Measuring the Quality of Life

and City Competitiveness: A Methodological Framework for the Iranian Metropolis

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Abstract

Recently competitiveness has become one of the most used concepts in the urban and regional planning literature. This research aims to show the competitive situation of the eight metropolises in Iran based on the quality of life indices. The analytical, descriptive method used in this research to show the facts that are involved in different metropolises. Applying framework, required information gathered from world cities information center (NUMBEO https://www.numbeo.com/). ELECTRE III (ELimination Et Choix Traduisant la REalité, in French) is an effective Multi Criteria Decision Analysis method. The results indicate that important effective factors in population selection of living in the metropolis are commuting time or traffic, the ratio of income to property price and health. Hence, metropolis ranking demonstrates that in terms of quality of life Shiraz placed on the first level and Ahwaz at the last level. Isfahan, Qom, Tabriz, Mashhad, Tehran, and Karaj respectively ranked from second to seventh. Tehran as the capital city with the highest population concentration does not have enough competitive power against other metropolises and for entering into the international system require deliberate attention to the effective factors of quality of life. In addition, the results show the application of the framework in measuring metropolis competitiveness based on the quality of life is very important and competitive can promote sustainability, adaptability, and quality of planning.

Keywords: *Competitiveness, Quality of Life, Multi Criteria Decision Analysis, Metropolis, Iran*

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Introduction

Urban population in the world is increasing and it will increase for the decades, In 1960 just 34% of the total world population lived in urban areas and by 2014 it reached 54%. The current and the future of urban population growth in the world show that very low developed areas and countries also will increase roughly 1.84% per year between 2015 and 2020, in the next 5 year period it is expected to increase slightly slower than this and by 1.63% per year between 2020 and 2025, at the last five year period of urban population forecast, it will continue to grow 1.44% per year between 2025 and 2030 (GHO, 2020). More than 4 billion people live in urban areas which this increase in urban population has been never been without any negative impacts, such as increase in the urban poor slums, air pollution, water contamination, informal economy and, poverty. According to Iran census reports, urbanization tendency shows a rapid increase since the first official census report in 1945 (Statistical Centre of Iran,2020). From the total population of the country in 1945, about 31% were urban dwellers, which increased in the next censuses with a relatively constant trend and in 2010 has reached 71.4%. In other words, over more than half a century, the percentage of urbanization in Iran doubled; it has been equated with the very rapid trend of urbanization during this period.

The highest annual urban growth occurred between 1976 and 1986 decade and at the same time for the first time in the history of urbanization in Iran the urban population exceeded from rural population by passing over 50% of the total population. Also, The emergence of new cities and transformation of rural areas to new cities made urban population in Iran higher than decades before. Thus, during the years 2005 to 2010, the number of cities in the country has increased from 1,012 urban points to 1,139 urban points. The urbanization rate is now much higher than the urbanization ratio in the whole world and in developing regions, and is close to the average percentage of urbanization in developed regions of the world (74% in 2005), (Nation United 2008). By 2050, the world's urban population will reach 70 percent, and Iran's urban population ratio will be 84 percent, slightly different from that of developed countries. As the urban population grows, subsequent increases in the percentage of urbanization become imperceptible, although the process any increase in the view that the size of the city is increasing may have continued (Mousakazemi, 2013). It is so important to know how the current urban development tendencies and how Iranian metropolises can survive in such national and international competitive context and understanding of each metropolis situation to identify weak and strength points. Furthermore, what have been identified, as the effective national criteria can be useful for strengthening cities in the competitive international context. However, this subject requires more empirical and conceptual studies it seems competitiveness has not well shaped in planners and decision makers mind and yet it is like an amorphous concept. Therefore, this research is the following two goals. First, to identify the effectiveness of competitiveness cities on the quality of life between selected cities and the second to assess the situation of the Iranian cities from the view of the quality of life in global system context.

Literature Review

Many studies have been done about competitiveness (Alberti & Giusti, 2012; Charles & Zegarra, 2014; Mendola & Volo, 2017; Mira et al., 2016; Park, 2012; Stanickova, 2015). The theoretical origin of competitiveness concept hints the international trade influence on the national welfare (Voinescu & Moisoiu, 2015). Therefore, technological advancement and the new ways of production in the last two decades have changed the world economic systems with the huge impact on cities and competitiveness become one of the most important concepts of urban and regional planning as a result of knowledge and opportunities that made by rapid information flows from one place to another place. Furthermore, the reason for attention to this concept is the changes in the world economy, population texture, demography, social structures, and activities (Schwab, 2016). The Competitiveness assessment is necessary for any nation that has drawn his goals to obtain and keep the position in the urban and regional competition that mainly characterized by success and ability to successful. Storper 1997 defines the economic competitiveness of regions and cities as economic ability of city for absorbing and maintaining customers with growing or sustainable markets that increase the standard of life of its residents. Aiginger (2006) defined the term of competitiveness as the ability of country or region in welfare creation (Lengyel, 2016). This concept is applicable at different geographical levels from micro to macro. Therefore, the competitiveness scholars believe that cities for attracting investments, population, labor force, budget, tourist and other sectors should be competitive. Therefore, urban competitiveness includes a situation that makes a city or region interesting in comparison to their rivals (Cibinskiene et al., 2015).

