Structural Analysis, Measurement of Spatial Distribution Model and Classification the Construction of Urban Areas Based on Benefit from Urban Services (Case Study: Five Districts of Zahedan)

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Received: 2015/01/20 **Accepted: 2015/08/01**

Abstract: Heterogeneity of distribution system of urban services is one of the most important consequences of rapid growth of urbanization and physical development of cities in the country in the past decades. It has paved the way for social injustice and having urban services land uses in the regions and neighborhoods of a city. This research has been developed in order to measure access level of residents in urban areas of Zahedan for required facilities and services. Initially, per capita of status quo of each individual from service uses of city's status quo was extracted by using data and information of Zahedan comprehensive urban plan and then the extent and distribution of land uses in five districts of Zahedan were examined by utilizing Williamson and entropy models. Finally, each district was evaluated and ranked in terms of having facilities and services. The results of Williamson and entropy models show unbalanced distribution and lack of services in district 4 due to large and increasing population. Balanced distribution of services is seen in district 5 and studying results of having urban services and facilities due to TOPSIS model shows that there is a big difference among urban areas in terms of accessibility and urban services so that the highest amount of TOPSIS for district 5 is 0.894 and the lowest amounts are 0.058 and 0.178 for districts 2 and 4 respectively.

Keywords: urban services, spatial distribution, Williamson model, entropy model, TOPSIS technique, Zahedan.
JEL Classification: N95, C63, C10, R12, G20

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The Scientific-Research Quarterly Journal
ISSN: 2345-2870
Indexed in: ISC, SID, Noormags, RICeST, Ensani, Magiran
www.Iueam.ir
Vol. 3, No.12
Fall 2015

[Downloaded from mail.iueam.ir on 2026-09-26]

[DOR: 20.1001.1.23452870.1394.3.12.7.9]

1- Introduction

Cities are complex social and physical phenomena that are under pressure of constant development and many qualitative and quantitative changes occur in them (Zavadskas et al., 2007). Since cities are the symbols of human interaction with each other and the environment for the emergence of social man, they should provide a balanced space for growth and the excellence of man and society. Despite injustice in living standards among the residents of a city, there is new phenomenon in none of cities of the world, but spatial difference of cities has been intensified in less developed countries because of the significant socio-economic differences and the emergence of below standard settlements (Abdi Daneshpour, 1999). Today, third world countries need planning and identifying facilities and resources in order to strengthen the economic infrastructure and freedom from dependency and the elimination of existing imbalances. Definitely, recognition the status of the different areas is one of the most important factors to achieve progress in growth and development planning of the country. Access to facilities and zoning correctly are issues that urban managers put it on top of their intentions to achieve goals such as comfort and beauty of the city. Spatial, social, cultural and economic differences become evident by classification of areas, therefore, classification requires analysis and studies (Monfarediyan Sarvestani, 2007). Today, most people have the common sense that urban areas are undesirable and inappropriate for living and activity since population growth and rapid urbanization in recent decades had adverse effects such as inharmonious spatial distribution of cities, creating neighborhoods on the peripheries, poverty and declining living standards, lack of service centers, and finally inequalities in facilities (Salehi and Reza Ali, 2004). Land in cities is a very important issue due to different economic and social changes, and physical increasing growth of cities in the world, particularly in the developing countries (Molazadeh, 2001); therefore, proportional distribution and balanced sort of urban services include locating these services or uses so that all determined social groups with different spatial features enjoy it as much as possible. The way of distribution urban services can have an influential role in spatial displacement of population and social changes. Since one of the criterions of urban sustainable development and social justice is attention to balanced distribution of services and urban facilities, so distribution of services should be such that social justice be established (Aqababatyi, 2009). Experimental studies show that imbalance and injustice are characteristics of urbanization of current third world countries. These inequalities are manifested in three levels, namely:

1. Inequalities in livelihood opportunities in rural and urban areas
2. Inequality from one city to another because of focusing limited resources on capital

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3. economic inequality within the cities among people and a small group of wealthy elite

These imbalances and inequalities may interfere with their performance and national economy expectations in addition to the inherent damage (Smith, 2005). Unused capacities of more limited areas can be noted as adverse consequences of regional inequality. Also, further use of the power of a region can destroy facilities more quickly. Air and land pollution are the effects of focusing on some areas. Furthermore, abnormal migration from non-prosperous areas to prosperous ones can be regarded as the effects of unbalanced regional growth (Monfarediyan Sarvestani, 2007). Urban planning in general and sustainable development planning of cities in particular seek to organize the urban environment in terms of access to facilities and urban services and appropriate distribution of urban land. In other words, urban planning seeks to provide the best living condition and suitable relations between different uses for urban residents (Hekmatniya and Mousavi, 2006).

