A Comparative Analysis of Facility Level and Population Distribution in Urban Network of Yazd Province

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Abstract: During last three decades, because of rapid influx of population into the cities, many problems have been emerged for cities. Thus, it is necessary to plan and present models in order to regulate urban network to reduce and organize emerging problems. Finding factors resulting from these events, presenting solution in order to reduce unfavorably existing situation, and move toward balance in population and activity distribution are some of the most concerns of planners and city managers. In this research, the relationship between urban facilities and population distribution in urban network was studied by evaluating level of enjoying municipal facilities in urban areas of Yazd Province. In terms of research type, it is developmental-applied and in terms of method, it is descriptive-analytical. Data were collected by library studies, documents of Iran's Statistical Center, statistical yearbook, and relevant documents. To analyze data and reach to practical results, numerical Taxonomy model and numerical analysis process were used. The results indicate that presented facilities and services in urban areas have fairly big influence on balanced distribution of population; therefore, deductive rank of Taxonomy analysis that indicates level of enjoying facilities in the areas is in line with the rank of population distribution. In this regard, indexes relevant with municipal facilities and services can considerably play effective role on absorbing population, avoiding immigration, and decentralization in different areas.

Keywords: municipal facilities and services, numerical Taxonomy, city of Yazd
JEL Classification: N95, C65, P25, R11

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1- Introduction

Unbalanced distribution of urban population is one of the dilemmas that it has affected many today's societies causing several economic, demographic, and cultural problems and so on. The emergence of extreme concentration of population in one or some specific urban areas and the occurrence of primate city are some signs of unbalanced distribution. In other words, emergence of populated cities leads to creation of primate city phenomenon that it has created imbalance in the total urban system (Drakakis Smith, 1998). Henderson (2002) considers the index of primate city as the ratio of the population of the first city to the total urban population that we may consider unfavorably social, economic and cultural status with growth of this index.

Some researchers believe that there is no appropriate theory to determine primate city; therefore, most of them agree that primate city exists mainly in developing countries or small-industrialized ones (Zebardast, 2007). Jeferson believes that primate city in each country is like an independent and large city and it indicates national ability and feeling (Behforuz, 1995). Currently, about 12 cities in the world have population of more than 10 million people that it will be increased to 33 ones by 2055 out of which only two cities will be in developed countries (United Nation, 1994).

During historical eras, imbalance had increasing trend in the population of cities and their distribution (Roehner, 1995). Studies have indicated that population and activity in urban system of developing countries have been more unbalanced and unequal (Sarmast and Zali, 2010). This attempt can also occur in the form of sustainable development and one of its results can be moving toward sustainable development of areas. Sustainability of areas can be defined as a form of sustainable development that it leads to urban sustainability and creation of ideal environment in order to form human relations. This will be achieved when the principles and approaches of sustainable development to be applied as a principle in urban and regional studies (Drakakis Smith, 1998).

One of most important and influential factors in directing to demographic situation of areas is the manner of qualitative and quantitative distribution of urban and regional services and facilities. As mentioned before, this may help a lot in order to direct areas to sustainable development. Planners try to avoid population concentration and consequently activity in some specific cities by presenting municipal services to all residential areas.

Regardless of natural increase of population and delay in movements that increase Iran urban and rural population spontaneously, immigration among different areas (from village to city and one city to another) in order to find job is one of the most important factors of population change (Research Center of Urban Development and Architecture of Iran, 2002). On the other hand, climate, socio-cultural features, qualitative and quantitative level of municipal services and facilities, economic and physical status and some other issues are influential in these movements. Assessing the role of each mentioned issues in population balance of

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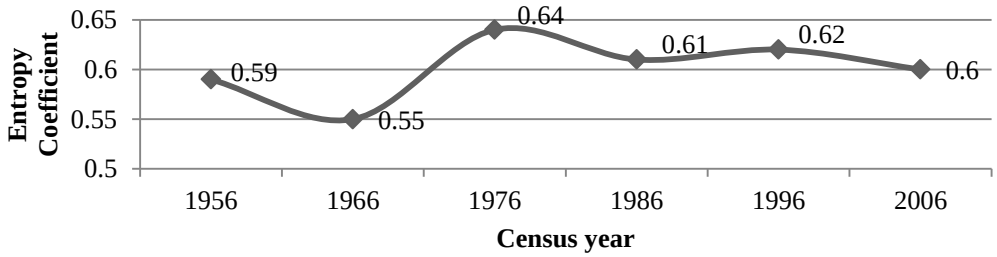
areas can be applied as a strategy in directing development of areas through improving each of mentioned indexes that can solve major social, economic, and cultural problems and disorders that exist in some of Iran's areas because of inappropriate distribution of population.

This research aims to adjust the relationship between the manner of population distribution and presenting municipal facilities and services. In other words, the balance of presented municipal services and facilities has been assessed in this paper.