Always, policymakers and regional drivers are looking for an agreement in order to increase the socio-economic success of a city or region. Many studies have shown that the success of a place is related to its competitiveness (Murray, 2011; Begg, 1999; Wood, 2009; Herrschel, 2020). There is a consensus on whether the economic status of the regions plays a key role in regional development and competitiveness and the other criteria do not play a role in competitiveness. Identification of the quality of life is one of the most fundamental indicators of development, especially human development, which can play a significant role in increasing regional and urban competitiveness (Alberti & Giusti, 2012). In the Future Vision of the Islamic Republic of Iran in the Horizon of 1404 (2025), have been considered a role for cities in the regional, national, transnational and international levels. The 1404 vision is known as a one of the long term visions drafts in Iran planning system. This 20 years plan calibrated entire 2025-2045 development plans. The determined aims and objectives of this vision are to be achieved by implementing four development plans (five-year plans) which the 4th Economical, Social, and Cultural Development Plan (2004-2009) has already been approved and started (Atafar et al., 2009). Therefore, measuring the competitiveness is way to determine the success of cities in terms of socioeconomic dimensions is about their successful experience of transformation in such competitive world. As Catree 2003 pointed out that, the transformation of the meaning and concepts of place under globalization makes place more interconnected by global economic, political and cultural processes. Urban as the most important inhabit place by human has made the

quality of life and these are all about power of place (Carmona, 2019) and values, meanings, and goods they offer (Movahed & Jafarpour Ghalehteimouri, 2019). Therefore, it is necessary to determine the status of cities and regions in the micro and macro levels for entering to the transnational and international levels, such rapidly urbanized world that cities have been being diluted in the international system which make them increasingly exposed to be influenced by the effects of the globalization

Competitiveness

Competitiveness relates to competing which shows the overall capacity of individuals, corporations, universities, schools, economy or areas that have capability and ability in the national or international competitions. Indeed, this concept makes cities seek to solve their weaknesses and improve their abilities (Gabor et al., 2012). Back then, the first academic study about competitiveness in 1985 was in the research symposium of economic faculty at Harvard University. A book that published as a result of this symposium considered two main ideas: First, defined competitiveness as a national level and second one defined the standard of living as an early indicator of competitiveness. There are some valuable efforts in this realm of science (Parkinson et al., 2004; Lever, 1999; Batty et al., 1995) studies. The spirit of competitiveness is important in competitiveness. The Oxford dictionary has given the best definition of this concept as having insisted on winning. When planners and consultants are talking in the field of competitiveness, they believe that external goals of competitive activities and direction of the all policies and resource are toward to achieve goals. Therefore, all want to measure performances of some cities against other cities. This action creates a system of ranking among cities. Competition between cities backs to the commercial cities in the sixteen century. Cities like New York, Philadelphia, and Baltimore have been in competition in the USA for expanding their access to the west of the country. Barcelona, Marcy, and Genova for being the Mediterranean gateway were in competition.

During the twenty century and from the beginning of the current century because of goods standardization, a decrease in costs of transportations and technological advancements that caused decreases in costs, cities started to compete for with each other. Internationalization and markets integration increased competition (Schwab, 2016). Metropolises competitiveness depends on the destination abilities for attracting socio-economic factors or in other words keeping and improving a position during the time. Although, competitiveness is a capacity in cities which deals with complex role of city in national and trans-national level, have positive impacts on the socio-economic aspects of cities or countries in a long time. According to European Union (1999), competitiveness concept is related to the abilities of corporations, industry, regions, nations and transnational regions for production and transfer to the international system of competitiveness, high rate of income and employment. Many factors in the competitiveness of cities from different socio-economic aspects such as human capital, Technology, Sustainability, innovation, and economic growth are involved (Peng & Zhanxin, 2011). By increasing of urbanization ratio, it is necessary to improve the competitiveness of a city in order to socio-economic development. Nowadays, it is clear that re-

gions maybe put their competitiveness based on different aspects of the economy, social, cultural and environmental sections. Barcelona, Toronto, Berlin, Bilbao, Glasgow, Denver, and Petersburg are the prime examples. These cities are trying to compete in the tourism section. USA, England, France, and Australia are examples of countries that are in competition for absorbing the students (Sasanpour & Hatami, 2017).

Quality of Life

The quality of life are in different disciplines of studies such as international development, political science, healthcare, environment, education, tourism and urban development (Mostafa, 2012; El-Din et al., 2013). The quality of life has been challenged both developing and developed countries by terms of traffic, unsuitable land use, environmental issues, lack of facilities, air pollution, hazes, and the lack of place identity and so on. Assessing in the definition of quality of life shows that there is no common definition because of its dynamic and complexity (Craglia el al.,2004 & Schweikart, 2004; Madakam et al., 2017; Serag El-Din et al., 2013). In other words, definition of quality of life depends on the network approach (Serag El-Din et al., 2013). Longman dictionary defined quality as goodness or badness of thing and defined the quality of life as the rate of satisfaction from life both in material and spiritual sections (Longman Dictionary, 2011). Oxford dictionary defined the quality of life as a standard of life from health, security, happiness that experienced by person or group of individuals (Oxford Dictionary, 1989).

