# EVALUATING URBAN SERVICE ACCESSIBILITY IN THE MEDIUM SIZED CITIES OF IRAN

**Sedigheh LOTFI**

*University of Mazandaran, Mazandaran,  Iran*
*s.lotfi@umz.ac.ir*

**Ayoub MANOUCHERI MIANDOAB**

*University of Tehran, Tehran, Iran*
*ayub.manochehri@gmail.com*

**Abstract**

It is a long tradition in urban planning that objective factors are used for study of urban life. However, this approach could be useful in first place to illustrate the level of resident's satisfaction and their environmental quality of life. But the reality is that concentrating only on the objective characteristics regardless to the subjective characters could be misleading because researches show that an objective quality necessarily does not mirror the subjective one. The present paper focuses on both objective and subjective criteria to measure quality of life in the city of Maragheh. Thus, regarding to the scarcity of research on smaller cities of Iran the research tries to examine urban accessibility to public space. The methodology of the research is based on descriptive-analytical methods which applied TOPSIS and FUZZY logic in GIS extension 9.3. The results revealed that the new parts of the city showed considerable differences by objective and subjective accessibility. Also, the findings of the study accentuated the importance of integrated objective-subjective dimensions of accessibility to proper understanding of urban quality of life to distribute main urban facilities by urban planners and designers.

**Keywords**: quality of access, objective- subjective aspect, public space, urban planning

## 1. INTRODUCTION

Study of quality of life has captivated widespread attention in recent years among the various fields including sociology, economics, psychology, urban planning, geography, political science, marketing and management. But these researches have been conducted in different scales and various methods were used to measure the quality of life. However, no comprehensive framework has been presented for studying quality of life on an integrated physical, social and spatial measure (Kamp et al, 2003). There is no an inclusive definition for it due to diverse perception by different classes or persons (Bond & Corner, 2004). Also, quality of life often is measured using objective or subjective approaches separately without combining two these approaches (Lee, 2008). Subjective approaches are measured by gauging people's perception, satisfaction and attitudes towards urban life (Campbell, 1976).

Subjective indexes are defined on the basis of ambitions and expectations (Das, 2005) which is characterized by individuals and groups as mental wellbeing. These indexes are reported by peoples on the base of their understanding about different aspects of life and their satisfaction to meet their needs. Such indexes may range from socio-economic to physical indicators displayed in their living areas.

Urbanization is growing, as the most recent census shows . 68 percent of country's total population live in urban areas in 2006 while this figure was only 10 percent in the beginning of 20th century. The main consequences of such growth have been the formation of three different physical structures. Firstly, the old texture or historical part which dominantly comprises the central core of the cities. This area, developed after Islamic era grown organically and is known as Iranian-Islamic texture (Soltanzade, 1986). Secondly, a new texture surrounded the old parts and has developed inconsistently around the cities. This type of urban growth owed its form to modernism which penetrated in the country from 1976 onwards gradually (Aaeednia, 2000) also land reform, mechanization of agriculture, growth of assembly industries and increased use of automobiles transformed the traditional urban areas and paved the way for creation of iron web form in the new expanded areas. Third, a rural texture in the adjacent parts which will merge into cities, however due to their particular socio-economic characters they still managed to stay independent physically from the city.

Today, in one hand, the main aim of planners is the integrated and qualitative development of cities and in the other hand, new urbanism concentrate on the development of small communities like neighborhood units. It worthy to mention that there are a long history of sovereignty of the Iranian urban neighborhoods as many old neighborhoods have preserved their social entity.  The aims of the research are as follow:

a) Importance of accessibility to public spaces and their usage

b) Measuring objective and subjective accessibility to neighborhood facilities

c) Comparing the results of both approaches in the neighborhood level

d) Comparing the results of accessibility quality in the three different parts of the city

To measure the objective accessibility to the neighborhood facilities ArcGIS was applied and the subjective accessibility for neighborhood facilities and their quality was measured via conducting a field work by completing questionnaires and TOPSIS model for the final analysis.

### 1.1. Defining public space

Public space is an environment which all people regardless to their socio-economic status can enter and be present without any restrictions, and in the vision of many scientists the space element is an integral part of each society which could not be perceived in the form of isolated social relations (Afrogh, 1998). In fact urban space is a physical and material setting with social and psychological dimensions (Madanipour, 2003). Urban space is a scene where collective life can form and there is an opportunity for breaking social boundaries which facilitate communication among the people (Lynch, 1976). The main role of urban space is the provision of amenities to facilitate human relations with each others. Urban space by accelerating the citizenship relationships through sense of place (physical aspects of the built environment) and the society (facilitating acts through human interaction together) will inject the civil life to the fabric of cities (Habibi, 1999). Urban spaces include a wide range of public and private spaces which every activity or behavior has its own territory and privacy; reciprocally each space has also its own dignity and privacy. Spaces in the city can be divided in terms of how to use them into three categories (Pakzad, (2006)):

a) Private spaces: Parts of urban spaces which are under possession of individuals such as homes, private courtyards and gardens.

b) Semi-private or semi-public spaces: those spaces which are used by certain groups due to limitations in use and goal such as residential areas, sport stadiums and exhibitions.

c) public spaces: A public space is a social space such as a town square that is open and accessible to all, regardless of gender, race, ethnicity, age or socio-economic level such as streets, parks, squares, markets, mosques. These spaces due to their broad functions have wide range of contacts and highest share in the collective life of society.

### 1.2. Public spaces and its impact on the urban quality of life

Public space consists a vital part of our daily life in cities; streets where we cross to reach our work place, school or university. Parks are the places where children play and enjoy from nature and wild life. In other words anywhere which free us even for few moments from crowded areas may be found in such public spaces. Lipton (2003) describes public space as "outdoor living room" and "recreation center and outdoor leisure". Public spaces are spaces that we get to share with strangers, who are not our relatives or friends and colleagues. These spaces are as places for our political activities, religious practices, business, etc. Public space sets territory for peaceful coexistence, non-personal encounter and our public life (Walzer, 1986). Public space is the scene that social life is performed under the

prospect of all citizens (Rafiayan, & Sifiyaee, 2005). However the role of public spaces are evident in the city's integrity and homogeneity but the high quality and urban positive life in streets and open spaces, is a precondition for the community, so that enables people to enjoy social interactions. Losing public space in cities leads to social consequences which Atkinson and Blandy call as decline of urban social relations (Atkinson & Blandly, 2005). This may have some impacts on citizens as existence of public space could be relevant to performance of public activities (Smith & Low, 2006). Public spaces in the city provide the public participation and make them linked together; Mumford emphasized on social cohesion and face to face interactions, mobility of ideas and aesthetic significance of urban spaces and rejected unilateral communication and self-centered fostering. On this basis, he opposes with private spaces because in that case social values are ignored, and ultimately more urban people isolate and collective life loses its importance (Pakzad, (2006). So the basic requirement for a public space of urban space is social interaction and conflict, on the same principle. Regardless of some uncertainties in defining, the public space can be beyond the area controlled by small groups and individual between private spaces, and is space for a range of functions, often used for common and symbolic goals (Madanipour, 2003). On the base of Ardalan's definition, in the Iranian old culture, public space includes public gardens, passages or crossings, streets, business complexes (Ardalan, 1980). However, this definition neglected squares in Islamic cities as the element and node socio-economic and political activities (Alizadeh, 2007). Kostof believed believes that public spaces are well defined in Islamic cities, for him such spaces include streets, squares, mosques and cemeteries (Kostof, 1992). It would be interpreted that public space concentrates on access to places without restrictions and diverse activities which results to social interaction. But today public spaces are disappearing and losing their key role in the process of infill planning in Iran, so that many of Iranian urban neighborhoods have less open spaces compared to the last two or three decades.