The importance of this subject in the geographic area of Yazd province is notable since demographic distribution of Yazd cities is unbalanced. In a way that, city of Yazd, as the center of this province and primate city of the region, has demographic gap than other cities. According to the studies during the last half century, Yazd Province has experienced the dominance of primate city. Diagram 1 indicates the trend of changes of Entropy during 1956 to 2006 in Yazd Province. According to this diagram, it was almost sinusoidal so that it had many changes by 1986 and it decreased since then. Thus, studying the indexes related to population balance can be effective in future decisions of the province planning system in order to improve spatial distribution of population and activity. One of these indexes is qualitative status of presentation and distribution of municipal services and facilities at the level of urban network of areas.

Diagram1. Entropy changes based on urban areas of Yazd province during 1956 to 2006.



Reference: (Rastegari and Saraei, 2014)

According to the research purpose, it seems that enjoyment level of facilities in urban areas of Yazd Province is not in accordance with spatial distribution of its cities' population. Thus, this hypothesis is tested by using indexes related to municipal facilities and services in the form of numerical Taxonomy model.

2- Literature Review

Today, urban planners and designers, and economists consider the theory of balanced growth in different areas as a properly regional planning to achieve to balanced and equal development. They also believe that balanced development prepares the best conditions for comprehensive development of all areas. Several studies have been done about the research subject focusing on investigating

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the reasons of inequality in urban network. The following are some of them.

Sabagh Kermani (2001) in a research studied employment balance in different provinces of Iran including East Azerbaijan, Tehran, Khuzestan, Gilan, Mazandaran, Markazi, and Yazd and he found job inequality in these provinces.

Mohammadzadeh Titkanlou (2002) in a paper entitled "capacity building in average cities and regionally spatial development" studied current trends and concluded that under conditions of urban population centralization, high Gini concentration ration in the country, intensity of concentration and accumulation of urban population in the studied province, the emergence of primate city phenomenon, adjustment of hub-orientation in urban development and decentralization of dominant city through the strategy of improving average cities is a logical measure in line with spatial development of the region.

Hekmatniya and Mousavi (2004) in a study considered regional inequality in Yazd Province as geographical inequality and concluded that there is a significant difference in enjoyment of areas of economic, social, cultural and other facilities.

Mazidi and Zare Shahabadi (2006) in a research indicated that employment is a major factor of rural immigrants' presence in the city of Yazd and access to educational and medical services are other influential factors.

Zarrabi and Mousavi (2009) studied the function of small cities in urban system and regional development of Yazd Province and concluded that improvement of small cities and capital injection to them are suitable strategies in order to achieve to spatially balanced structure in the province.

Sadr Mousavi and Talebzedeh (2009) studied urban hierarchical changes of west Azerbaijan Province during a five-year period and indicated imbalance in urban hierarchical system of this province and noncompliance of rank-size rule. They believed that there has been imbalance in distribution and establishment of population and moving toward imbalance of population establishment in urban areas of the province. It is necessary to observe equity in distribution of facilities and services and also create equal opportunities for cities of the province in order to deal with it and archive to optimally urban and spatial hierarchy.

Momeni and Hatami (2010) in a research indicated that inequity and spatial imbalance of Yazd Province is of development inconsistency of areas and regional inequalities and they acknowledged that concentrated planning style has revealed its harmful impacts in different ways in Yazd Province in order that city of Yazd, regardless of urban sequence order of the province, has maintained its superiority as a top and primate city in different fields.

Parhizkar and Zakeriyan (2010) in an analysis of urban sustainable development of Yazd Province, concluded that demographic, economic, medical, educational, equipment, physical, environmental, cultural, and communication and transport indicators have the most impact on sustainable development of Yazd

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Province cities. If strategies of urban sustainable development are not applied, not only cities will not achieve to sustainability and balance, but also inequalities will be increased and urban sustainable development will be questioned.

3. Theoretical Principles

Human being needs space for its socio-economic activities. Thus, there should be a particular place for its functions. This prepares the ground to form spatial structure of a region (Hatamijenad et.al, 2011).

Urban system investigates the manner of organizing a land area that includes a set of cities and their sphere of influence through studying the way of functions, economic and social communications and other issues with each other. These relations can be direct due to the flow of goods and capital and so on or occur in indirect way and under the influence of social, economic, and cultural behaviors that there is a kind of work division and functional hierarchy. In other words, in studying human behavior in space, creating a reasonable and logical hierarchy has been taken into consideration in order to distribute activity and population in a space. Since urban network, both to its spatial concept i.e. the manner of establishment and distribution of different cities (size, population, etc) and to its economic concept i.e. exchange and trade system among cities based on their basic functions, is both result and cause of many today's urbanization issues and phenomena, recognizing the quality of this network, changes, and the way of its performance in the area can solve part of these issues (Taqvayi and Goodarzi, 2009).

Generally, a geographical domain in a combination of natural factors include a network of human communities in which urban centers, in the aura of smaller communities than itself –village, market, residences, so on- show a specific space like interlocking chain rings so-called as "urban network" (Nazariyan, 2010). Economically, urban network in a region or a country is mutual relationship of urban centers, and exchange and trade system that are created among cities about their technical functions (basic functions) (Hesamiyan et.al., 2004).