Local and regional relative capabilities and merits are always different due to the influence of different economic, social and environmental factors and this important matter will cause unequal distribution of urban services from an area to another. Therefore, recognition of merits and local and regional capacities are considered as basic principles of development planning and scientific strategies of development become meaningful by explaining status quo. Since space is not always transparent and free of side effects, rational attitude to space will not be simple. This complexity of relations creates various effects and actions in different places and environment (Mohammadi and Izadi, 2011). Today, problems caused by poor distribution of urban services such as density, environmental pollution, population displacement and some others have caused the distribution of urban services be one of the most important issues facing most developed and developing countries (Kamran et.al, 2010). Optimal distribution of facilities and services required by citizens at city level should be in a way that all of them have suitable access to them. It will cause save time and cost of citizens because of appropriate provide of citizens' needs and also avoiding their unnecessary displacement. It will provide the necessity of urban sustainability (Maleki, 2003). The establishment of any urban element in spatial-physical location of city is subject to certain principles and mechanisms. It will lead to functional success and efficiency of that element in the same specific place in case of observance, otherwise, the risk of numerous problems is very high (Aqababayi, 2009). The process of urban centralization in Iran was started in 1960s after land reform, it was increased with the outbreak of imposed war, and it caused increasing growth of urbanization and double lack of facilities and infrastructure by increasing urban population ad different urban groups proportional with the quality of life have different access to these facilities (Hataminejad et.al, 2008). Undoubtedly, interruption in service distribution system

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and its failure is the main effect of the rapid growth of urbanization and uncontrolled growth of urban space that it has appeared without exception in all the major cities in Iran (especially in provincial capitals). Development of service space was not in line with the speedy growth of population and physical development of cities and finally, population growth overtook from levels of service spaces. This leads to failure in spatial and physical structure of most of cities in the world (Salehi and Reza Ali, 2004). Therefore, in Iran like other countries, inadequate distribution of urban services is very disconcerting in different cities and it has changed into a transnational issue. The greatest concern of municipal authorities has been the provision of urban services in the city so far and adequate distribution has been considered less.

2- Literature Review

Many studies have been done in the field of prioritizing, ranking services, and living facilities, planning in neighborhoods, and using TOPSIS technique, which are listed as follows:

Gutierrez et.al (2009) argue in an article that there is a significant relationship between the quality of services and citizens' satisfaction, and with an increase in quality, satisfaction increases too, but there is not a significant relationship between satisfaction and local government's credit.

Sun (2010) used TOPSIS multi-criteria decision-making technique for local planning and distribution centers of urban services. Best places for creating distribution centers of services, which are more compatible with the environment and coordinated with transit systems, have been suggested in this article.

Deniz Akgül (2012) in the article of "the measurement of citizens' satisfaction from presented services by municipality" examined and measured citizens' satisfaction from presented services by Chiro municipality. The results show that Chiro municipality did not meet the expectations of citizens' satisfaction. Satisfaction level is different according to various variables such as income level, marital status, sex and education level and there is no significant relationship between age and presented services.

Nastaran et.al (2010) in a research entitled "Application of TOPSIS technique in analysis and prioritization of urban sustainable development (case study: Isfahan areas)" concluded that there are six deprived areas with priority coefficient of 0.22 to 0.34 in the lowest prosperity level among Isfahan urban areas and they devote the first development to themselves.

Ramesht and Arab Ameri (2011) in an article entitled "Prioritization of urban areas in order to establish fire stations using linear allocation method and TOPSIS in Maku" came to a conclusion that in TOPSIS method, district 3 with 0.47 and district 4 with 0.42 are in the first and last rank respectively among five districts and 1, 5, and 2 districts are placed in the next ranks respectively.

Taqvayi and Kiyoumarsi (2011) in an article entitled "Ranking neighborhoods on the basis of prosperity level from facilities and urban services using

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TOPSIS technique in the neighborhoods of Abadeh" found that there is a significant difference among urban neighborhoods in terms of access to facilities and urban services.

Maroufi and Karimi (2012) in an article entitled "ranking urban areas on the basis of prosperity level fron urban services using TOPSIS method (case study: Sanandaj urban areas)" presented the results from access level to the services as ranking neighborhoods in five categories and the results show that there is a big difference among urban areas in terms of facilities and urban services so that the highest amount of TOPSIS is for district 14 with 0.61 and the lowest is for district 10 with 0.0014.