However, quality of life is a subjective and objective concept that is different from time to place. WHO defined the quality of life as full access to social, physical and mental welfare (Madakam et al., 2017). Meeburg defined the quality of life as satisfaction from life and Ferrans defied as a person feeling from welfare that comes from satisfaction or dissatisfaction form life (Poradzisz & Florczak, 2013). The emergence of the concept of quality of life is equal to human existence. Also, the human effort suggests this for many years to improve the quality of life (Higgins & Campanera, 2011:290). The Philosopher such Aristotle and other scientists have noted the quality of life in their philosophy. In utopia plans also indicate human efforts to improve quality of life. Assessing different definitions of quality of life indicate that this concept related to the satisfaction feeling from everything that a person dealing with. The satisfaction obtained from the quality of services citizens get from transportation, climate, and health, and emergency facilities, environment. Quality of life has three social, economic and environmental circles (Chen et al., 2016) and seven dimensions such as urban environment, urban physical life, urban transportation, urban social life, urban phycology, urban economy, urban politic life. New urbanization, Smart growth, urban village, and smart urbanization are also theories that announced the quality of life. However, scientifically quality of life in the field of urban planning is the results of Brunt land report (Serag El-Din et al., 2013). But the quality of life after the second war with fast urbanization and globalization were used (Chen et al., 2016). Nowadays, it is believed that quality of life definition is different for different individuals. In other words, it is a positional concept that depends on the different approaches, can be interpreted differently. Thus, academicians and policymakers are in agree-

ment that for a better understanding of this concept, the main effective factors should be recognized. Generally, quality of life is a quantitative and qualitative concept between people and community. Some of the qualitative factors of people are life satisfaction, happiness feeling, and some of the communities qualitative factors are the ability to participate and effectiveness, the correlation between people and community. In other words, quality of life is a two-dimensional matrix (Mostafa, 2012). In the other side, The United Nations regards the quality of life with the concept of a sustainable city that needs to meet the needs of citizens in social, economic, environmental and physical dimensions. Therefore, this concept has the main effect on the social, economy, and environment, politic trends in the urban, regional and even in the national levels. By using the concept of quality of life, can have fully understood from current and existence trends in society from different dimensions (Turkoglu, 2015).

In this research, for proposing a framework to measure the urban quality of life competitiveness Applying framework, required information gathered from world cities information center (NUMBEO https://www.numbeo.com/). ELECTRE III (ELimination Et Choix Traduisant la REalité, in French) is an effective comparative decision making method., Coefficient of variation and Entropy Shannon were used. Figure 1 shows the research method.
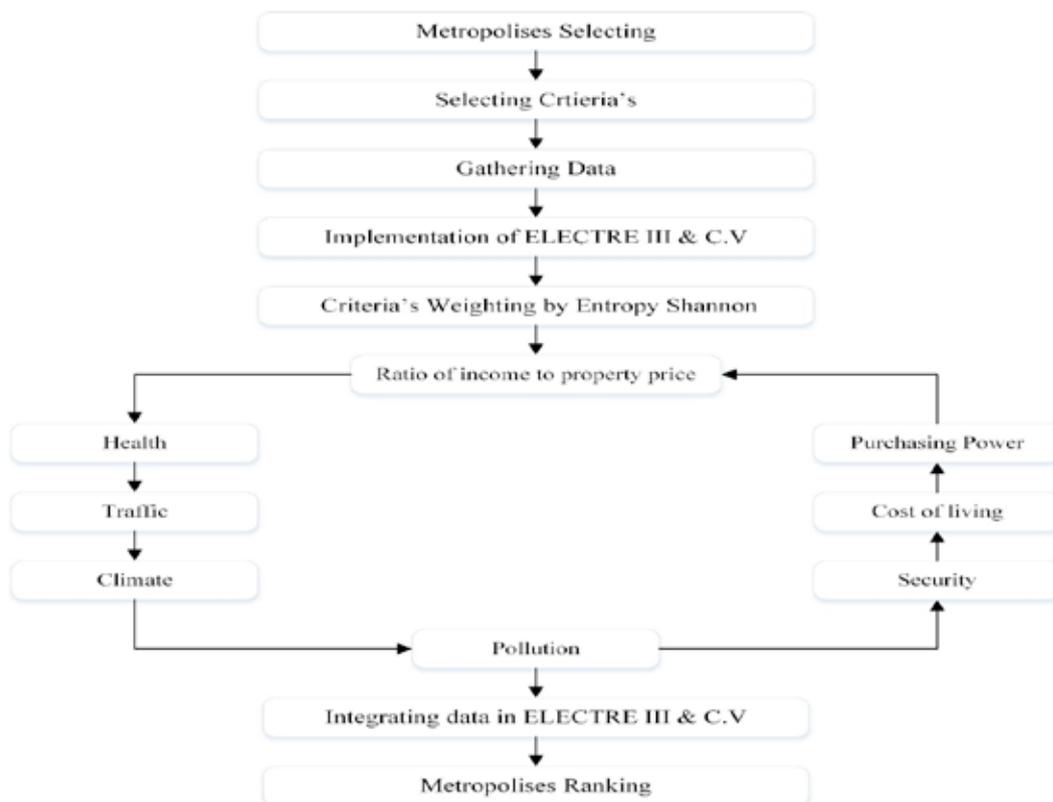

Figure 1. Quality of Life Competitiveness Measurement Framework.