One of the most important factors about balanced distribution of population and activity in land area is the manner of presenting municipal services and facilities that has a major role on improvement of functional status of urban areas in relation with spatial structure. It should be considered that spatial inequality and imbalance in areas of a region is not a new phenomenon, but it has been intensified in developing countries because of significance of socio-economic differences and inequality and imbalance in municipal services (Abdi Daneshpour, 1999). This difference can solely increase regional inequalities.

In order to study regional or sectoral difference, it is necessary to rank different areas or activities of certain sectors. Thus, when we try to carry out this work with numerical index, ranking seems simple. However, if we want to rank by several indexes, solving the issue is not as simple as before. If a single index entitled

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combined index is obtained for each region or activity based on different indicators that shows a criterion for development or prosperity of an area, it will not act one-dimensional in analysis and a more comprehensive analysis of the studied subject will be presented since the results of the comprehensive analysis is more real; therefore, given that we want to rank regions or different activities based on several relevant indicators and in other words, to obtain a combination of indexes, we use numerical Taxonomy method that is a specific type of Taxonomy analysis method (Bidabad, 1983).

4. Research Methodology

This research is developmental-applied and the method is documentary. In terms of data analysis, it is descriptive-analytical. Required data were collected by using library studies, documents of Iran Statistical Center, statistical yearbooks, and interview. Given that determining used indexes is the most important step in developmental studies, it has been tried to use indexes that are more precise in order to achieve goals according to experts' opinions. It should be considered that in choosing indexes, reliability of indexes for test, providing a clearer insight to researcher, and their ease are important (Amirahmadi & Atash, 1987). Accordingly, in order to analyze research data, 12 indexes related to the manner and level of presenting municipal services and facilities collected by using statistical yearbooks of 2011 and related documents were used. To analyze data and achieve to practical results, numerical Taxonomy model and its numerical analysis stages were used.

The twelve used indexes include number of slaughterhouses, fire stations, public parks, green spaces, greengrocers, sport salons, swimming pools, cinemas, public libraries, universities (higher education institutions), hospitals, townships, and industrial areas.

Research Model

Numerical Taxonomy model is one of the conventional models in studying development level of regions and their grouping in homogeneous sets. In this method, one of the studied areas is selected as an ideal region and other areas are graded upon which (Kalantari, 2001). This method was first proposed by Adunson in 1763, expanded in 1950 by a number of Polish mathematicians, and proposed as an instrument to classify development degree among different nations in UNESCO. This method can divide a set into more or less homogeneous subsets that provide an acceptable scale to study development level of areas for planners (Hekmatniya and Mousavi, 2006). Since we deal with one-dimensional space in practice, i.e. it rarely happens classification is based on an index or characteristic of a unit; we address multi-dimensional Taxonomic space (Hekmatniya and Mousavi, 2006). Numerical Taxanomy model has several operational stages.

The steps of performing numerical Taxonomy analysis technique are as follows (Asayesh, 1997):

Step 1: Forming data matrix that is done by participation of "m" index (es) and "n" area(s). Given that, mean and

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standard deviation are needed to standardize data, calculating mean and standard deviation of each column is done.

Step 2: Forming standard matrix of data that is calculated by using following equation:

$$Z_{ij}=\frac{X_{ij}-\bar{X}_j}{s_j}$$

Step 3: Calculating compound intervals among regions

$$D_{ab}=\sqrt{\sum(Z_{aj}-Z_{bj})^2}$$

Step 4: Forming the matrix of the shortest intervals (matrix of compound intervals)

Step 5: Drawing a diagram and determine homogenous regions that numbers of obtained intervals should be placed in the defined area.

$$D_r=\bar{D}\pm 2Sd$$

Step 6: Classification of homogeneous regions, determining ideal value and model of development by using following equation:

$$C_{io}=\sqrt{\sum(Z_{ij}-Z_{oj})^2}$$

Step 7: Calculating development degree of regions via following equation:

$$F_i=\frac{C_{io}}{C_o}$$

$$C_o=\overline{C_{io}}+2S_{io}$$

C_{io} is mean and S_{io} is standard deviation, and they are calculated by following equations:

$$S_{io}=\sqrt{\frac{\sum_{i=1}^{n}(C_{io}-\overline{C_{io}})^2}{N}}$$

$$\overline{C_{io}}=\frac{\sum_{i=1}^{n}C_{io}}{n}$$

Fi value varies between zero and one. As this value is closer to zero, it indicates more development, and as it is closer to one, it means underdevelopment (Hekmatniya and Mousavi, 2006).

After completing mentioned steps, development degree of different areas of provinces can be divided in terms of development level including developed, relatively developed, less developed, and underdeveloped ones by determining cumulative relative frequency. If development degree is between $0<Hi\leq 0.25$, it will be developed, if it is $0.25<Hi\leq 0.50$, it will be relatively developed, if it is $0.50<Hi\leq 0.75$, it will be less developed, and finally if it is $0.75<Hi\leq 1.0$, it will be considered as underdeveloped areas (Bakhtiyari, 2002).

5. Research Findings

To analyze data, data matrix has been addressed according to tables 1 and 2.