### 1.3. Public space accessibility and the quality of life

Communication networks account a large percentage of cities which are very important join to blocks and locations to each others, as Lynch believes that one of the advantages of city relates to the provision of good access. Appropriate traffic channels, communication paths, streets, alleys, subway route, bike path and walking with good quality invite citizens. Accessibility, public space and physical structures are among the issues under pressure of rapid urban growth. Public spaces such as neighborhood parks or public gardens are important and unique elements of the cities (Pasaogullari & Doratli, 2004). The link between public spaces, walking and the face to face communication does not happen, unless a proper system of communication, walking, leisure and shopping which result to social

dealings in urban life. So the quality of communication networks has a determinant role in citizen satisfaction and efficiency of the city. Road networks with different scales link all parts of a city, if this connection take place easily it leads to qualitative promotion of the city. Tibbalds on being accessible urban environment and its use by all people writes: We need more than ever trying to create urban environment with less obstacles (Tibbalds,1992). One of the spatial dimensions of considering to accessibility in public level is the easy access from one location to another. There are different measurements which exactly relate to social and physical variables. The link between accessibility and land use has been acknowledged by many researchers in rural and urban environments (Castella et al, 2005; Etter et al, 2006; Hanson, 1986; Laurance et al, 2002; Nagendra et al, 2003; Verburg et al, 2004). Analyzing accessibility is important for spatial equity consideration (Talen & Anselin, 1998). As Gould pointed out accessibility has a broad meaning and is flexible and slippery (Gould, 1969). Simple definition of accessibility is that how fast we can reach from one location to another? This question shows the spatial relation of an origin to destination, or shows the degree of relation between one place to other in a region. But often it is defined as relative proximity or proximity of one location to others (Tsou et al, 2005). During the few past decades the concept of accessibility was used in several contexts such as; public amenities, health services, public facilities, shopping centers etc (Nicholls, 2001; Talen, 2002; Cho, 2003; Luo & Wang 2003; Talen, 2003). In fact there is a positive and direct relationship between public space, accessibility and quality of life in urban neighborhoods, whatever the size of public space increase and access becomes easier, results a positive impact on quality of life in urban neighborhoods.

## 2 METHODOLOGY OF THE RESEARCH

### 2.1. Case Study

Maragheh is one of the oldest cities of Iran. The city was chosen as capital of the country during the Mongol domination by Mongol Holago khan. The city is located in 37° 22' 54" N / 46° 15' 15" E along the river bank of Sofi Chay and the southern slopes of Sahand mount in an area of 2647 hectares, with 1390 meter height from sea level. The city had 149929 population according the latest national census of Iran in 2006. At present, the city is divided into 7 districts and 26 neighborhoods which consisted from tree different urban textures namely old, new and rural structures. In this research three districts with 11 neighborhoods have been selected for measuring the quality of accessibility to urban facilities. These areas have a population of 67958 peoples which cover about 45.56% of the city residents. The main specifications and facilities of the selected districts and neighborhoods are shown in Table 1 and Figure 1.

TABLE1. THE CHARACTERISTICS OF SELECTED NEIGHBORHOODS

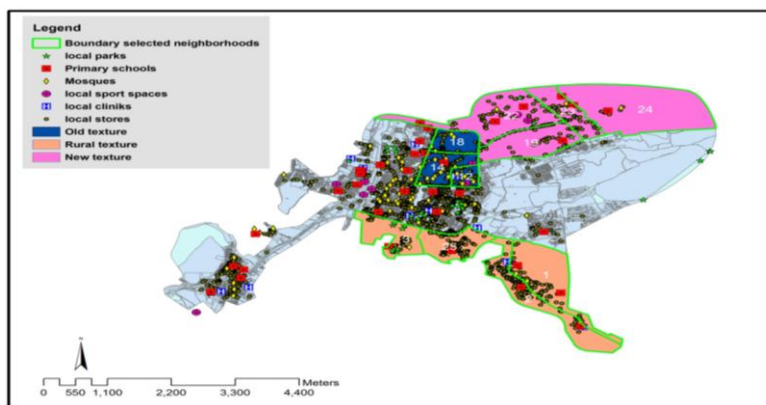| Districts | Neighborhoods | Population | Density | % of city as whole |
|---|---|---|---|---|
| District 6 (new texture) | 22 | 6466 | 252 | 3.82 |
| | 19 | 6481 | 165 | 3.061 |
| | 23 | 5010 | 130 | 6.04 |
| | 24 | 1294 | 194 | 0.84 |
| District as whole | - | 19251 | - | 12.90 |
| District 2 (old texture) | 12 | 4566 | 54 | 3.35 |
| | 18 | 5700 | 78 | 4.34 |
| | 14 | 9022 | 66 | 4.33 |
| District as whole | - | 19288 | - | 12.933 |
| District 4 (rural texture) | 1 | 7375 | 188 | 4.94 |
| | 2 | 7908 | 149 | 5.30 |
| | 25 | 8706 | 84 | 5.83 |
| | 3 | 5429 | 168 | 3.64 |
| District as whole | - | 30455 | - | 20.42 |



FIGURE 1 - STUDY AREA AND DISTRIBUTION OF URBAN FACILITIES

To achieve the research objectives two approaches of objective and subjective criteria were used to measure the quality of facility accessibility.

### 2.2. Objective approach

In this approach, firstly the data of neighborhood facilities (parks, elementary school, daily shopping, mosques, clinics and neighborhood centers, sports) were obtained from municipality as points of destination. Then census blocks of each neighborhood were regarded as points of origins. In the next stage the distance between origins and destinations was calculated using Extension network analysis and ARCGIS 9.3 which our criteria in this method was the amount of proximity of statistical blocks to neighborhood facilities. Fuzzy Logic was used to obtain scores of neighborhoods from minimum accessibility distance to urban facilities which 800 meter was considered as most appropriate distance;

in fact the distance was between 800m and 1200m (full fuzzy).The points more than 1200 meter were calculated inappropriate (fuzzyless).