Metropolises selection were based on population from last national consensus (2016) of Iran. We used 1 million people for metropolises. Based on this criteria

eight cities (Tehran, Mashhad, Isfahan, Karaj, Shiraz, Tabriz, Ahwaz and Qom) selected as metropolises. Generally, development in Iran follows the ecological fundamentals. Therefore, most of the metropolitans in Iran located in the western part of Iran and Mashahd the only metropolis in the eastern part. Qom and Karaj used to be part of Tehran and their developments not only was because of their religious (Qom) and pleasant environment (Karaj), also as result of Tehran sprawl. In this study we analyzed 6 metropolis out of ten. Then data about mentioned metropolises gathered from NUMBEO. Eight criteria's such as Purchasing Power, Security, Health, Climate, Cost of living, Rate of income to the property prices, Traffic and Pollution were studied. Research method indicated in figure 1 and Figure 3's table indicate the metropolises data (figure 2.).
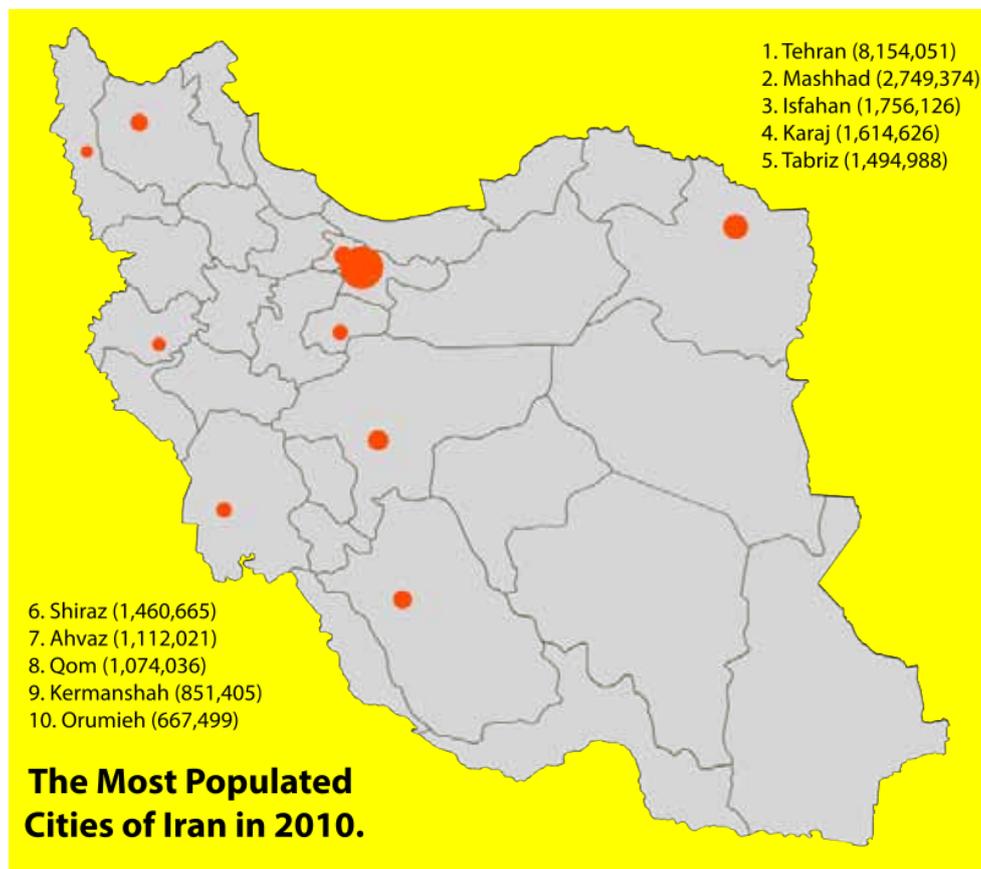

Figure 2. The most populated cities and metropolitan areas in Iran. Source: Iran statistical center https://www.amar.org.ir/english.

Factors	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Purchasing power	35.62	34.25	35.8	38.05	36.53	33.54	41.77	35.21
security	45.85	67.46	57.23	49.17	60.81	69.22	48.37	44.53
health	52.36	43.52	45.67	47.22	52.45	41.25	56.35	25.23
climate	69.75	65.78	39.42	59.22	55.78	53.47	63.45	67.23
Cost of living	60.9	62.52	64.01	67.01	68.03	69.45	65.78	65.03
Income to property prices	86.08	93.5	91.1	90.57	84.93	88.5	90.15	89.62
Traffic	45.22	71.9	70.46	69.89	56.67	70.46	66.67	51.67
Pollution	14.16	27.87	8.67	18.82	39.86	30.42	42.64	11.21

Figure 3. Table showing the metropolises quality of life data.

ELECTRE III

ELECTRE as one of MCDA methods family was born in Europe in 1960 by Bernard Roy and his colleagues in the SEMA Company (Govindan & Jepsen, 2016). ELECTRE III have been used in many ranking problems (Buchanan ET AL., 1999; Corrente et al., 2017; Vasto-Terrientes et al.,, 2015; Fancello et al., 2014; Chavira et al., 2017; Ghobadipour & Mojarradi, 2015; Hashemi et al., 2016a, 2016b). This method uses to quantify the relative importance of criteria and uses a structural producer to extract the relationship between alternatives. In this method, the researcher can participate directly in the decision process. One other advantage of ELECTRE III is the definition of indifference and preference threshold (Hashemi et al., 2016a). Also, ELECTRE III is based upon pseudo-criteria (Certa et al., 2013) and defines an alternative ranking based on evaluation criteria (Fancello et al., 2014). ELECTRE III algorithm is the following:

Step 1. Formation of decision matrix: According to a number of criteria's and alternatives and assessing all options for different criterion, the decision matrix creates the following:

$$x = \begin{pmatrix} x_{11} & \mathrm{K} & x_{1n} \\ \mathrm{M} & \mathrm{O} & \mathrm{M} \\ x_{m1} & \mathrm{L} & x_{mn} \end{pmatrix}$$

That Xij is the performance of i option (i=1, 2…m.) in relation to j criterion (j=1, 2….m).

