updated available services, to be fundamental or not, etc.)		+	
Housing price	Ranking of neighborhoods in terms of housing price per square meter.		-	
Per capita green space	Calculation of available green space (in meter) in each neighborhood as a ratio to the number of inhabitants		+	
Change of temperature	Temperature variation in the hottest and coldest months of the year		-	
Urban futurism,	Forecasting the future of cities in terms of expansion of facilities within the past decade and present facilities (this factor was completed by the opinions of urban experts familiar with the districts, in a way that the percentage of social, economic and cultural progress in each neighborhood was determined by the opinion of experts)		+	
The amount of income	The average household income in each neighborhood		+	
The quality of housing	Integration of parameters about percentage of housing ownership, construction endurance, the area of housing and the number of rooms in each house		+	
Population aging	Ratio of population above 65 to total population		-	
Youth population	Ratio of population under 14 to total population		+	

3.1. BWM and TOPSIS

The map of all the criteria was prepared by using GIS and remote sensing capability. In the next phase we have used multi-criteria decision making and BWM to prioritize the criteria. The BWM method has been developed in the evolution of the AHP (Maleki et al., 2014) and ANP (Gonzalez-Urango et al., 2021) methods. In order to get the significance of the criteria in BWM we have followed the following steps.

Step 1. Determine a set of decision criteria {c1, c2, c3, cn}.

Step 2. Determine the best (e.g. Most desirable, most important) and the worst (e.g. Less desirable, less important) criteria.

Step 3. Determine the preference of the best criterion over all the other criteria using a number between 1 and 9. The resulting Best-to-Others vector would be:

$A_B=(A_{B1}, A_{B2}, \ldots, A_{Bn})$

Where A_{BJ} indicates the preference of the best criterion B over criterion j. It is clear that $A_{BB}=1$

Step 4. Determine the preference of all the criteria over the worst criterion using a number between 1 and 9. The resulting Others-to-Worst vector would be:

$A_W = (A_{1w}, A_{2w} \ldots A_{nw})^T$

Where A_{JW} indicates the preference of the criterion j over the worst criterion W. It is clear that $a_{ww}=1$.

Step 5. Find the optimal weights (W_1^*; W_2^*; …; W_n^*). The optimal weight for the criteria is the one where, for each pair of W_B/W_J and W_J/W_W, we have $W_B/W_J = A_{BJ}$ and $W_J/W_W= A_{JW}$. To satisfy these conditions for all j, we should find a solution where the maximum absolute differences $\left|\frac{W_B}{W_J} - A_{BJ}\right|$ and $\left|\frac{W_j}{W_w} - A_{jw}\right|$ for all j is minimized. Considering the non-negativity and sum condition for the weights, the following problem is resulted (Rezaei, 2015 & Rezaei et al., 2016):

$$\text{Min} \max_j \left\{ \left|\frac{W_B}{W_J} - A_{BJ}\right|, \left|\frac{W_j}{W_w} - A_{jw}\right| \right\} \quad (1)$$

s.t.

$\sum_j W_j = 1$

$W_j \geq 0$; for all j

Can be transferred to the following problem: min ξ

s.t.

$$\left|\frac{W_B}{W_J} - A_{BJ}\right| \leq \xi \text{ for all j} \quad (2)$$
$$\left|\frac{W_j}{W_w} - A_{jw}\right| \leq \xi \text{ for all j}$$

$\sum_j W_j = 1$

$W_j \geq 0$; for all j

By solving the above model, the optimal amount of (W_1^*; W_2^*; …;W_n^*) and ξ is acquired. By using the acquired ξ^* , the rate of compatibility is calculated (Rezaei, 2015). The amount of compatibility is acquired through Table 2 (in this table the incompatibility index is changed on the basis of the advantage of the best index to the worst index).

Table 2. The calculation values of compatibility index

A_{BW}	1	2	3	4	5	6	7	8	9
Compatibility Index	0.00	0.44	1.00	1.63	2.30	3.00	3.73	4.43	5.23

$$\frac{\xi^*}{Compatibility\ Index} = \text{Incompatibility Rate} \quad (3)$$

Finally, TOPSIS method was used for ranking the alternatives. The method of preference ranking based on the ideal responses of TOPSIS, is another strong methods in multi-criteria decision making. This method was developed by (Hwang and Yoon, 1981).