### 2.3. Subjective approach

Subjective quality of life shows the perception of people about their living status and is measured by subjective indicators. Subjective indicators are based on the people describe and perceive their life (Campbell, 1976). These indicators investigate the expressed level of satisfaction by individuals and groups which called mental well-being (Costanza et al, 2007). Such indicators which are complementary to socio-economic and environmental variables illustrate personal reports of individuals' perceptions and evaluations about their objective life. Subjective quality is often measured by questionnaire survey and interviewing. In this research, the questions were classified in four categories include: accessibility to urban facilities, satisfaction about neighborhood service quality, social and environmental security and the overall feeling towards their neighborhoods. Then the questionnaires were distributed equally in eleven neighborhoods of study. The answers were sorted in five options of very well, good, moderate, low and very low; for easier and clearer comparison these five options were ranked from 5 to 1 respectively. The scores of each neighborhood were calculated by multiplying the share of each option to its weight and the sum of all weights for each neighborhood. Then for better analysis TOPSIS was applied as follow:

a) Normalizing the values

Converting existing raw data matrix into a non-scale matrix using the following equation:

$$R_{ij} = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} X_{ij}^{2}}}$$

J= {1,…,n}          I = {1,…, m}

b) Criteria weighting

Using entropy technique for weighting, firstly the amount of E was computed by equation 2:

(Equ. 2):

$$E \approx s\{P_1, P_2, \ldots P_n\} = -k \sum_{i=1}^{n} \left[ P_i . Ln p_i \right]$$

K is a positive constant and the amount of p for each i and j is obtained from equation 3.

(Eqe3):

$$p_{ij} = \frac{r_{ij}}{\sum\limits_{i=1}^{m} r_{ij}}; \forall i, j$$

And for the Ej of Pij set the equation 4 shows:

(Equ. 4):

$$Ej = -k\sum\limits_{i=1}^{m}[P_{ij}.Lnp_{ij}]; \forall j$$

As equation 5 shows:

(Equ. 5):

$$k = \frac{1}{Lnm}$$

Then the degree of information variance is calculated by Dj for each j index according to equation 6:

(Equ. 6):

$$d_j = 1 - E_j; \forall j$$

The equation 7 is used to calculate the weights of Wj from existing indexes (for all j).

(Equ. 7):

$$W_i = \frac{d_i}{\sum\limits_{j=1}^{n} d_i}; \forall j$$

Then the scale-less of weighted matrix is created by multiplying each similar weight to another similar weight of obtained indices from entropy method.

Vmn=WnRmn          W = {W1,W2,…,Wn}

2.4 Identifying the ideal positive and negative responses

A+={(Max Vij| jεJ),(Min Vij-| jεJ-)|i={1,2,3,…,m})} , J={1,2,3,…,n}

A-={(Min Vij| jεJ),(Max Vij-| jεJ-)|i={1,2,3,…,m})} , J-={1,2,3,…,n)

2.5 Calculating the distance of each option from ideal and negative ideal

$$d_i^+ = \{\sum_{j=1}^{n}(V_{ij} - V_j^-)^2\}^{0.5} \qquad\qquad d_i^- = \{\sum_{j=1}^{n}(V_{ij} - V_j^+)^2\}^{0.5}$$

2.6 Calculating the relative proximity to ideal solution

$$0 \le cl_i^+ \le 1 \qquad\qquad cl_i^+ = \frac{d_i^-}{(d_i^+ + d_i^-)}$$

TABLE 2 - STATISTICAL BLOCKS AND ACCESSIBILITY IN NEW TEXTURE

| Neighborhoods access | Neighborhood 1 | | | Neighborhood 2 | | | Neighborhood 25 | | | Neighborhood 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | population | Block | F(x) | population | Block | F(x) | population | Block | F(x) | population | Block | F(x) |
| Clinics | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 65(1) | 66 88 | 0.69 | 130 | 2 79 81.4 | 0.85 | 0 | 0 33 67.3 | 0.39 | 0 | 0 33 94.3 | 0.31 |
| Moderate | 905(14) | 9 12 | | 194 | 3 4 4.1 | | 0 | 0 16 32.7 | | 0 | 0 1 2.9 | |
| Low | 5496(85) | 0 0 | | 6157 | 95 14 14.4 | | 5010 | 100 0 0.0 | | 1294 | 100 1 2.9 | |
| Shopping centers | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 6466(100) | 0 0 | 1 | 6481 | 100 0 0.0 | 1 | 3457 | 69 0 0.0 | 1 | 0 | 0 4 11.4 | 1 |
| Moderate | 0(0) | 0 0 | | 0 | 0 0 0.0 | | 651 | 13 0 0.0 | | 0 | 0 3 8.6 | |
| Low | 0(0) | 75 100 | | 0 | 0 97 100 | | 902 | 18 49 100 | | 1294 | 100 28 80.0 | |
| Mosque | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 323(5) | 74 99 | 0.98 | 5250 | 81 94 96.9 | 0.84 | 651 | 13 31 63.3 | 0.83 | 375 | 29 32 91.4 | 0.96 |
| Moderate | 1099(17) | 1 1 | | 843 | 13 3 3.1 | | 2705 | 54 15 30.6 | | 116 | 9 2 5.7 | |
| Low | 5043(78) | 0 0 | | 389 | 6 0 0.0 | | 1653 | 33 3 6.1 | | 802 | 62 1 2.9 | |
| Sports | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 1293(20) | 42 56 | 0 | 4472 | 69 75 77.3 | 0 | 3357 | 67 19 38.8 | 0 | 91 | 7 4 11.4 | 0.13 |
| Moderate | 2004(31) | 20 27 | | 1231 | 19 17 17.5 | | 150 | 3 1 2.0 | | 0 | 0 15 42.9 | |
| Low | 3168(49) | 13 17 | | 778 | 12 5 5.2 | | 150 | 3 29 59.2 | | 1203 | 93 16 45.7 | |
| Schools | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 3362(52) | 75 100 | 0.99 | 6092 | 94 97 100 | 0.99 | 5010 | 100 49 100 | 0.72 | 595 | 46 35 100 | 0.97 |
| Moderate | 3039(47) | 0 0 | | 389 | 6 0 0.0 | | 0 | 0 0 0.0 | | 375 | 29 0 0.0 | |
| Low | 65(1) | 0 0 | | 0 | 0 0 0.0 | | 0 | 0 0 0.0 | | 324 | 25 0 0.0 | |
| Parks | 6466(100) | 75 100 | | 6481 | 100 97 100 | | 5010 | 100 49 100 | | 1294 | 100 35 100 | |
| High | 4397(68) | 75 100 | 0 | 4990 | 77 97 100 | 0 | 4860 | 97 7 14.3 | 0.4 | 272 | 21 33 94.3 | 0.95 |
| Moderate | 1487(23) | 0 0 | | 1102 | 17 0 0.0 | | 150 | 3 21 42.9 | | 505 | 39 1 2.9 | |
| Low | 582(9) | 0 0 | | 389 | 6 0 0.0 | | 0 | 0 21 42.9 | | 518 | 40 1 2.9 | |

## 3 FINDINGS

### 3.1. Accessibility quality by objective dimension

As tables 2, 3 and 4 show each three textures are analyzed separately for better understanding. First neighborhoods are analyzed with respect to their inner features.

### 3.1.1. Rural texture

Access to shopping center has been highest in all four neighborhoods with score of 1 (Table 2). Access to school placed in second which neighborhood 25 had lesser access compared to other neighborhoods with score of 0.72. Access to mosques was ranked after schools.