Step 2. Unscaled decision matrix: in this step criteria's with different aspect converting to unscaled criteria's and R matrix defines as follows:

$$R = \begin{pmatrix} r_{11} & \mathrm{K} & r_{1n} \\ \mathrm{M} & \dots & \dots \\ r_{m1} & \mathrm{L} & r_{mn} \end{pmatrix}$$

There are many ways to unscaled but in ELECTRE III following algorithm uses (Tille & Dumont, 2003):

[1] $$r_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} X_{ij}^2}}$$

Step 3. Determining criteria's weight matrix: according to the relative importance of different criteria's in decision making, matrix defines as follows:

$$\begin{pmatrix} w_1 & & 0 \\ \text{M} & w_2\text{L} & \text{L} \\ 0 & & w_n \end{pmatrix}$$

W matrix is a Diagonal matrix that only elements on its main diameter are none zero and the amount of these elements equal to importance factor of the related vector.

Step 4. Determining normalized decision matrix: this matrix obtains from multiplied unscaled decision matrix to the matrix of criteria's weight as follows:

$$V = R \times W = \begin{pmatrix} v_{11} & \text{K} & v_{1n} \\ \text{M} & \text{L} & \text{L} \\ v_{m1} & \text{L} & v_{mn} \end{pmatrix}$$

Step 5. Formation of Concordance and discordance index: for each pair of options (k, e= 1, 2… m, k≠e) set of criteria j= (1, 2 …, m) divided in tow subset of concordance and discordance. Concordance set (S_{ke}) is a set that option k to option e is preferred and its complementary set is discordance (I_{ke}) as follows:

[2] $$S_{ke} = \left\{ j \,\middle|\, v_{kj} \geq v_{ej} \right\}$$

[3] $$I_{ke} = \left\{ j \,\middle|\, v_{kj} \,\text{p}\, v_{ej} \right\}$$

Step 6. Formation concordance and discordance matrix: this matrix requirement is aggregate index. Aggregate index obtains from a set of weights from the concordance set. Therefore concordance index Cke that is between options is k and e is equal to:

[4] $$C_{ke} = \frac{\sum\limits_{j \in S_{ke}} W_j}{\sum\limits_{j=1} W_j}$$

For sets of normalized weights $\sum W_j$ equal with one, then:

[5] $$C_{ke} = \sum_{j \in S_{ke}} W_j$$

Concordance index indicates the amount of preference k option to e option that its amount varies from 0 to 1. By calculating the concordance index for all pairs options can define concordance matrix that is an m*m matrix as follows:

$$\begin{pmatrix} - & c_{12} & K & c_{1m} \\ c_{21} & - & K & c_{2m} \\ M & M & - & M \\ c_{m1} & K & c_{m(m-1)} & - \end{pmatrix}$$

Discordance index defines as follows:

[6] $$d_{ke} = \frac{\max\limits_{j \in I_{ke}} \left| v_{kj} - v_{ej} \right|}{\max\limits_{j \in I} \left| v_{kj} - v_{ej} \right|}$$

The amount of discordance index varies from 0 to 1. By calculating the discordance index for all pairs of options can define discordance matrix that is an m*m matrix as follows:

$$D = \begin{pmatrix} - & d_{12} & K & d_{1m} \\ d_{21} & - & K & d_{2m} \\ M & M & - & M \\ d_{m1} & K & d_{m(m-1)} & - \end{pmatrix}$$

It is necessary to mention that there is a big difference between concordance and discordance matrix and indeed this information are each other complementary. The difference weights obtain from concordance matrix, in another side, the difference between amounts obtains from discordance matrix.

Step 7. Formation dominant concordance and discordance matrix: in step 6 calculating concordance index mentioned. In this step, a precise amount for concor-

dance index that its name is concordance threshold and marked by $\bar{c}$. If c_{ke} was bigger than $\bar{c}$, preference of k option to e is acceptable. Otherwise k option preference to e option is not acceptable. Concordance threshold calculated as follows:

[7]
$$\bar{c} = \sum_{\substack{k=1 \\ k \neq e}}^{m} \sum_{\substack{e=1 \\ e \neq k}}^{m} \frac{c_{ke}}{m(m-1)}$$

Dominance concordance matrix (F) forms according to concordance value threshold that its members recognize as follows:

[8]
$$f_{ke} = \begin{cases} 0 & c_{ke} \geq \bar{c} \\ 1 & c_{ke} \; \mathrm{p} \; \bar{c} \end{cases}$$

Step 8. Formation of discordance matrix: discordance matrix (G) forms as like as concordance matrix. For this purpose first discordance threshold must mention by decision maker that can be average of discordance index, which means:

[9]
$$\bar{d} = \sum_{\substack{k=1 \\ k \neq e}}^{m} \sum_{\substack{e=1 \\ e \neq k}}^{m} \frac{d_{ke}}{m(m-1)}$$

As mentioned in step 7, whatever discordance matrix was smaller, is better, because of the value of discordance indicates preference of k option to e option. Therefore if the value of d_{ke} was bigger than $\bar{d}$, the value of discordance was big and it cannot be considered expedient. Therefore, dominant matrix discordance elements (G) calculate as follows:

[10]
$$g_{ke} = \begin{cases} 0 & d_{ke} \; \mathrm{f} \; \bar{d} \\ 1 & d_{ke} \leq \bar{d} \end{cases}$$

Every member of G matrix also indicates dominant relations between options.