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Table1. Quantitative and qualitative index of municipal services (data matrix) of Yazd Province in 2011

	Industrial areas and townships	Sport Salon	Swimming Pool	Hospital	Slaughter houses	Fire Stations	Green Space	Public Parks	Greengrocers	Cinema	Library	Higher Education Centers
Yazd	4	3	6	7	1	9	641	150	1	4	18	12
Meybod	4	1	0	1	1	3	131.8	19	0	0	6	4
Ardakan	1	2	1	1	1	2	82.5	29	0	0	6	3
Tabas	1	1	1	1	1	2	85.1	2	0	0	2	3
Bafgh	2	1	1	1	1	1	42	3	0	0	5	2
Hamidiya	1	0	0	0	0	1	35	17	1	0	1	0
Mehriz	3	1	1	1	1	1	32.4	15	0	0	5	2
Abarkooh	2	1	1	0	1	1	32	9	0	0	2	5
Taft	3	1	1	1	0	1	85	12	0	0	6	4
Shahediyeh	0	0	1	0	0	0	63.6	8	0	0	1	0
Ashkzar	2	1	0	0	0	2	66	2	0	0	6	1
Harat	1	0	1	1	1	1	32	2	0	0	4	0
Zarch	0	0	0	0	0	1	65	11	0	0	3	1
Marvast	1	0	0	0	1	1	22	5	0	0	0	1
Behabad	1	1	0	0	1	1	38	9	0	0	1	0
Mehrdasht	1	0	0	0	0	1	8.5	1	0	0	1	0
Ahmadabad	0	0	0	0	0	1	3.5	2	0	0	0	0
Eshghabad	1	0	0	0	0	1	12.8	3	0	0	0	0
Deyhook	1	0	0	0	0	1	10.5	5	0	0	1	0
Nodooshan	1	0	0	0	0	1	7	6	0	0	0	0
Nir	1	0	0	0	1	1	9	5	0	0	0	0
Aghda	1	0	0	0	0	1	1	4	0	0	0	0
Khezrabad	0	0	1	0	0	1	0.35	1	0	0	0	0
Mean	1.39	0.57	0.65	0.61	0.48	1.52	65.47	13.91	0.09	0.17	2.96	1.65
Standard Deviation	1.16	0.79	1.27	1.47	0.51	1.73	130.04	30.46	0.29	0.83	4.20	2.76

Reference :(Planning deputy of Yazd Province governance and results of interviews, 2011)

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Table2. Quantitative and qualitative index of municipal services (standard matrix of data) of Yazd Province in 2011

	Industrial areas and townships	Sport Salon	Swimming Pool	Hospital	Slaughter houses	Fire Stations	Green Spaces	Public Park	Greengrocers	Cinema	Library	Higher Education Centers
Yazd	2.25	3.08	4.21	4.35	1.02	4.32	4.43	4.47	3.15	4.61	3.74	3.75
Meybod	2.25	0.55	-0.51	0.27	1.02	0.85	0.51	0.17	-0.30	-1.00	0.76	0.85
Ardakan	-0.34	1.82	0.27	0.27	1.02	0.28	0.13	0.50	-0.30	-1.00	0.76	0.49
Tabas	-0.34	0.55	0.27	0.27	1.02	0.28	0.15	-0.39	-0.30	-1.00	-0.24	0.49
Bafgh	0.52	0.55	0.27	0.27	1.02	-0.30	-0.18	-0.36	-0.30	-1.00	0.51	0.13
Hamidiya	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.23	0.10	3.15	-1.00	-0.49	-0.60
Mehriz	1.39	0.55	0.27	0.27	1.02	-0.30	-0.25	0.04	-0.30	-1.00	0.51	0.13
Abarkooh	0.52	0.55	0.27	-0.41	1.02	-0.30	-0.26	-0.16	-0.30	-1.00	-0.24	1.21
Taft	1.39	0/55	0.27	0.27	-0.94	-0.30	0.15	-0.06	-0.30	-1.00	0.76	0.85
Shahediyeh	-1.20	-0.72	0.27	-0.41	-0.94	-0.88	-0.02	-0.19	-0.30	-1.00	-0.49	-0.60
Ashkzar	0.52	0.55	-0.51	-0.41	-0.94	0.28	0.00	-0.39	-0.30	-1.00	0.76	-0.24
Harat	-0.34	-0.72	0.27	0.27	1.02	-0.30	-0.26	-0.39	-0.30	-1.00	0.26	-0.60
Zarch	-1.20	-0.72	-0.51	-0.41	-0.94	-0.30	0.00	-0.10	-0.30	-1.00	0.01	-0.24
Marvast	-0.34	-0.72	-0.51	-0.41	1.02	-0.30	-0.33	-0.29	-0.30	-1.00	-0.74	-0.24
Behabad	-0.34	0.55	-0.51	-0.41	1.02	-0.30	-0.21	-0.16	-0.30	-1.00	-0.49	-0.60
Mehrdasht	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.44	-0.42	-0.30	-1.00	-0.49	-0.60
Ahmadabad	-1.20	-0.72	-0.51	-0.41	-0.94	-0.30	-0.48	-0.39	-0.30	-1.00	-0.74	-0.60
Eshghabad	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.41	-0.36	-0.30	-1.00	-0.74	-0.60
Deyhook	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.42	-0.39	-0.30	-1.00	-0.49	-0.60
Nodooshan	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.45	-0.36	-0.30	-1.00	-0.74	-0.60
Nir	-0.34	-0.72	-0.51	-0.41	1.02	-0.30	-0.43	-0.29	-0.30	-1.00	-0.74	-0.60
Aghda	-0.34	-0.72	-0.51	-0.41	-0.94	-0.30	-0.53	-0.33	-0.30	-1.00	-0.74	-0.60
Khezrabad	-1.20	-0.72	0.27	-0.41	-0.94	-0.30	-0.50	-0.42	-0.30	-1.00	-0.74	-0.60
Ideal values	2.25	083	4.21	4.35	1.02	4.32	4.43	4.47	3.15	4.61	3.74	3.75