Regarding accessibility to health clinics shows variation among the different neighborhoods of the rural texture. As neighborhood 3 with 0.3 score stood behind the neighborhood 2 with 0.85 score.

Accessibility to parks shows a better condition for neighborhood 3 while others have lesser access to parks. The last criterion is physical access of residents to sport centers which all neighborhoods have no good access.

### 3.1.2. New texture

Accessibility to neighborhood facilities of new texture of Maragheh is reflected in Table 3. Access to shopping centers (stores) is high in three neighborhoods of the area which reaches to maximum level i.e. 1, and only one of them (Neighborhood 24) has the minimum access to such uses. Totally the area favors a good condition of accessibility to urban facilities however shows some oscillation.

### 3.1.3. Old texture

As table 4 shows there is less variation to urban facilities in the neighborhoods of old section of the city. Access to shopping centers reaches to the highest level with full score of 1 in three neighborhoods. Mosques and schools are the central elements in the Islamic cities and so in the city of Maragheh access to such centers is high (Table 4).

Access to parks shows a lower level compared to the average level of the area. A neighborhood has the maximum accessibility to the urban facilities as this section is located right to the heart of the old texture and such facilities were provided in the course of times.

TABLE 3 - STATISTICAL BLOCKS AND ACCESSIBILITY IN NEW TEXTURE

| Accessibility | Neighborhood 19 Population | | Block | | F(x) | Neighborhood 22 population | | Block | | F(x) | Neighborhood 23 population | | Block | | F(x) | Neighborhood 24 population | | Block | | F(x) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clinics | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 3245 | 44 | 3 | 5.2 | 0.05 | 4428 | 56 | 80 | 76.2 | 0.01 | 2612 | 30 | 80 | 49.7 | 0 | 675 | 15 | 0 | 0 | 0.31 |
| Moderate | 2286 | 31 | 10 | 17.2 | | 2214 | 28 | 25 | 23.8 | | 1828 | 21 | 54 | 33.5 | | 810 | 18 | 1 | 50 | |
| Low | 1844 | 25 | 45 | 77.6 | | 1265 | 16 | 10 | 9.5 | | 4266 | 49 | 27 | 16.8 | | 3015 | 67 | 1 | 50 | |
| Shopping centers | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 7375 | 100 | 18 | 31.0 | 1 | 7908 | 100 | 62 | 59.0 | 1 | 8706 | 100 | 32 | 19.9 | 1 | 4500 | 100 | 0 | 0 | 0 |
| Moderate | 0 | 0 | 12 | 20.7 | | 0 | 0 | 33 | 31.4 | | 0 | 0 | 84 | 52.2 | | 0 | 0 | 0 | 0 | |
| Low | 0 | 0 | 28 | 48.3 | | 0 | 0 | 10 | 9.5 | | 0 | 0 | 45 | 28.0 | | 0 | 0 | 2 | 100 | |
| Mosques | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 4573 | 62 | 30 | 51.7 | 0.11 | 5694 | 72 | 96 | 91.4 | 0.91 | 5311 | 61 | 121 | 75.2 | 0.73 | 2340 | 52 | 0 | 0 | 0 |
| Moderate | 1918 | 26 | 27 | 46.6 | | 1028 | 13 | 9 | 8.6 | | 3308 | 38 | 28 | 17.4 | | 135 | 3 | 0 | 0 | |
| Low | 885 | 12 | 1 | 1.7 | | 1186 | 15 | 0 | 0.0 | | 87 | 1 | 11 | 6.8 | | 2025 | 45 | 2 | 100 | |
| Sports | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 0 | 0 | 0 | 0.0 | 0.41 | 0 | 0 | 0 | 0.0 | 0.77 | 0 | 0 | 0 | 0.0 | 0.52 | 90 | 2 | 0 | 0 | 0 |
| Moderate | 0 | 0 | 52 | 89.7 | | 0 | 0 | 3 | 2.9 | | 0 | 0 | 0 | 0.0 | | 135 | 3 | 0 | 0 | |
| Low | 7375 | 100 | 6 | 10.3 | | 7908 | 100 | 102 | 97.1 | | 8706 | 100 | 161 | 100.0 | | 4275 | 95 | 2 | 100 | |
| Schools | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 7154 | 97 | 58 | 100.0 | 0.76 | 7908 | 100 | 105 | 100.0 | 0.97 | 5137 | 59 | 161 | 100.0 | 0.83 | 3915 | 87 | 1 | 50 | 0.5 |
| Moderate | 221 | 3 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | | 3134 | 36 | 0 | 0.0 | | 225 | 5 | 0 | 0 | |
| Low | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | | 435 | 5 | 0 | 0.0 | | 360 | 8 | 1 | 50 | |
| Parks | 7375 | 100 | 58 | 100.0 | | 7908 | 100 | 105 | 100.0 | | 8706 | 100 | 161 | 100.0 | | 4500 | 100 | 2 | 100 | |
| high | 0 | 0 | 41 | 70.7 | 0.76 | 79 | 1 | 72 | 68.6 | 0.78 | 1132 | 13 | 157 | 97.5 | 0.98 | 3555 | 79 | 2 | 100 | 0.5 |
| Moderate | 0 | 0 | 9 | 15.5 | | 0 | 0 | 22 | 21.0 | | 3569 | 41 | 4 | 2.5 | | 360 | 8 | 0 | 0 | |
| Low | 7375 | 100 | 8 | 13.8 | | 7829 | 99 | 11 | 10.5 | | 4005 | 46 | 0 | 0.0 | | 585 | 13 | 0 | 0 | |

## 3.2. Comparing quality of accessibility by objective dimension in three urban textures

Analyzing of three textures the qualities are illustrated in figures 2, 3, 4, 5, 6 and 7. Among the six urban facilities, access to shopping centers and stores was in maximum level with score of 1 except neighborhood 24 with score of 0 had the least access to such uses. This neighborhood is a new expanded part of the texture area which needs to wait for the provision of new stores. Old areas of the city had highest (very good) access to primary schools with 66.6 percent and good access of 33.3 percent. The old part of the city had the highest accessibility score to mosques. As it was outlined in the Islamic cities mosque is an important element which has been one of the crucial points in socio-cultural issues which has lost its significance in the face of modernism. Rural texture also present a good accessibility to mosques compared to the new areas. Such reason is depended to the cultural character of rural people who are still attached to Islamic values and practices and so establishing a mosque is their first priority.

As figure 4 shows old neighborhoods had better success health clinics compared to two other textures. It could be discussed that despite the critiques who believe that old areas of Islamic cities suffer from lack of urban public amenities, but the case of Maragheh showed a different scenario. This matter is also obvious in the high accessibility of old neighborhoods to sport facilities. It seems that older areas of the city absorbed traditional sport centers namely zoorkhaneh, where youth and middle aged people practice professional actions.