Step 9, Formation of the final dominant matrix. This matrix (H) obtains form F matrix multiplication to G matrix.

[11]
$$h_{ke} = f_{ke} \cdot g_{ke}$$

Step 10. Removing the alternatives with less satisfaction and selecting the best alternative: H matrix indicate options preference, for example, if value of h_{ke} Equal to 1, this means that k preference to e option in both concordance and discordance is acceptable (that means, that's preference was bigger than concordance threshold and disagreement or its weakness is smaller than discordance threshold) and thus K option has a chance to dominant with other options. An option should be chosen to dominate more than being defeated, and the options can be ranked in this respect.

Entropy Shannon

Entropy indicating uncertainty of an information in a probabilistic distribution. The main idea of this method is that whatever amount of dispersion in an index value was more, that index is important. This method's algorithm is as follows (Yang, Xu, Lian, Ma, & Bin, 2018):

Step 1. Formation of decision matrix: Calculation of decision matrix is as follows:

$$[1] \quad P_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} X_{ij}}$$

Step 2. Determining Ej amount as follows:

$$[2] \quad E_{j} = -K \sum_{i=1}^{m} P_{ij} Ln(P_{ij}) = -\frac{1}{Lnm}$$

Step 3. Determining each criteria weight as follows:

$$[3] \quad W_{j} = \frac{d_{J}}{\sum_{i=1}^{n} d_{i}}$$

The Coefficient of Variation (C.V.)

The coefficient of variation (C.V.), shows the pattern of data distribution in a geographical area and for comparing dispersion of two or more things were used. The high amount of C.V. indicates an inequality in the distribution of the factors. In this formula, C.V., S, and M indicate respectively the Coefficient of Variation, Standard deviation and Mean(Verrill and Johnson 2007).

$$[1] \quad CV = \frac{S}{M}$$

Application and Discussion

Figure 4 has a table representing the results of C.V. for criteria's. Criteria that have the highest value is the most effective criteria in the ranking of metropolises.

Criteria	Value	Rank
Traffic	0.276	1
Income to Property Price	0.258	2
Health	0.211	3
Security	0.176	4
Pollution	0.171	5
Climate	0.165	6
Cost of living	0.082	7
Purchasing Power	0.071	8

Figure 4. Values of Coefficient of Variation.

As figure 4 shows, traffic, income to property price and health respectively located from 1-3 rank that have the most effect in the metropolises ranking. The lowest effectiveness is related to the climate, cost of living and purchasing power.
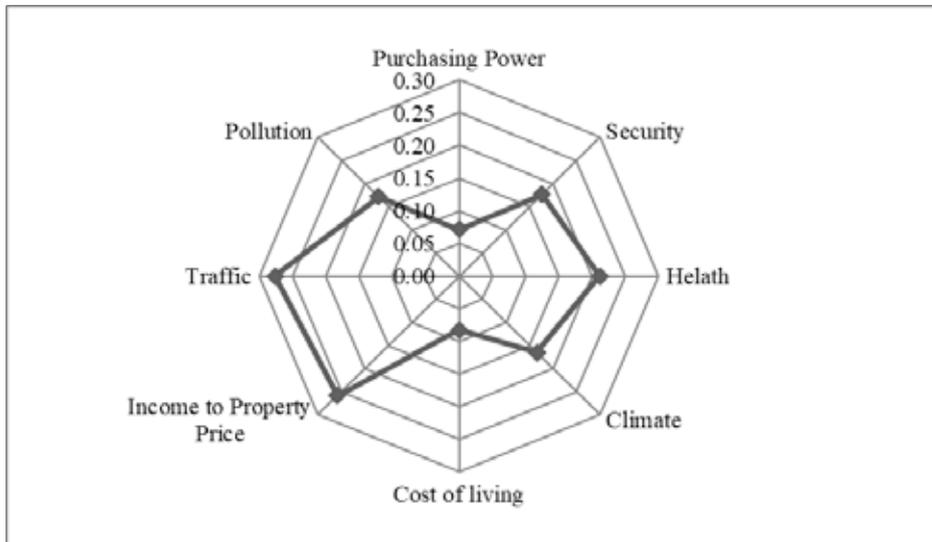

Figure 5. Criteria's Coefficient of Variation.

After determining effective factors in the quality of life competitiveness, ELECTRE III implemented the following stages:

Step 1 - Creation of decision matrix: required data of research after gathering standardized and entered into the matrix (Table in figure 3).
Step 2 - Normalization of decision matrix: Criteria's according to 8*8 matrix (Xij) after standardization creating Normalization Matrix (R).