Reference: (Researchers' findings)

Compound intervals between urban areas of Yazd Province have been calculated based on diagram2.

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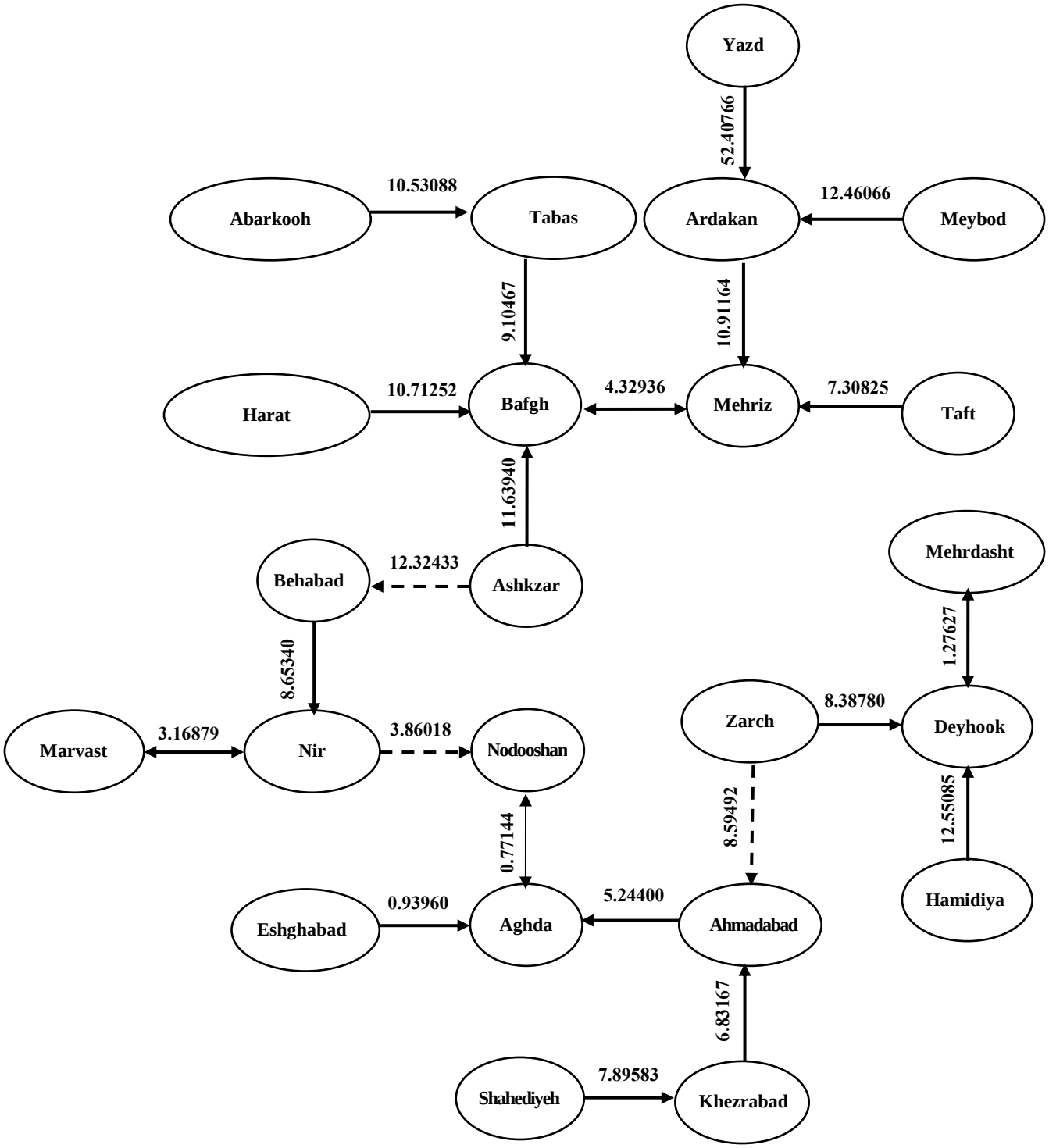

Diagram2. Homogeneous areas of compound intervals

Reference: (Researchers' findings)

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Table3. Quantitative and qualitative index of municipal services (data matrix) without considering Yazd Province in 2011