Darvish and Kalteh (2013) in article entitled "ranking urban neighborhoods on the basis of having urban services (case study: Nowshar)" studied neighborhoods in Nowshahr. The results show unequal distribution of services and facilities in urban neighborhoods which is the effect of administrative, political and managerial factors.

Taqvayi and Zakeri (2013) in article entitled "analyzing the distribution of hospital and clinical services using GIS and TOPSIS models" concluded that there are adequate hospital and clinical services in Isfahan, but they do not have appropriate spatial distribution; as a result, access to these places is not well.

Amanpour et.al (2013) in an article entitled "evaluation of development level in Kermanshah cities in terms of having the indicators of urban services" studied eight indicators in this city and found that there is a significant difference between Kermanshah as the center of the province with other cities in terms of having the indicators of urban services.

3- Theoretical Principles

Disintegration of distribution system is the most important consequences of rapid growth of urbanization and physical development of cities in the country in recent decades. It has paved the way for citizens' social inequality in the enjoyment of these services. Public urban services organize the shape and nature of the physical, social and spatial of city; therefore, injustice in their distribution affects structure, nature of a city, classified segregation of neighborhoods, and in equality in the life quality and urban management faces with serious problems (Kalantari et.al 2013). Focus of service centers on a specific place, not only creates bipolar areas and uptown and downtowns, it is followed by influx of the consumer population to these areas so that it is followed by environmental, traffic, sound and air pollution pressures on one hand and on the other hand intensification of spatial polarization in cities because of absorbing complementary and parallel uses so that cities will face density, undesirable and incompatible with sustainable development environments. Unfortunately, currently the distribution of urban services is studied mostly in the form of land use plans and user's per capita criterion and less importance is given to residents' access to urban services while one of the main promoting elements of quality of the urban environment is the development of appropriate access indicators considered

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as one necessary factor for achieving to urban sustainability (Khakpour, 2009).

Urban Sustainable Development

Urban development, as one of the spatial concept, can be defined as changes in land use and density levels in order to meet the residents' needs in the field of housing, transport, free time, and food etc. Such development would be sustainable when we have environmentally habitable, economically lasting, and socially correlated city (Kamran et.al 2010). It is emphasized on a process in urban sustainable development theory in which energy circulation in the city would have maximum efficiency and destructive environmental effects minimize as much as possible ((Haughton, 1997). One of the necessities to achieve urban sustainable development is creating beautiful and balanced perspectives. Outlook pollution shows socio-economic inequalities among residents of a city. Development of marginalized areas of cities and spatial pollution is the product of inequality processes in capitalist systems. Concentration of poverty in outskirts, not only it leads to outlook pollution, but it also prepares the grounds for increase in crime. Rising crime and other social abnormalities in city makes urban sustainable development impossible ultimately leading to citizens' insecurity, fear, depression and anxiety (Mofidi Shemirani, 2009). The process of achieving to urban sustainable development does not have certain principles. It is important to consider economic, environmental, and social health indicators. It is only obtained by combining multiple instances in different scales (Marcotullio, 2001).

UN introduces basic issues and necessary conditions for achieving to sustainable development as follows: population and development, food security, energy, industry, urban problems

In this regard, observing following issues has been emphasized in order to track down systematically and more effectively the urban sustainable development policies:

a. A political system that regulates citizen participation

b. An economic system that presents solutions to problems and obstacles of uncoordinated and unbalanced development

c. A productive system that respects to the commitment of maintaining the principles of ecology for development

d. A technological system that backs up life supporting systems

e. An international system that plans sustainable models for business and financial affairs (Masoumi, 2011).

Social Justice in City

The issue of social justice arises in urban environment in order to access all city dwellers to their needs equally. Inattention to it will have very unpleasant consequences such as: suburbanization and too much density in a region, unilateral development of cities, depopulation of some urban areas, land speculation, and dozens of other difficult issues. Therefore, identifying the effects of social justice issue is considered as one of the fundamental elements of urban studies. A city changes to utopia when social justice covers all necessary aspects