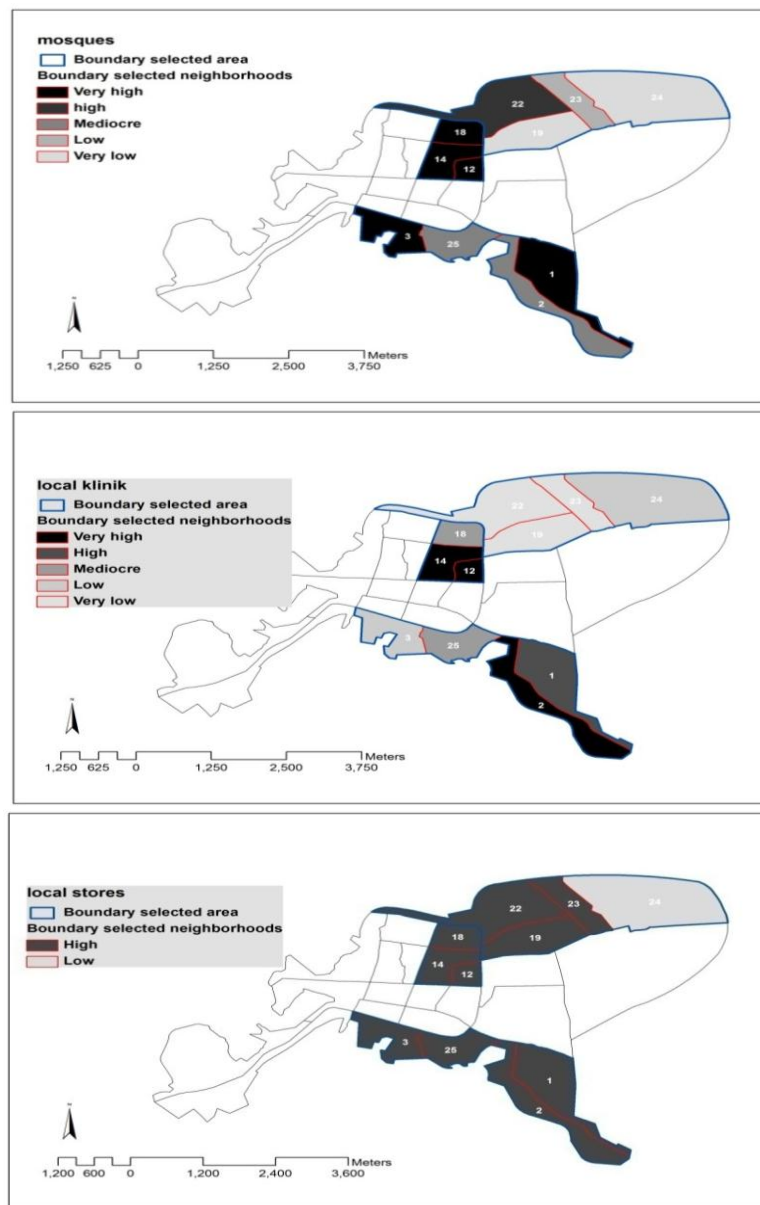TABLE 4 - STATISTICAL BLOCKS AND ACCESSIBILITY IN OLD TEXTURE

| | Neighborhood 18 | | | | | Neighborhood 14 | | | | | | Neighborhood 12 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | population | | Block | | F(x) | population | | Block | | F(x) | population | | Block | | F(x) |
| Clinics | 5700 | 100 | 38 | 100 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 100 | |
| High | 2109 | 37 | 36 | 94.7 | 0.47 | 7759 | 86 | 29 | 100 | 0.96 | 4566 | 100 | 18 | 100 | 1 |
| Moderate | 2964 | 52 | 2 | 5.3 | | 1263 | 14 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | |
| Low | 627 | 11 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | |
| Shopping centers | 5700 | 100 | 38 | 100 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 100 | |
| High | 5700 | 100 | 12 | 31.6 | 1 | 9022 | 100 | 15 | 51.7 | 1 | 4566 | 100 | 18 | 100 | 1 |
| Moderate | 0 | 0 | 17 | 44.7 | | 0 | 0 | 11 | 37.9 | | 0 | 0 | 0 | 0.0 | |
| Low | 0 | 0 | 9 | 23.7 | | 0 | 0 | 3 | 10.3 | | 0 | 0 | 0 | 0.0 | |
| Mosques | 5700 | 100 | 38 | 100 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 1000 | |
| High | 5187 | 91 | 21 | 55.3 | 0.99 | 9022 | 100 | 27 | 93.1 | 1 | 4566 | 100 | 17 | 94.4 | 0.98 |
| Moderate | 513 | 9 | 17 | 44.7 | | 0 | 0 | 2 | 6.9 | | 0 | 0 | 1 | 5.6 | |
| Low | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | |
| Sports | 5700 | 100 | 3 | 7.9 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 100 | |
| High | 1767 | 31 | 8 | 21.1 | 0.57 | 4150 | 46 | 25 | 86.2 | 0.72 | 4566 | 100 | 18 | 100 | 1 |
| Moderate | 2451 | 43 | 4 | 10.5 | | 4331 | 48 | 4 | 13.8 | | 0 | 0 | 0 | 0.0 | |
| Low | 1482 | 26 | 14 | 36.8 | | 541 | 6 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | |
| Schools | 5700 | 100 | 38 | 100 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 100 | |
| High | 3819 | 67 | 38 | 100 | 0.89 | 8390 | 93 | 29 | 100 | 0.98 | 4064 | 89 | 18 | 100 | 1 |
| Moderate | 1881 | 33 | 0 | 0.0 | | 632 | 7 | 0 | 0.0 | | 502 | 11 | 0 | 0.0 | |
| Low | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | | 0 | 0 | 0 | 0.0 | |
| Parks | 5700 | 100 | 38 | 100 | | 9022 | 100 | 29 | 100 | | 4566 | 100 | 18 | 100 | |
| High | 342 | 6 | 1 | 2.6 | 0.17 | 632 | 7 | 1 | 3.4 | 0.3 | 2146 | 47 | 13 | 72.2 | 0.92 |
| Moderate | 2109 | 37 | 12 | 31.6 | | 5774 | 64 | 17 | 58.6 | | 2374 | 52 | 5 | 27.8 | |
| Low | 3249 | 57 | 25 | 65.8 | | 2616 | 29 | 11 | 37.9 | | 46 | 1 | 0 | 0.0 | |

Parks in their new form are the outcome of new urbanism as important use in the city. It should be recalled that Iranian cities once enjoyed many attractive traditional gardens which were open to all people. But by the surge of new urbanism hectares orchards and lands converted into constructed urban buildings which now most of the cities in the country have a small per capita of green space and parks. Today importance of parks is highly voiced by urban planners in the urban development plans. A

glance on the figure 7 shows that old areas of the city have less access to parks while in the new areas the condition is better.