	Industrial areas and townships	Sport Salons	Swimming pools	Hospital	Slaughter houses	Fire Stations	Green Spaces	Public Parks	Greengrocers	Cinemas	Libraries	Higher Education Centers
Meybod	4	1	0	1	1	3	131.8	19	0	0	6	4
Ardakan	1	2	1	1	1	2	82.5	29	0	0	6	3
Tabas	1	1	1	1	1	2	85.1	2	0	0	2	3
Bafgh	2	1	1	1	1	1	42	3	0	0	5	2
Hamidiya	1	0	0	0	0	1	35	17	1	0	1	0
Mehriz	3	1	1	1	1	1	32.4	15	0	0	5	2
Abarkooh	2	1	1	0	1	1	32	9	0	0	2	5
Taft	3	1	1	1	0	1	85	12	0	0	6	4
Shahediyeh	0	0	1	0	0	0	63.3	8	0	0	1	0
Ashkzar	2	1	0	0	0	2	66	2	0	0	6	1
Harat	1	0	1	1	1	1	32	2	0	0	4	0
Zarch	0	0	0	0	0	1	65	11	0	0	3	1
Marvast	1	0	0	0	1	1	22	5	0	0	0	1
Behabad	1	1	0	0	1	1	38	9	0	0	1	0
Mehrdasht	1	0	0	0	0	1	8.5	1	0	0	1	0
Ahmadabad	0	0	0	0	0	1	3.5	2	0	0	0	0
Eshghabad	1	0	0	0	0	1	12.8	3	0	0	0	0
Deyhook	1	0	0	0	0	1	10.5	5	0	0	1	0
Nodooshan	1	0	0	0	0	1	7	6	0	0	0	0
Nir	1	0	0	0	1	1	9	5	0	0	0	0
Aghda	1	0	0	0	0	1	1	4	0	0	0	0
Khezrabad	0	0	1	0	0	1	0.35	1	0	0	0	0
Mean	1.22	0.43	0.39	0.30	0.43	1.13	37.60	7.39	0.04	0.00	2.17	1.13
Standard Deviation	1.03	0.60	0.50	0.48	0.51	0.59	35.01	7.09	0.21	0.00	2.37	1.62

Reference :(Planning deputy of Yazd Province governance and results of interviews, 2011)

By calculating mean and standard deviation, mentioned intervals are as follows:

$\overline{D}= 8.442$

$Sd= 9.816$

$0 < D_{+}<28.07$

According to diagram2, it is obvious that city of Yazd is out of homogeneous domain because of big difference in terms of development level and enjoyment of municipal services than other cities; therefore, we calculate once again without considering city of Yazd.

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Table4. Quantitative and qualitative index of municipal services (standard matrix of data) without considering Yazd Province in 2011

	Industrial areas and townships	Sport Salon	Swimming pools	Hospitals	Slaughter houses	Fire stations	Green spaces	Public Parks	Greengrocers	Cinemas	Libraries	Higher Education Centers
Meybod	2.70	0.94	-0.78	0.45	1.11	3.17	2.69	1.64	-0.21	0.00	1.61	1.77
Ardakan	-0.21	2.61	1.22	1.45	1.11	1.47	1.28	3.05	-0.21	0.00	1.61	1.15
Tabas	-0.21	0.94	1.22	1.45	1.11	1.47	1.36	-0.76	-0.21	0.00	-0.07	1.15
Bafgh	0.76	0.94	1.22	1.45	1.11	-0.22	0.13	-0.62	-0.21	0.00	1.19	0.54
Hamidiya	-0.21	-7.72	-0.78	-0.63	-0.85	-0.22	-0.07	1.36	4.55	0.00	-0.50	-0.70
Mehriz	1.73	0.94	1.22	1.45	1.11	-0.22	-0.15	1.07	-0.21	0.00	1.19	0.54
Abarkooh	0.76	0.94	1.22	-0.63	1.11	-0.22	-0.16	0.23	-0.21	0.00	-0.07	2.39
Taft	0.73	0.94	1.22	1.45	-0.85	-0.22	1.35	0.65	-0.21	0.00	1.61	1.77
Shahediyeh	-1.18	-0.72	1.22	-0.63	-0.85	-1.92	0.73	0.09	-0.21	0.00	-0.50	-0.70
Ashkzar	0.76	0.94	-0.78	-0/63	-0.85	1.47	0.81	-0.76	-0.21	0.00	1.61	-0.08
Harat	-0.21	-0.72	1.22	1/45	1.11	-0.22	-0.16	-0.76	-0.21	0.00	0.77	-0.70
Zarch	-1.18	-0.72	-0.78	-0.63	-0.85	-0.22	0.78	0.51	-0.21	0.00	0.35	-0.08
Marvast	-0.21	-0.72	-0.78	-0.63	1.11	-0.22	-0.45	-0.34	-0.21	0.00	-0.92	-0.08
Behabad	-0.21	0.94	-0.78	-0.63	1.11	-0.22	0.01	0.23	-0.21	0.00	-0.50	-0.70
Mehrdasht	-0.21	-0.72	-0.78	-0.63	-0.85	-0.22	-0.83	-0.90	-0.21	0.00	-0.50	-0.70
Ahmadabad	-1.18	-0.72	-0.78	-0.63	-0.85	-0.22	-0.97	-0.76	-0.21	0.00	-0.92	-0.70
Eshghabad	-0.21	-0.72	-0.78	-0.63	-0.85	-0.22	-0.71	-0.62	-0.21	0.00	-0.92	-0.70
Deyhook	-0.21	-0.72	-0.78	-0.63	-0.85	-0.22	-0.77	-0.34	-0.21	0.00	-0.50	-0.70
Nodooshan	-0.21	-0.72	-0.78	-0.63	-0.85	-0.22	-0.87	-0.20	-0.21	0.00	-0.92	-0.70
Nir	-0.21	-0.72	-0.78	-0.63	1.11	-0.22	-0.82	-0.34	-0.21	0.00	-0.92	-0.70
Aghda	-0.21	-0.72	-0.78	-0.63	-0.85	-0.22	-1.05	-0.48	-0.21	0.00	-0.92	-0.70
Khezrabad	-1.18	-0.72	1.22	-0.63	-0.85	-0.22	-1.06	-0.90	-0.21	0.00	-0.92	-0.70
Ideal Values	2.70	2.61	1.22	1.45	1.11	3.17	2.69	3.05	4.55	0.00	1.61	2.39