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(Khoshrooy, 2006). Attention to social justice is of great importance in cities to extent that they play an important role in any determiner indicators of healthy cities (Sheykhi, 2001). Proportional distribution and balanced sort of urban services include locating these services or uses so that all certain social groups with various spatial features take advantage of them as much as possible. The amount and manner of distribution of municipal services can have an influential role in spatial displacement of population and social changes. In this regard, according to the allocation of resources from urban management and the amount of emphasis on social justice, it will be followed by urban population's satisfaction since the allocation of resources along with social justice help citizens to access to urban services and also increase their efficiency (Ziyari, 2012). The appropriate and optimal distribution of social, economic, cultural, and sanitary facilities among areas and regions is one of the most important factors avoiding inequalities and development gap, and appropriate spatial distribution of population in the land. Thus, justice in city should follow proportional and appropriate allocation of services and facilities, using actual and potential capacities in the city, eliminating the gap between rich and poor in the city, and preventing the emergence of slums. As a result, any types of urban planning based on social justice in city should be effective both in distribution of needs, public benefits and entitlements and in their allocation. One of the most factors in urban planning is using spaces and appropriate distribution; in other words, spatial justice. In this regard, uses and urban services are effective and useful factors can also establish dimensions of spatial, social, and economic justice in case of establishing more equitably with addressing population's need, increasing public benefit, and attending to entitlement and individual merits. Therefore, disruption of population balance, which the most important its reasons are immigration inside and outside the city, and too much density of uses in special areas, can change urban spaces into spaces contradictory with justice from economic and social dimensions (Harwee, 2000). Generally, it can be said that balanced spatial distribution of urban services is considered as one of the most important sign of social justice in city. Social justice in city means continuity of the interests for different social groups on the basis of expansion of urban resources, revenues, and costs (Gray, 2002)

4- Research Method

It has been tried to use different methods in this research in order to study the subject well and its different aspects to be explored until finally, the desired result to be achieved and it makes the subject sense to others. This research is practical and its method is descriptive-analytic. Since library method has also been used in this research for data collection, it also can be considered as document research. In this research, desired data were collected firstly by library and field studies and then quantitative models such as Williamson coefficient, entropy coefficient, TOPSIS

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model, Arc GIS and Excel software for plan and diagrams of spatial distribution of urban services in Zahedan were used.

Indicators in Research

Current uses of each urban area were extracted from land use of Zahedan in detailed plan. In order to measure prosperity level of residents in urban areas, the per capita of each uses was obtained. Studied uses in this research are explained in table 1on the basis of available regulations and criteria.

Table1. Types of land uses and subgroups based on the regulations of Policy Management and Planning Organization

Type of land use	Sub-groups
Business	Business centers in the city (market, services, shopping malls, wholesale shops, private offices, banks, etc.) Business centers in the neighborhood (retail trade, neighborhood services), Non-permanent markets (daily market, weekly market)
Training	Preschools and kindergartens, primary schools, middle schools, high schools, vocational training centers, technical schools, colleges and post-secondary educational institutions
Cultural	Historical and cultural sites (museums, libraries, community halls, cinemas and theaters)
Religion	Mosques, Hosseinieh, shrine and religious minorities centers
Sanitary	Public bathrooms, restrooms, laundry, public toilets
Clinical	Hospitals, clinics, health and medical centers
Sport	Stadiums, indoor hall, soccer fields, swimming pools, public sports facilities
Green Space	Parks, recreation areas, public green space, protected green space

Source: (Taqvayi and Kiyoumarsi 2011)

Research Territory

Zahedan is located in the center of Sistan-Baluchistan province in the east of Iran and near the borders of Afghanistan and Pakistan. Zahedan is located in the area of 8123 hectares and the geographic position at longitude 60 degrees 51 minutes 25 seconds east and latitude 29 degrees 30 minutes 45 seconds north. Topographic characteristics are different. The city's population at the first general and official census of the country in 1956 was 17495 people and 3865 families, while the city's population in 2011was 575,116 people and the number of households increased to 116,155 (Consulting Engineers city and house, 2011 and 2006). Until 1390, the city had three urban areas. According to the new spatial divisions, urban areas in Zahedan have increased from three regions into five ones and each region has eleven neighborhoods.

Zehedan is considered as one of the prosperous city because of having facilities and amenities. Since this city is

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located in the border of Afghanistan and Pakistan, cultural commonalities with them, transit line of goods and drugs have caused this city be non-prosperous from effective potentials on urban life quality so that most domestic and non-domestic immigrants have selected outskirts as haven. Most of them are in the north and north-east of the city located in district 3 and 4 in Zahedan. Therefore, in different areas in Zahedan, imbalance and injustice are obvious in terms of access and enjoyment of the required services, so that distribution of some services in the areas is unfair. Their spatial distribution tends to polarization and concentration in some of these areas (district 5 and 1). The situation is such that unbalanced and unequal distribution of services and resources at regional and neighborhood level are observed in this city. These inequalities are created because of natural, economic factors, Ethno-cultural issues, and inadequacy of planning system and they influence socio-economic and cultural performance of these neighborhoods and they provoke such inequalities in this city so that the influx of low-income classes from cities of this province in recent decades has been followed by unbalanced distributed service centers and it has been leaded to lack of equal prosperity of citizens from services in the city. Survey and population of Zahedan and its areas are in tables 2 and 3 and the location of Zahedan is in map1.