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Purchasing Power	0.346	0.332	0.347	0.369	0.355	0.326	0.405	0.342
Security	0.289	0.425	0.361	0.31	0.383	0.436	0.305	0.281
Health	0.398	0.331	0.354	0.359	0.399	0.314	0.428	0.192
Climate	0.411	0.388	0.232	0.349	0.329	0.315	0.374	0.396
Cost of Living	0.329	0.338	0.346	0.362	0.368	0.375	0.356	0.352
Income to Property Prices	0.341	0.37	0.361	0.358	0.336	0.35	0.357	0.355
Traffic	0.251	0.4	0.392	0.389	0.315	0.392	0.371	0.287
Pollution	0.185	0.364	0.113	0.246	0.52	0.397	0.557	0.146

Figure 6. Table of the Normalization Matrix.

Step 3 - creating criteria's weighting matrix: for indicating the relative importance of criteria's entropy Shannon was used. Table 4 shows the relative weights of criteria's.

Criteria	Weight
Purchasing power	0.011
Security	0.069
Health	0.112
Climate	0.066
Cost of Living	0.004
Income to Property Prices	0.002
Traffic	0.063
Pollution	0.671

Figure 7. Table of obtained weights of criteria's from Entropy Shannon.

Step 4 - creating normalized weighted decision Matrix (V): indeed this matrix obtained from multiple by the standard values of each criterion in the weights corresponding to the same criterion (Figure 8).

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Purchasing Power	0.00388	0.00373	0.00389	0.00414	0.00397	0.00365	0.00454	0.00383
Security	0.02019	0.0297	0.0252	0.02165	0.02678	0.03048	0.0213	0.01961
Health	0.04463	0.0371	0.0397	0.04025	0.04471	0.03516	0.04803	0.02151
Climate	0.02723	0.02568	0.01539	0.02312	0.02177	0.02087	0.02477	0.02624
Cost of living	0.00142	0.00146	0.00149	0.00156	0.00159	0.00162	0.00153	0.00152
Income to Property Prices	0.00074	0.00081	0.00079	0.00078	0.00073	0.00076	0.00078	0.00077
Traffic	0.01587	0.02524	0.02473	0.02453	0.01989	0.02473	0.0234	0.01814
Pollution	0.12407	0.2442	0.07597	0.1649	0.34925	0.26654	0.37361	0.09822

Figure 8. Table of the weighted normalized decision matrix.

Step 5 - Creating a Positive (Agreement) and negative (Disagreement) criteria set: criteria that have high value is positive and desirable but negative criteria is criteria that have less value (Figure 9).

Criteria	Type of Criteria
Purchasing power	Positive
Security	Positive
Health	Positive
Climate	Positive
Cost of Living	Negative
Income to Property Prices	Negative
Traffic	Negative
Pollution	Negative

Figure 9. Table of positive and negative criteria determination.

Step 6 - Creating Positive and Negative Matrix: in a pairwise comparison of positive criteria, if a positive criteria value was more than other criteria's, the weight of that criterion is considered positive, but if it's value was less than other criteria's value, that criterion considered negative. In the negative criteria's, if the value of negative criteria was more than other criteria's, that criteria weight as negative and if it was low, it is considered positive.

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Karaj	0.070	0.082	0.742	0.066	0.068	0.080	0.066	*
Shiraz	0.934	0.799	0.865	0.861	0.926	0.863	*	0.934
Qom	0.810	0.745	0.875	0.808	0.139	*	0.137	0.920
Isfahan	0.932	0.799	0.935	0.857	*	0.861	0.074	0.932
Mashhad	0.822	0.128	0.865	*	0.143	0.192	0.139	0.934
Ahwaz	0.151	0.128	*	0.135	0.065	0.189	0.135	0.258
Tabriz	0.810	*	0.872	0.872	0.201	0.255	0.201	0.918
Tehran	*	0.190	0.849	0.178	0.068	0.190	0.066	0.930

Figure 10. Table of positive (Agreement) matrix.

In this step negative matrix calculated. Negative matrix obtained from the sum of a set of negative criteria's in the pairwise comparison.

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Karaj	1	1	0.817	1	1	1	1	*
Shiraz	0.010	0.065	0.013	0.005	0.225	0.086	*	0.005
Qom	0.066	0.215	0.024	0.050	1	*	1	0.032
Isfahan	0.024	0.051	0.018	0.025	*	0.059	1	0.018
Mashhad	0.107	1	0.040	*	1	1	1	0.047
Ahwaz	1	1	*	1	1	1	1	1
Tabriz	0.063	*	0.015	0.040	1	1	1	0.004
Tehran	*	1	0.184	1	1	1	1	0.088

Figure 11. Table of negative (Disagreement) matrix.

Step 7 - Creating Dominant positive matrix: in this step, a certain amount for the agreement will be specified, which will be called the threshold of agreement and marked by $\bar{c}$. In the positive matrix, if existence amount in the comparing options was higher than the threshold Agreement, value 1 and if it was less than Threshold, value 0 will obtain. In this research threshold agreement is the following:

$\bar{d}$ = 28.06/56 = 0.501.

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Karaj	0	0	1	0	0	0	0	*
Shiraz	1	1	1	1	1	1	*	1
Qom	1	1	1	1	0	*	0	1
Isfahan	1	0	1	1	*	0	0	1
Mashhad	1	0	1	*	1	1	1	1
Ahwaz	0	0	*	0	0	0	0	0
Tabriz	1	*	1	1	0	0	0	1
Tehran	*	0	1	0	0	0	0	1

Figure 12. Table of dominant positive matrix.