### *Analyzing objective dimension of quality of life*

As it was depicted in research method to analysis the quality of accessibility to neighborhood facilities and the quality of these facilities a field survey was undertaken by completing questionnaires among the household's heads in a random way. Then, the score of each question was obtained which ranged from minimum of 30 to maximum of 150 (table 5).  TOPSIS was applied to analysis all answers.
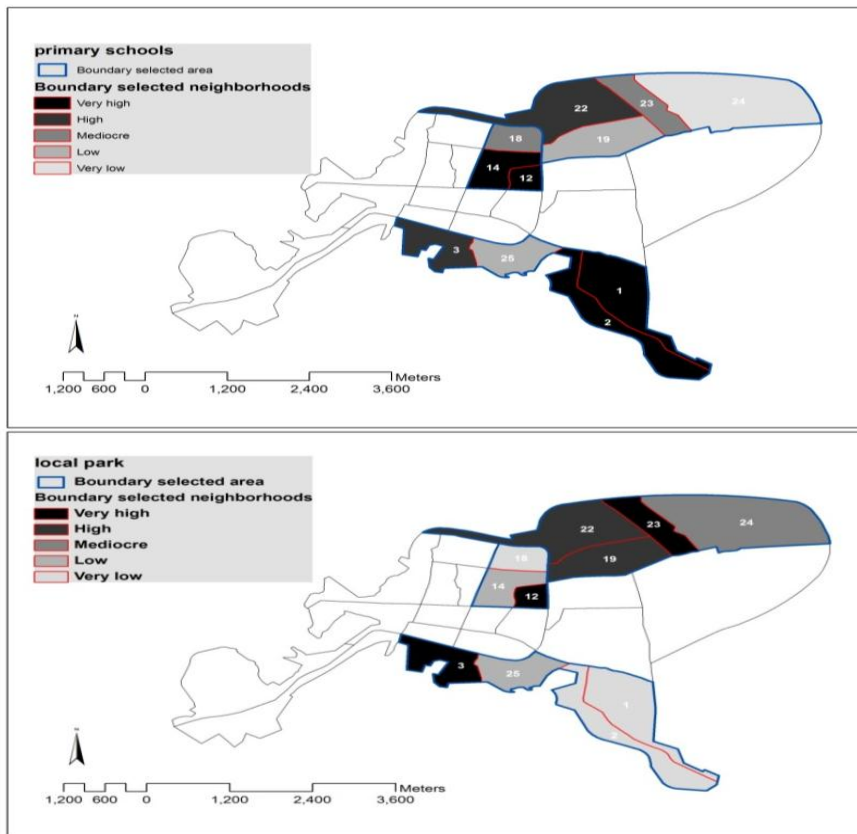
Figure 3, 4, 5, 6 and 7 - The level of accessibility to urban facilities in different part of the city

As diagram 1 and table 6 shows the subjective quality of neighborhoods was compared which revealed a dramatic difference among the neighborhoods. D+ and D- represent the distance from positive ideal and the negative ideal respectively. Neighborhood 24 of new texture has the farthest distance from positive ideal.  Four neighborhoods of rural area have maximum distance from positive ideal and least from negative ideal. Such position is depended to the different structure of the formation of neighborhoods in the city and the adjacent rural texture, as city facilities are provided by establishment of neighborhoods while neighborhood facilities in rural texture are located in the center of rural structure which by physical expansion of neighborhoods, access to facilities became inappropriate. The minimum distance from positive ideal belongs to neighborhood 22. Generally the neighborhoods of new texture have minimum distance from positive ideal (Table 6 and diagram 1).   Table 6 shows the ranking of all neighborhoods of three different areas of Maragheh city.
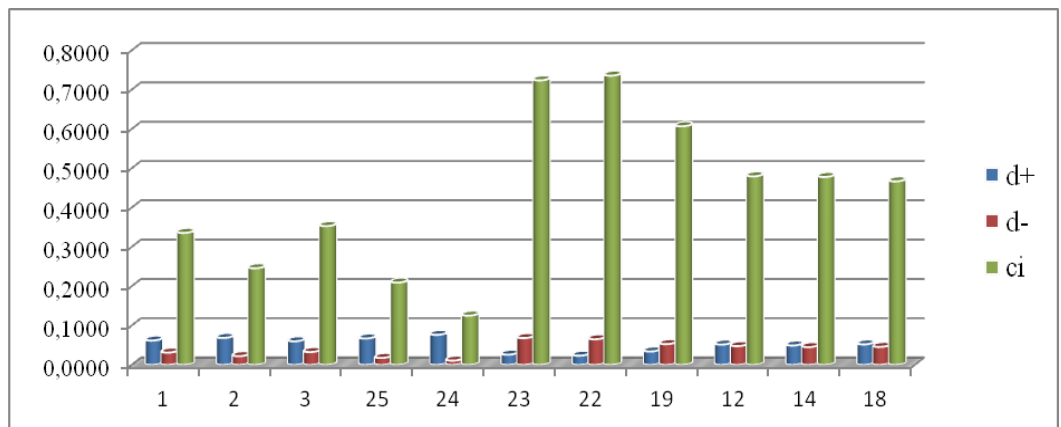
TABLE 5 - RESULTS OBTAINED FROM QUESTIONNAIRES

| Textures | Neighborhoods | 1- Do you have easy access to urban parks? | 2- Do you have easy access to easy access to schools? | 3- Do you have easy access to mosques? | 4- Do you have easy access to clinics? | 5- Do you have easy access to shopping centers? | 6- Do you have easy access to sports? | 7- How is the quality of parks? | 8- How is the quality of clinics? | 9- How is the quality of the mosques? | 10- How is the quality of primary schools? | 11- How is the quality of shopping centers? | 12- How is the quality of sport centers? | 13- Are pedestrians safe and efficient? | 14- Are thoroughfares socially safe? | 15- My neighborhood is safe from thief. | 16- Do think have less stress in your neighborhood? | 17- Do you think all people have equal access to urban neighborhood? | 18- can you safely walk in your neighborhoods? | 19- Do you like your neighborhood for living? | 20 Is your neighborhood a part of your identity? | 21- Is heart to leave your neighborhood? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rural | 1 | 38 | 73 | 82 | 89 | 118 | 35 | 51 | 44 | 58 | 102 | 109 | 38 | 44 | 57 | 54 | 80 | 65 | 39 | 80 | 58 | 58 |
| | 2 | 39 | 109 | 121 | 28 | 115 | 45 | 31 | 71 | 81 | 31 | 100 | 36 | 67 | 55 | 58 | 94 | 47 | 70 | 53 | 56 | 58 |
| | 3 | 84 | 112 | 108 | 38 | 116 | 56 | 38 | 30 | 112 | 86 | 89 | 36 | 56 | 62 | 62 | 84 | 36 | 56 | 36 | 46 | 46 |
| | 25 | 44 | 67 | 55 | 43 | 135 | 42 | 44 | 44 | 89 | 71 | 116 | 44 | 62 | 63 | 72 | 86 | 32 | 58 | 46 | 42 | 56 |
| | Mean | 51 | 90 | 92 | 50 | 121 | 45 | 41 | 47 | 85 | 73 | 104 | 39 | 57 | 59 | 62 | 86 | 45 | 56 | 54 | 51 | 55 |
| New | 24 | 32 | 39 | 58 | 30 | 114 | 47 | 36 | 36 | 84 | 51 | 100 | 45 | 32 | 87 | 76 | 97 | 39 | 74 | 56 | 46 | 36 |
| | 23 | 116 | 112 | 112 | 64 | 114 | 45 | 100 | 34 | 135 | 110 | 128 | 48 | 88 | 49 | 39 | 118 | 94 | 102 | 122 | 114 | 94 |
| | 22 | 98 | 135 | 84 | 57 | 122 | 64 | 87 | 68 | 113 | 115 | 128 | 96 | 107 | 89 | 44 | 88 | 69 | 72 | 106 | 96 | 135 |
| | 19 | 89 | 110 | 84 | 86 | 132 | 84 | 78 | 56 | 126 | 113 | 130 | 62 | 98 | 82 | 64 | 98 | 56 | 59 | 67 | 79 | 76 |
| | Mean | 82 | 95 | 85 | 50 | 117 | 52 | 74 | 46 | 111 | 92 | 119 | 63 | 76 | 75 | 53 | 101 | 67 | 83 | 95 | 85 | 88 |
| Old | 12 | 39 | 98 | 146 | 96 | 150 | 52 | 43 | 73 | 135 | 86 | 144 | 52 | 47 | 56 | 54 | 86 | 64 | 84 | 104 | 112 | 110 |
| | 14 | 46 | 107 | 146 | 74 | 135 | 46 | 53 | 54 | 124 | 98 | 128 | 58 | 46 | 82 | 44 | 104 | 47 | 86 | 84 | 124 | 112 |
| | 18 | 36 | 112 | 146 | 76 | 128 | 35 | 56 | 66 | 116 | 108 | 132 | 49 | 53 | 78 | 38 | 96 | 53 | 87 | 96 | 116 | 113 |
| | Mean | 40 | 106 | 146 | 82 | 138 | 44 | 51 | 68 | 125 | 97 | 135 | 53 | 49 | 72 | 45 | 95 | 55 | 86 | 95 | 117 | 112 |