In the first step in this method a matrix of alternatives and the criteria which are under evaluation is developed: which includes the alternative n and the criterion m.

$$A = \begin{bmatrix} \tilde{x}_{11} & \cdots & \tilde{x}_{1n} \\ \vdots & \ddots & \vdots \\ \tilde{x}_{m1} & \cdots & \tilde{x}_{mn} \end{bmatrix} \quad (4)$$

Quantification and unscaled decision-making matrix (normalization): this item is done through the following equation.

$$r_{ij} = x_{ij} \sqrt{\sum_{i=1}^{m} x^2{}_{ij}} \quad i = 1, 2 \ldots m \;\&\; j = 1, 2, \ldots, n \quad (5)$$

Acquiring weighted unscaled matrix: V_{ij} which is unscaled matrix is multiplied in weights diagonal matrix W_j (which in this method Stochastic Weight Averaging (SWA) is used).

$$V_{ij} = r_{ij} \times W_j \quad i = 1, 2, \ldots, m \;\&\; j = 1, 2, \ldots, n \quad (6)$$

V_{ij}: weighted unscaled matrix

W_j: weight of matrix (total weights should be equal to 1)

Determining the positive ideal solution and the negative ideal solution

A^+: the positive ideal solution= the vector of the best values for each A^+ matrix

A^-: the negative ideal solution: the vector of the worst values for each A^- matrix

$$A^{*} = \{(\max_i v_{ij} \mid j \in C_b), (\min_i v_{ij} \mid j \in C_c)\} = \{v_j^{*} \mid j = 1, 2, ..., m\} \quad (7)$$

$$A^{-} = \{(\min_i v_{ij} \mid j \in C_b), (\max_i v_{ij} \mid j \in C_c)\} = \{v_j^{-} \mid j = 1, 2, ..., m\} \quad (8)$$

Acquiring the amount of distance for each option to the positive and negative ideal: the Euclidean distance of each option from the positive ideal (A^+) and distance of each option to the positive ideal (A^-).

$$S_i^* = \sqrt{\sum_{i=1}^{m}(v_{ij} - v_j^*)^2}, j = 1, 2, \ldots, m \quad (9)$$

$$S_i^- = \sqrt{\sum_{i=1}^{m}(v_{ij} - v_j^-)^2}, j = 1, 2, \ldots, m \quad (10)$$

Determining the relative closeness (RC^+_i) of an option to the ideal solution:

$$RC_i^* = \frac{S_i^-}{S_i^* + S_i^-}, i = 1, 2, \ldots, m \quad (11)$$

Ranking the options: every option with greater RC^+I, is identified as more suitable (Wu and Chuang, 2013).

4. RESULTS AND DISCUSSION

After completing the methodology steps, the results of QoL in the districts under study is acquired. These results can be presented in three parts. The first section is about the extracted map from the used methods in Table 1 which is shown in Table 2.