Step 8 - creating a dominant negative matrix. As same as step 7, by calculating the negative threshold, Negative dominant matrix created. In this research negative threshold is the following: $\bar{d}$ = 30.40/56 = 0.542.

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Karaj	0	0	0	0	0	0	0	*
Shiraz	1	1	1	1	1	1	*	1
Qom	1	1	1	1	0	*	0	1
Isfahan	1	1	1	1	*	1	0	1
Mashhad	1	0	1	*	0	0	0	1
Ahwaz	0	0	*	0	0	0	0	0
Tabriz	1	*	1	1	0	0	0	1
Tehran	*	0	1	0	0	0	0	1

Figure 13. Table of dominant negative matrix.

Step 9 - Creating final dominant matrix: this matrix obtains is obtained by multiplying the cells of the matrix of dominance.

	Tehran	Tabriz	Ahwaz	Mashhad	Isfahan	Qom	Shiraz	Karaj
Karaj	0	0	1	0	0	0	0	*
Shiraz	1	1	1	1	1	1	*	1
Qom	1	1	1	1	0	*	0	1
Isfahan	1	1	1	1	*	1	0	1
Mashhad	1	0	1	*	0	0	0	1
Ahwaz	0	0	*	0	0	0	0	0
Tabriz	1	*	1	1	0	0	0	1
Tehran	*	0	1	0	0	0	0	1

Figure 14. Table of final dominant matrix.

Step 10 - Overcome matrix- The last step is to remove options with less satisfaction and choose the best option. The option should be chosen to dominate more than being conquered, and the options can be ranked in this regard. Based on this matrix, the number of times each control is computed. According to Figure 15's table, the metropolitan area of Shiraz is ranked first in terms of quality of life. The lowest quality of life in the Ahwaz metropolis. The metropolis of Isfahan, Qom, Tabriz, Mashhad, Tehran, and Karaj are ranked second to seventh respectively.

Overcome (N)	Name	R
7	Shiraz	1
6	Isfahan	2
5	Qom	3
4	Tabriz	4
3	Mashhad	5
2	Tehran	6
1	Karaj	7
0	Ahwaz	8

Figure 15. Table showing the overcome matrix.

Conclusion

According to the coefficient of variation (C.V.) analysis the most important criterion in Iran have shown traffic 0.276 , Income to Property Price 0.258, Health 0.211, Security 0.176, Pollution 0.171, Climate 0.165, Cost of living 0.082, and Purchasing Power 0.071. While the cost of living and purchasing power because of the same situation of the population in terms of income have no main effects. Hence, metropolis ranking demonstrates that in terms of quality of life Shiraz placed on the first level and Ahwaz at the last level. Isfahan, Qom, Tabriz, Mashhad, Tehran, and Karaj respectively ranked from second to seventh. Tehran as the capital city with the highest population concentration does not have enough competitive power against other metropolises and for entering into the international system require deliberate attention to the effective factors of quality of life. In addition, a metropolis with less population in terms of quality of life can be used in order to enter the international system of competitiveness. As results, the capacity of competitiveness in sustainable cities is more than other cities.

From globalization, cities are trying to obtain a position between metropolises in the international system. Each of cities following specialty and introducing himself in the local, national, regional and transnational level. Nowadays, it is necessary to have competitiveness in different levels if a city wants to enter into the international system. Competitiveness in the economy, social, environmental and technological and in different other related fields is very necessary. Level of quality of life is one of the important criteria's for assessing metropolises from the view of social welfare or social and welfare competitiveness. Every year, different

international organizations reporting statistics about situations of world metropolises from different view such, livability, happiness, clearance and so on. According to the importance of the issue, this research aimed at proposing a framework to assess metropolises competitiveness form view of the quality of life. For this reason, eight metropolises of Iran based on their population (1 million) have selected. Results indicate that between case study metropolises, commuting time or Traffic, the ratio of income to property price and health are the indicators that have caused most inequalities between metropolises. In another word, the most effective indicators for living in Iran metropolises were Transportation, housing, and health. Criteria's like security, pollution, climate, cost of living and purchasing power are located in the next orders respectively. That is why purchasing power placed in the lowest level or less effective criteria in choosing metropolises for a living, it can be said that most of Iran people are in the same condition. The leveling results indicate that in terms of quality of life criteria's Shiraz is placed in the first level. Isfahan, Qom, Tabriz, Mashhad, Tehran, Karaj, and Ahwaz are ranked respectively in second to Eights. The results also indicate that Tehran's metropolis is ranked 8th out of 10th as the capital of Iran, which has little competitive ability in terms of quality of life at the domestic level Which is contrary to the objectives of the 1404 (2025) vision document, which has set international roles for Tehran.

Final conclusion indicates that the concentration of a large part of the development budget in the Tehran metropolis leads to the loss of capital, which can be attributed to the quality of life through the allocation of investment funds to low-income metropolises, and in particular the middle-sized cities. Therefore, planners and policymakers in the urban area need to rethink their approaches to urban and metropolitan development. The importance of this in the UN report also indicated that future urban growth would be in middle and small cities. What emerges from the results of this study is that with the decline in population in each metropolis, the quality of life rises. In other words, the quality of life of metropolises in Iran is inversely proportional to the population, which indicates the lack of balanced development in various social, economic and environmental areas of city. In another side it is clear that MCDA methods especially ELECTRE III, Coefficient of Variation and Entropy Shannon are useful tools for measuring the urban quality of life competitiveness.

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