TABLE 6 - EUCLIDEAN DISTANCE OF NEIGHBORHOODS TO POSITIVE AND NEGATIVE DISTANCE AND THEIR RANK

| Texture type | Rural texture | | | | New texture | | | Old texture | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Neighborhoods | 1 | 2 | 3 | 25 | 24 | 23 | 22 | 19 | 12 | 14 | 18 |
| $d+$ | 0.0620 | 0.0686 | 0.0601 | 0.0672 | 0.0765 | 0.0261 | 0.0235 | 0.0343 | 0.0518 | 0.0494 | 0.0522 |
| $d-$ | 0.0313 | 0.0224 | 0.0328 | 0.0178 | 0.0110 | 0.0684 | 0.0653 | 0.0529 | 0.0477 | 0.0452 | 0.0458 |
| $C_i$ | 0.3358 | 0.2459 | 0.3531 | 0.2094 | 0.1253 | 0.7239 | 0.7358 | 0.6072 | 0.4797 | 0.4780 | 0.4670 |
| Rank | 8 | 9 | 7 | 10 | 11 | 2 | 1 | 3 | 4 | 5 | 6 |

Diagram 1: Euclidean distance of neighborhoods to positive and negative distance and their rank



From subjective point of view all three neighborhoods have good condition but are placed in three different levels of very high, high and moderate by their objective accessibility.

TABLE 7 - RANKING OF OBJECTIVE ACCESSIBILITY IN THREE DIFFERENT URBAN AREAS OF MARAGHEH

| Components | Neighborhoods | Old texture | % | New texture | % | Rural texture | % |
|---|---|---|---|---|---|---|---|
| *Very high* | *12* | *1* | *33.3%* | *0* | *0%* | *0* | *0%* |
| *High* | *14* | *1* | *33.3%* | *0* | *0%* | *0* | *0%* |
| *Moderate* | *18-22-23-3* | *1* | *33.3%* | *2* | *50%* | *1* | *25%* |
| *low* | *1-2-25-19* | *0* | *0%* | *1* | *25%* | *3* | *75%* |
| *Very low* | *24* | *0* | *0%* | *1* | *25%* | *0* | *0%* |

TABLE 8 - RANKING OF SUBJECTIVE ACCESSIBILITY IN DIFFERENT URBAN AREAS OF MARAGHEH

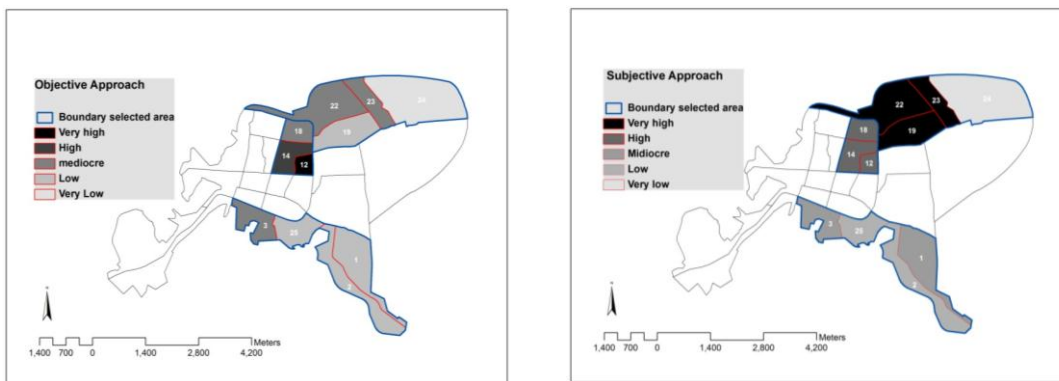| Components | Neighborhoods | Old texture | % | New texture | % | Rural texture | % |
|---|---|---|---|---|---|---|---|
| *Very high* | *19-22-23* | *0* | *0%* | *3* | *75%* | *0* | *0%* |
| *High* | *12-18-14* | *3* | *100%* | *0* | *0%* | *0* | *0%* |
| *Moderate* | *1-3* | *0* | *0%* | *0* | *0%* | *2* | *50%* |
| *Low* | *2-25* | *0* | *0%* | *0* | *0%* | *2* | *50%* |
| *Very low* | *24* | *0* | *0%* | *1* | *25%* | *0* | *0%* |



FIGURE 8 AND 9: FINAL MAPS OF OBJECTIVE AND SUBJECTIVE ACCESSIBILITY

## 4 DISCUSSIONS AND CONCLUSIONS

The starting point of development in human society is a precise understanding of people's needs and then monitoring the acheivements of development. Measuring quality of life could be a right tool for such puposes as it provides an effective way of interaction between citizens and urban authoritis. In fact there would be better solution to urban problems by integrating objective and subjective accessibilities as people can participate and show their real needs. Today, accessibity to public spaces is widley considered by researchers as an important components of quality of life in urban communities. In this research there has been an effort to measure objective-subjective accessibility to neghbourhood facilities in the three different urban areas of Maragheh city in Iran.  As it was outlined earlier Iranian cities has different urban structures which are the outcome of historical evennts. Three different textures of the city were analyzed  by using Fuzzy TOPSIS and statistical modeles. The results showed that the old area of the city influenced from Islamic-Iranian urbanism in a gradual way and had a better condition from both objective and subjective accessibility. While the new area of the city has developed by

influencing from modernism and wide use of automobile. The study showed that people of this texture wre satisfied by their accessibility to local facilities and has more choice of selection of their living place and generally were better off than other areas of the city. The rurla texure of the city showed a lesser satisfaction regarding to accessibility.Historically Iranian rural areas suffer from lack of public living amenities. The attached rural neighbourhoods of Maragheh city however had a better condition compared to the common rural places of the country but due to the influx of rural migrants these areas bear most of the urban pressures.  Also here compition for occupiying land is very high which increases the use of urban facilities. So thre has been lower quality of life in the rural texture of the city, howevere the residents were hoped that the condition will change for good.  Now it could be concluded that urban authorities should pay more attention towards the marging areas of the city where play as obserbent of rural migrant to new and older section of the city. There has been different level of quality of life when objective and subjective accssibilty were measured in these three areas. So urban authorities and QOL researchers should take care of their type of polices and methods contributed to urban planning The study revealed that mere statisfaction toward objective accessibility can not guarantee  subjectve one and for an approperiate understanding of quality of life both objective and subjective approches should be considered especially in developing counteries.