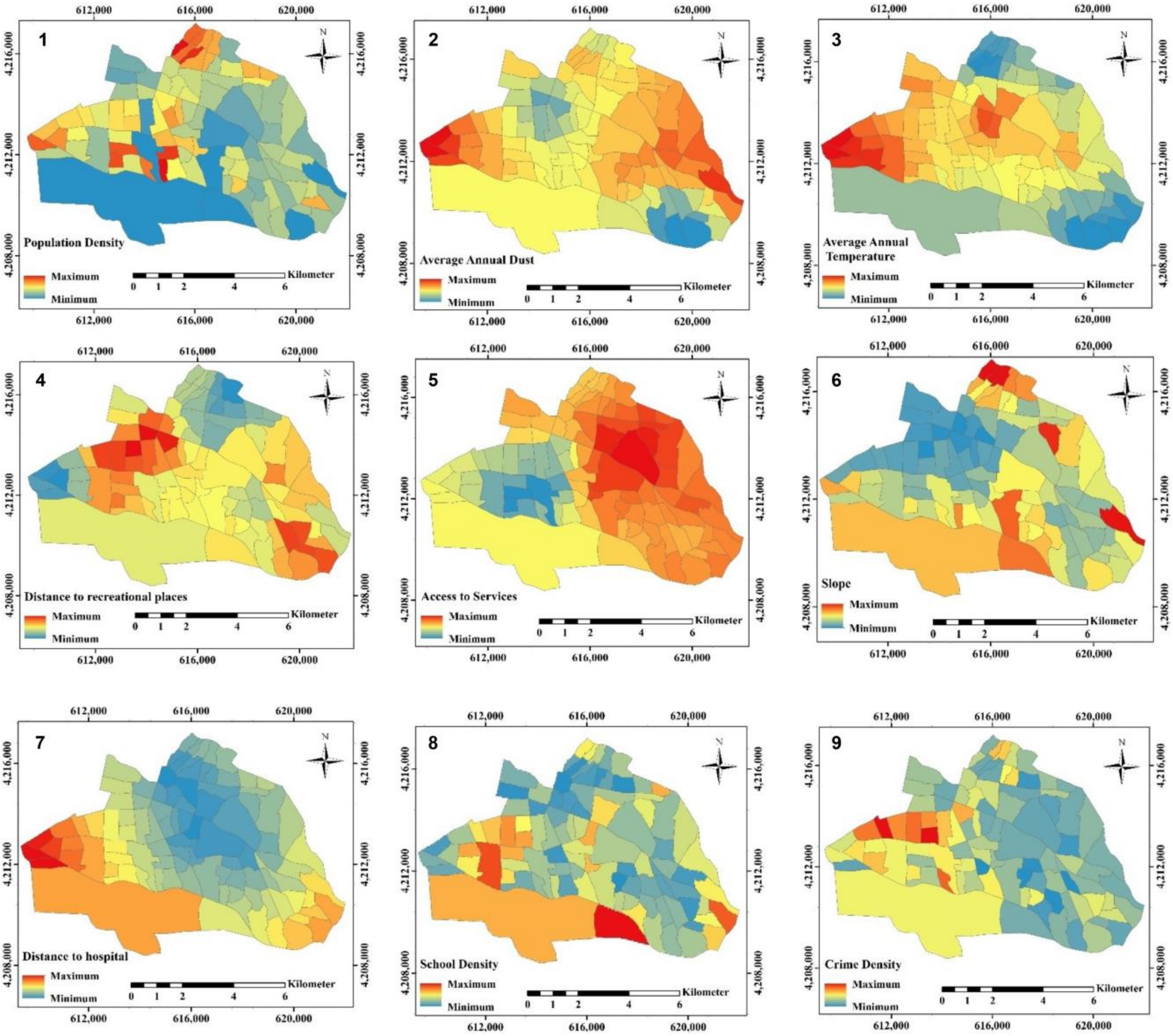

Figure 2. The map of used criteria 1) Population density 2) pollution 3) LST 4) recreational centers 5) access to services 6) slope 7) Distance to hospital 8) School density 9) Density of delinquency