Reference: (Researchers' findings)

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The values of development model have been calculated by using presented equations in table5.

Tbale5. Determining development model values for urban areas

	$(Z_{ij}-Z_{oj})^2$												$\sum(Z_{ij}-Z_{oj})^2$	$C_{io}=\sqrt{\sum(Z_{ij}-Z_{oj})^2}$
Name	**Index 1**	**Index 2**	**Index 3**	**Index 4**	**Index 5**	**Index 6**	**Index 7**	**Index 8**	**Index 9**	**Index 10**	**Index 11**	**Index 12**		
Meybod	0	2.78	4	0	0	0	0	1.99	22.68	0	0	0	31.83	5.64
Ardakan	8.48	0	0	0	0	2.87	1.98	0	22.68	0	0	1.52	37.53	6.13
Tabas	8.48	2.78	0	0	0	2.87	1.78	14.5	22.68	0	2.85	1.52	57.46	7.58
Bafgh	3.77	2.78	0	0	0	11.49	6.58	13.45	22.68	0	0.18	3.43	64.36	8.02
Hamidiya	8.48	11.11	4	4.34	3.84	11.49	7.64	2.86	0	0	4.45	9.53	67.47	8.23
Mehriz	0.94	2.78	0	0	0	11.49	8.06	3.9	22.68	0	0.18	3.43	53.46	7.31
Abarkooh	3.77	2.78	0	4.34	0	11.49	8.13	7.96	22.68	0	2.85	0	64	8
Taft	0.94	2.78	0	0	3.84	11.49	1.79	5.75	22.68	0	0	0.38	49.65	7.05
Shahediyeh	15.08	11.11	0	4.34	3.84	25.85	3.83	8.77	22.68	0	4.45	9.53	109.48	10.46
Ashkzar	3.77	2.78	4	4.34	3.84	2.87	3.53	14.5	22.68	0	0	6.1	68.41	8.27
Harat	8.48	11.11	0	0	0	11.49	8.13	14.5	22.68	0	0.71	9.53	86.63	9.31
Zarch	15.08	11.11	4	4.34	3.84	11.49	3.64	6.45	22.68	0	1.6	6.1	90.33	9.5
Marvast	8.48	11.11	4	4.34	0	11.49	9.84	11.46	22.68	0	6.41	6.1	95.91	9.79
Behabad	8.48	11.11	4	4.34	0	11.49	7.18	7.96	22.68	0	4.45	9.53	82.89	9.1
Mehrdasht	8.48	11.11	4	4.34	3.84	11.49	12.4	15.6	22.68	0	4.45	9.53	107.92	10.39
Ahmadabad	15.08	11.11	4	4.34	3.84	11.49	13.43	14.5	22.68	0	6.41	9.53	116.41	10.79
Eshghabad	8.48	11.11	4	4.34	3.84	11.49	11.55	13.45	22.68	0	6.41	9.53	106.88	10.34
Deyhook	8.48	11.11	4	4.34	3.84	11.49	12	11.46	22.68	0	4.45	9.53	103.38	10.17
Nodooshan	8.48	11.11	4	4.34	3.84	11.49	12.71	10.52	22.68	0	6.41	9.53	105.11	10.25
Nir	8.48	11.11	4	4.34	0	11.49	12.3	11.46	22.68	0	6.41	9.53	101.8	10.09
Aghda	8.48	11.11	4	4.34	3.84	11.49	13.96	12.43	22.68	0	6.41	9.53	108.27	10.41
Khezrabad	15.08	11.11	0	4.34	3.84	11.49	14.1	15.6	22.68	0	6.41	9.53	114.18	10.69

Reference: (Researchers' findings)

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In this step, development degrees of urban areas are shown in table 6 with having the values of development model and by using presented equations. Finally, ranking of each urban area has been specified based on enjoyment level of municipal services and facilities (table7).