## REFERENCES

Afroogh, E. (1998). *Space and social injustice*: a pattern for social segregation and its consequences, Tarbiat Moddres University Press. Tehran, Iran. 1st edition.

Alizadeh, H. (2007). Changes in conceptions of women's public space in the Kurdish city. *Cities*, 24( 6), 410–421.

Ardalan, N. (1980).  Places of public gathering. In L Safran (ed.) *Places of Public Gathering in Islam*, pp. 5–16. Aga.Tehran, Iran.

Atkinson, R. & Blandly, S. (2005). Introduction: international perspectives on the new enclavism and the rise of gated communities. Housing Studies, 20(2), 177-186.

Bond, J., & Corner,L.(2004).  Quality of life and older people, London, Open University Press. Measurement. Human Sciences Press, New York.

Campbell, A; Converse, P and Rodgers, W. (1976). The quality of American life. New York: Russell Sage.

Casta C.D. (2002). Predictors of deforestation in the Brazilian Amazon. Journal of Biogeography, 29, 737-748.

Castella, J.-C., Manh, P. H., Kam, S. P., Villano, L., & Tronche, N. R. (2005). Analysis of village accessibility and its impact on land use dynamics in a mountainous province of northern Vietnam. Applied Geography, 25, 308e326.

Cho, M. C. (2003). Study on effects of resident-perceived neighborhood boundaries on public services accessibility and its relation to utilization: using geographic information system, focusing on the case of public parks in Austin, Texas. PhD dissertation.

Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., L.Danigelis, N., Dickinson, J., Elliott, C., Farley, J., Elliott Gayer, D., MacDonald Glenn, L., Hudspeth, T., Mahoney, D., McCahill, L., McIntosh, B., Reed, B., Rizvi, S.A.T., M. Rizzo, D., Simpatico, T., Snapp, R., (2007). Quality of life: An approach integrating opportunities, human needs, and subjective well-being, Ecological Economics 61(2007)267–276, doi:10.1016/j.ecolecon.

Das, D. (2008). Urban quality of life: A case study of Guwahati, Social indicators research, 88:279-310.

Etter, A; McAlpine, C; Wilson, K; Phinn, S and Possingham, H. (2006). Regional patterns of agricultural land use and deforestation in Colombia. Agriculture, Ecosystems & Environment, 114, 369-386.

Gould, P. (1969). Spatial Diffusion, Resource Paper Number 17, Association of American Geographers, Washington DC.

Habibi, M. (1999). Civilized society and urban life, Journal of Fine Arts, Vol 7, pp 21-31.

Hanson, S., (1986). Dimensions of the urban transportation problem. Geographic Perspectives on Urban Transportation, 3-23.

Lee, Y-J., (2008). Subjective quality of life measurement in Taipei, Building and Environment 43 (2008) 1205–1215, doi:10.1016/j.buildenv.2006.11.023

Lipton, S. (2003). The value of public space: How high quality parks and public spaces create economic, social and environmental value. Available from www.cabespace.org.uk.

Laurance, W. F; Albernaz, A. K. M; Schroth,G; Fearnside, P. M; Bergen, S; Venticinque, E. M., Nagendra, H; Southworth, J and Tucker, C. (2003). Accessibility as a determinant of landscape transformation in western Honduras: linking pattern and process. Landscape Ecology, 18, 141-158.

Luo, W and Wang, F. (2003). Measures of spatial accessibility to healthcare in a GIS environment: Synthesis and a case study in Chicago region. Environment and Planning B 30(6):865-884.

Lynch, K. (1972). *The openness of open spac*e .Arts of environment. Aidan Ellis.

Kamp, I K, Van; Leidelmeijer, K; Marsman, G. and de Hollander, A. (2003). Urban environmental quality and human wellbeing:Towards a conceptual framework and demarcation of concepts; a literature study*, Landscape and Urban Planning*, 65(1-2).

Kostof, A., (1992). *The city assembled: the elements of urban form through history*. Thames and Hudson. London.

Madanipour, A. (2003). *Public and Private Spaces of the City*. Rutledge, London, New York.

Nicholls, S. (2001). Measuring the accessibility and equity of public parks: A case study using GIS. *Managing Leisure*, Vol. 6, 201–219.

Pakzad, J. (2006). *Theoritical principles of process of urban design*, Minstry of Housing and Urban Planning Press, 1st edition.

Pasaogullari, N. and Doratli, N. (2004). Measuring accessibility and utilization of public spaces in Famagusta, *Cities*, Vol. 21, No. 3, p. 225–232,

Rafiayan, M and Sifiyaee, M. (2005). Urban Public Space: a qualitative review*, Journal of Fine Arts*, Vol 23, pp 3-42.

Saeednia, A. (2000). *Urban Management*, published by Municipality 11th volume, Tehran, Iran.

Smith, N., & Low, S., (2006). Introduction: The imperative of public space. In S. M. Low, & N. Smith (Eds.), *The politics of public space* (1–16). New York: Rutledge.

Soltanzadeh, H. (1986). *An introduction to history of city anf urbanization in Iran*. Nashr Pblication, Tehran , Iran.

Talen, E. (2003). Neighborhoods as service providers: a methodology for evaluating pedestrian access, Environment and Planning B: *Planning and Design*, 30, 181-200.

Talen, E. (2002). Pedestrian access as a measure of urban quality, *Planning Practice & Research*, 17(3): 258-278.

Talen, E and Anselin, L. (1998). Assessing spatial equity: an evaluation of measures of accessibility topublic playgrounds. *Environment and Planning*, 30, 595–613.

Tibbalds, F. (1992). *Making people friendly towns: Improving the public environments in towns and cities*.Harlow, Essex: Longman Press.

Tsou, K; Hung, Y and Chang, Y.L. (2005). An accessibility-based integrated measure of relative spatial equity in urban public facilities, *Cities*, 22 (6), 424–435.

Verburg, P. H; Overmars, K. P and Witte, N. (2004). Accessibility and land-use patterns at the forest fringe in the northeastern part of the Philippines. *The Geographical Journal*, 170, 238-255.

Walzer, M. (1986). Pleasures and costs of urbanity. *Dissent* 33(4).pp470-475

Woolley, H. (2003). *Urban Open Spaces*. London, Spon Press.