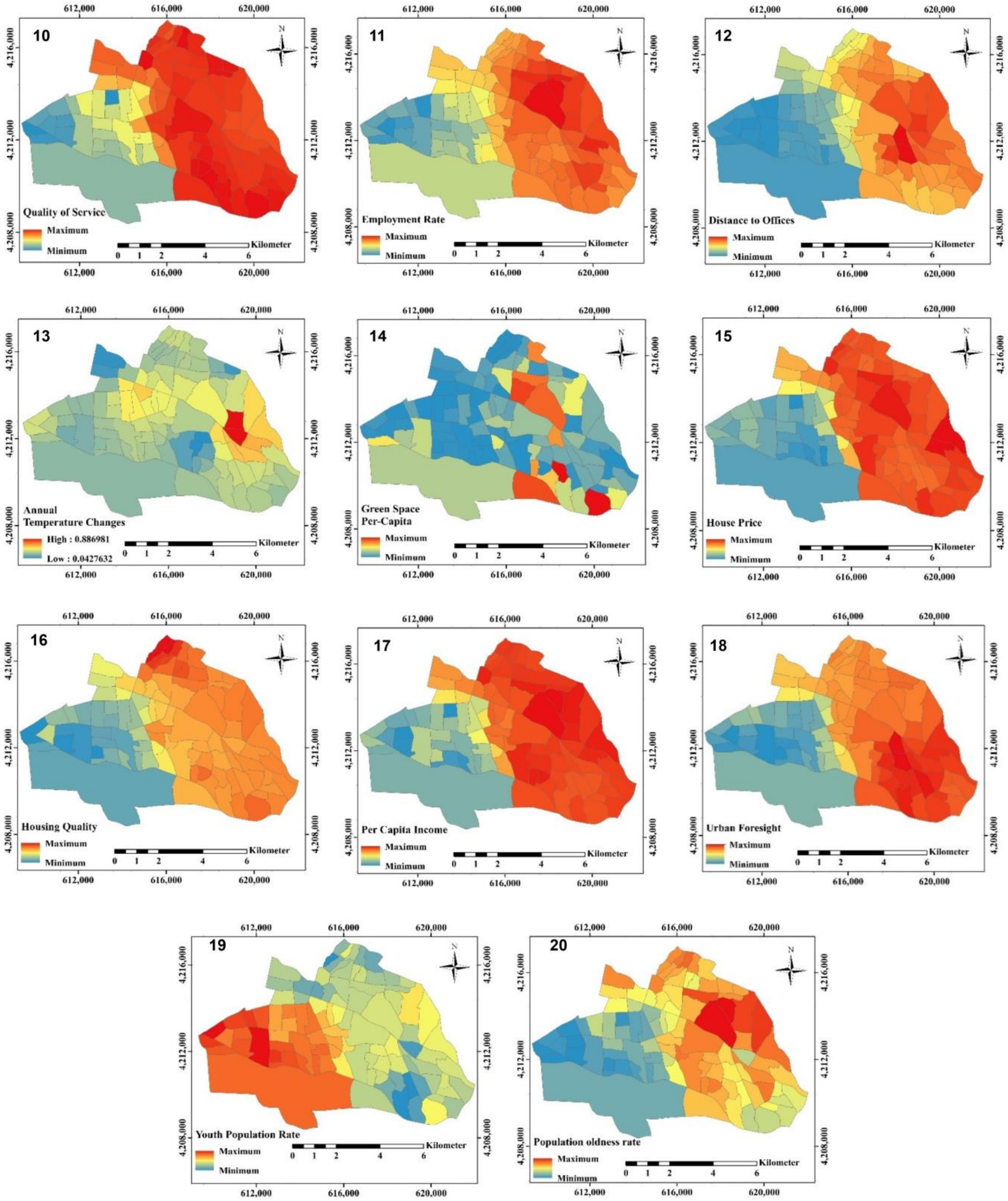

Figure 2 (continued). The map of used criteria 10) Quality of services 11) Employment rate 12) Distance to offices 13) Annual temperature change 14) Green space per capita 15) Housing price 16) Housing quality 17) income 18) Urban futurism 19) Youth population 20) Population oldness

According to Figure 2, the eastern half of maps 5, 10, 11, 12, 15, 16, 17, 18 and 20 is more valuable than the western half, and maps 3, 7 and 19; The western half has more value than the eastern half. The rest of the maps have values scattered throughout the study area.

In Table 3 the significance value for every criterion is calculated and provided by using the BWM. According to this Table three of the most effective criteria in urban QoL is respectively paying attention to the future of city (attention to security issue) and the amount of per capita income. In contrast, three less effective criteria are respectively as slope, land surface temperature, annual temperature variation (equal to land surface temperature). After determining weight of the criteria, we managed to make the ranking of neighborhoods according to TOPSIS and BWM. Table 4 shows 10 high quality and 10 low quality neighborhoods.

Table 3. Weight of effective criteria in QoL by BWM

Weight	Criterion	Weight	Criterion	Weight	Criterion	Weight	Criterion
12.23	Urban futurism	3.82	Employment rate	3.75	Distance to recreational centers	1.47	Land surface temperature
7.95	income	6.49	Quality of services	9.61	Density of delinquency	1.75	pollution
5.08	Housing quality	5.42	Housing price	7.78	School density	1.60	Population density
2.89	Population oldness	2.86	Green space per capita	7.81	Distance to hospital	1.15	slope
2.61	Youth population	1.47	Annual temperature change	6.49	Distance to public offices	7.67	Access to services

Table 4. Ranking of the neighborhoods` quality of life

Ranking	Neighborhood	Ranking	Neighborhood
1	Elahi Parast	88	Leil Abad
2	Mirdamad 2	89	Taleghani 3
3	Rajaee Shahr 2	90	Taleghani 4
4	Zaaferaniyeh 1	91	Ghatran
5	Gol Park	92	Manzarieh 1
6	Zaaferaniyeh 3	93	Islam Shahr
7	Bilankooh 1	94	Abureihan
8	Golkar	95	Islam Abad 1
9	Sari Zamin	96	Islam Abad 2
10	Zaaferaniyeh 4	97	Zanguleh Abad

According to provided results in table 4, three neighborhoods which provide the highest quality of life for citizens are as follows: Elahi Parast, Mirdamad 2 and Rajaee Shahr 2. However, in contrast three neighborhoods with the lowest quality of life are as follows: Zanguleh Abad, Islam Abad 2 and Islam Abad 1. Among the districts, the quality of life is respectively high in district 2, district 1, district 8 and finally district 8.