Table6. Calculating enjoyment level of facilities in urban areas of Yazd Province in 2011

City name	$C_{io}=\sqrt{\sum(Z_{ij}-Z_{oj})^2}$	$Fi=\frac{C_{io}}{C_o}$	Rank
Meybod	5.64	0.46689	1
Ardakan	6.13	0.50745	2
Tabas	7.58	0.62748	5
Bafgh	8.02	0.66391	7
Hamidiya	8.23	0.68129	8
Mehriz	7.31	0.60513	4
Abarkooh	8	0.66225	6
Taft	7.05	0.58361	3
Shahediyeh	10.46	0.86589	20
Ashkzar	8.27	0.68460	9
Harat	9.31	0.77070	11
Zarch	9.5	0.78642	12
Marvast	9.79	0.81043	13
Behabad	9.1	0.75331	10
Mehrdasht	10.39	0.86010	18
Ahmadabad	10.79	0.89321	22
Eshghabad	10.34	0.85936	17
Deyhook	10.17	0.84189	15
Nodooshan	10.25	0.84851	16
Nir	10.09	0.83526	14
Aghda	10.41	0.86175	19
Khezrabad	10.69	0.88493	21

Reference: (Researchers' findings)

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Table7. Comparison of demographic rank and enjoyment level of facilities in urban areas of Yazd Province in 2011

City Name	Demographic rank	Ranking enjoyment level of facilities
Yazd	1	1
Meybod	2	2
Ardakan	3	3
Hamidiya	4	9
Tabas	5	6
Bafgh	6	8
Mehriz	7	5
Abarkooh	8	7
Shahediyeh	9	21
Taft	10	4
Ashkzar	11	10
Harat	12	12
Zarch	13	13
Marvast	14	14
Behabad	15	11
Mehrdasht	16	19
Ahmadabad	17	23
Eshghabad	18	18
Deyhook	19	16
Nodooshan	20	17
Aghda	21	20
Nir	22	15
Khezrabad	23	22

Reference: (Researchers' findings)

According to the results of tables 6 and 7, cities of Yazd, Meybod, and Ardakan are in the best possible situation respectively in terms of enjoyment level of municipal services and facilities, and cities of Ahmadabad, Khezrabad, and Shahediyeh are in the worst conditions respectively. In order to achieve to the role and impact of enjoyment level of municipal services and facilities in demographic situation and its appropriately spatial distribution in the region, it is necessary to compare obtained ranks of qualitative and quantitative enjoyment level of municipal services and facilities of each city with demographic ranks of that city. Thus, according to table7, there is a relative consistency and compliance between two mentioned ranks in seven cities of the region, and there is a full compliance in seven cities as well. In a way that in the worst condition, there is only one unit between two mentioned ranks. On the other hand, this compliance in 6 other cities of the region is relative so that the difference between two ranks is between 2 and 4. However, there is no proportion between two mentioned ranks in five cities of the studied area. With a statistically simple analysis, it can be said that there is a relative and full compliance between ranking enjoyment level of municipal services and facilities and demographic rank of urban areas in more

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than 78 percent of the regions' cities, and it is contrary only in less than 22 percent of urban areas.

6. Conclusion

Many factors and indicators are effective on balanced distribution of population. In this research, 12 indexes related to municipal services and facilities based on statistical results of 2011 were selected among proposed indexes from experts' view, quantitative and qualitative of these indexes were analyzed by using numerical Taxonomy model, and then the results were compared to qualitative and quantitative status of these indexes.

According to the studied indicators and table7, there is a relative and full compliance between ranking level of presented municipal services and facilities and demographic rank in 78 percent of urban areas of the province and there is only contradiction between two mentioned ranks in five cities out of total 23 cities of the province. It is under the circumstances that there is 2 to 4 unit difference between two compared ranks in the rest of the cities that indicates a relative compliance in these urban areas.

Thus, according to the findings of research model and research hypothesis, there is a relative homogeneity in compliance with ranking of Yazd Province cities and their municipal services, but the existence of relative gap indicates tendency toward inconsistency of demographic rank and ranking of municipal services in Yazd Province. It is obvious that as qualitative and quantitative level of services increases in urban areas, particularly in small urban areas, the level of local people's willingness to stay in their own cities increases as well.

In this regard, immigration to large cities is reduced by increase and balanced distribution of municipal services and facilities in different cities and regions, on the other hand, immigration to small cities increases leading to decentralization and improvement of community's efficiency, and consequently it will be followed by security, comfort, and social welfare in long-run.

Generally, the results indicate relative impact of enjoyment level of presented facilities and services in urban areas in balanced distribution of population in order that related indexes with municipal facilities and services can play influential role at an acceptable level on absorbing population in different areas, avoiding migration, and decentralization.

Therefore, following strategies are suggested:

- Applying spatial thinking in distribution of municipal services
- Directing population settlement in residential system of the province in regions that distribution of municipal services is more possible
- Particular attention to urban services in small and less-developed cities of the province

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