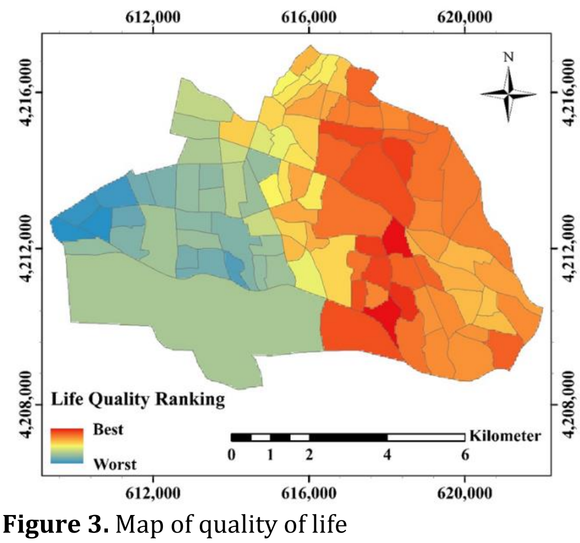

Figure 3. Map of quality of life

As determined in Figure 3, the neighborhoods with the highest QoL are generally in districts 1 and 2 (red range colors) and the districts with the lowest QoL are in district 3 (blue range colors). The highness of negative indicators like distance to services, density of delinquency, density of population and the lowness of positive indicators like low per capita income, low employment rate, density of hospitals (Which this inequality is partly due to not having proper planning and partly due to life style of inhabitants) have made the QoL in district 3 the lowest among the other districts.

Figure 3 shows the quality of life in neighborhoods. This map confirms data in Table 4, shows the spatial quality of life and much more details of quality of life (neighborhoods are not provided in the table).

Since the 1930s, researchers have studied the quality of life through a variety of methods and approaches. They have tried to determine the components and elements of quality of life and compare geographical areas such as cities, states and countries by quality-of-life indicators (Liu, 1976; Ülengin et al., 2001; Ali Akbari & Amini, 2010; Goli et al., 2021). Different methods have been used in academic research and various researches of organizations. The difference between this study is the use of the new BWM method to assess the quality of urban life, which the authors of this article encourage other researchers to use this method. This article presents a new method for assessing the quality of life and it's recommended to compares it with the results of other methods.

5. CONCLUSION

QoL is an important indicator, because humans are inherently after enhancing their welfare. QoL has vast dimensions and we must have a comprehensive world view in examining QoL. Today urban industrialization and rural youth rush to cities which is on the one hand because of shortage of proper jobs (especially for educated people) and on the other hand because of subjective attractions of urban life, push the cities as demographic attraction hubs to a new phase. Discussion on the QoL in cities can be very much helpful for those who are after housing (purchase or rent) but do not have proper knowledge about the districts.

Meanwhile developing new decision-making methods can disclose newer dimensions of the subjects ahead. The BWM is one of the newest methods which besides high effectiveness, is easier to use in comparison with other methods (like ANP and AHP) and its combination with other methods like TOPSIS can lead us to precise results.

In this study by combination of BWM, TOPSIS and GIS capabilities, first it was determined that attention to future of cities is the most important factor in QoL which in itself shows that attention to future prevents change in the QoL in future. Two other important factors are related to the data on offence and crime which shows attention to security issue is very much important. On the third rank we see the important factor of the amount of income, which is rooted in the effects of capitalist life style in improving the QoL.

A point which is grasped from Table 3 and Map 3 is that most neighborhoods in a district are in a similar situation (or have almost the same quality of life) which is rooted in the views of urban planners and developers who cause the gap in the QoL among the neighborhoods by concentration of facilities in particular districts. The position of neighborhoods with similar names next to each other in the final ranking like the presence of three phases in Zaaferaniyeh neighborhood (1, 2 and 4) among high quality neighborhoods and the position of two phases of Islam Abad district (1 and 2) and two phases of Taleghani (3 and 4) among neighborhoods with lowest quality, is strong evidence on this issue. On the other hand, the neighborhoods with the lowest quality are witnessing influx of low-income strata which in itself lowers the QoL in those districts. Among the effects of this influx to the QoL in the first step is further decline in per capita income, increase in criminal acts, decrease in housing quality and price along with unlawful house building on the one hand and low inclination of city authorities in providing public services including public offices, schools, hospitals etc.

Author contributions

The authors contributed equally to the article.

Conflicts of Interest

The authors declare no conflict of interest.

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