Table2. The area and population of Zahedan during 1355-1390

Year	1976	1986	1996	2006	2011
Population	93740	281923	419518	552706	575116
Area (hectares)	1285	3022	4650	6468	8123

Source: (statistical center of Iran, 2011)

Table3. The area and population of Zahedan areas (2011)

Area	Population	Area (Hectares)
1	112816	1814
2	113932	679
3	120018	1545
4	114475	1862
5	113875	2223

Source: (Researchers' findings)

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Map1. The location of Zahedan, Sistan and Balouchestan Province, Iran
Source: (Citypedia)

5- Research Findings

Urban facilities have been created for citizens, therefore, knowing quantity and quality of population and related indicators are necessary for any types of planning (Abbasi, 2009). Urban services include training, medical, sanitary, cultural, commercial, religious, sport, and facilities and equipment issues. We have studied these services at Zahedan areas level according to the available statistics and data in this research.

Williamson is the first one who generalized the issue of income inequality in the region in the field of regional issues (Tadjoeddin, 2003). In this research, rankings of areas have been determined in presenting eight types of urban services on the basis of Williamson indicator formula.

$$V_i = \left(\sqrt{\sum_{i=1}^{n}(xi - xn)\frac{pi}{N}}\right)/xn$$

In this formula "n" is the number of areas, "xi" the per capita of intended indicator in the area of "i", "xn" the per capita of intended indicator in the whole city, "Pi" the population of area, and "N" is the total population of city (Hataminejad et.al., 2014).

It is noteworthy that the obtained number in this indicator is between zero and one. Each obtained number which tends to zero shows the reduction of regional inequalities (Kalantari, 2001: 140).

Williamson indicator shows the extent and distribution of intended land uses at five areas level of Zahedan. According to the obtained results from this indicator among training, sanitary, medical, religion, sport, and business services at Zahedan urban areas, the least inequality is in district 5 and the most one is in district 4. Among green space services, the lowest inequality is in district 1 and the most one is in district 4.

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In cultural services, the lowest inequality is in district 5 and the most one is in district 2. Totally, district 5 has the lowest inequality and most balances and district 4 has devoted the most inequality and the lowest balances to itself in urban areas of Zahedan.

Table4. The per capita of urban services in Zahedan areas

Land use	Area 1	Area 2	Area 3	Area 4	Area 5
Education	2.67	2.44	3.56	2.23	4.65
Health	0.21	0.19	0.27	0.17	0.36
Medical care	1.54	1.41	2.05	1.29	2.68
Business	2.06	1.88	2.74	1.72	3.57
Green space	3.67	1.5	2	1.01	3.3
Region	0.62	0.56	0.82	0.51	1.07
Culture	2.17	1.15	3.21	2.63	4.72
Sport	2.16	1.97	2.87	1.8	3.75

Source: (Researchers' calculations)

Table5. The per capita of urban services in Zahedan areas based on Williamson model

Land use	Area 1	Area 2	Area 3	Area 4	Area 5	Total	Rank
Education	0.102	0.104	0.102	0.105	0.095	0.508	2
Health	0.367	0.373	0.367	0.377	0.340	1.824	8
Medical Care	0.135	0.136	0.134	0.138	0.124	0.667	6
Business	0.116	0.118	0.116	0.119	0.108	0.577	4
Green Space	0.108	0.122	0.123	0.126	0.111	0.59	5
Religion	0.213	0.216	0.212	0.218	0.197	1.056	7
Culture	0.081	0.111	0.068	0.074	0.055	0.389	1
Sport	0.114	0.115	0.113	0.117	0.105	0.564	3
Total	1.236	1.295	1.235	1.274	1.135	-	-
Rank	3	5	2	4	1	-	-

Source: (Researchers' calculations)

Entropy Coefficient

To measure uniformly the required variables such as distribution of population in urban areas or general services, entropy model can be used (Hekmatniya and Mousavi, 2006). According to the theoretic model, when entropy tends to 1, it shows a sign of spatial balance of a variable and less than that number is on the contrary of this case (Varesi, 2008). Initially, the coefficient in Zahedan and then at the level of areas have been calculated in this research.

The overall structure of the model is as follows (Sudhira, et al, 2003: 24):

$H = -\sum_{i=1}^{n} Pi \times Ln(Pi)$ Absolute Entropy

$G = \frac{H}{LN\ K}$ *Relative Entropy*

In the above equation:

H: the amount of absolute Entropy

Pi: per capita rate of each land use for total i

the total per capita of regions

N: total of classes

K: number of classes

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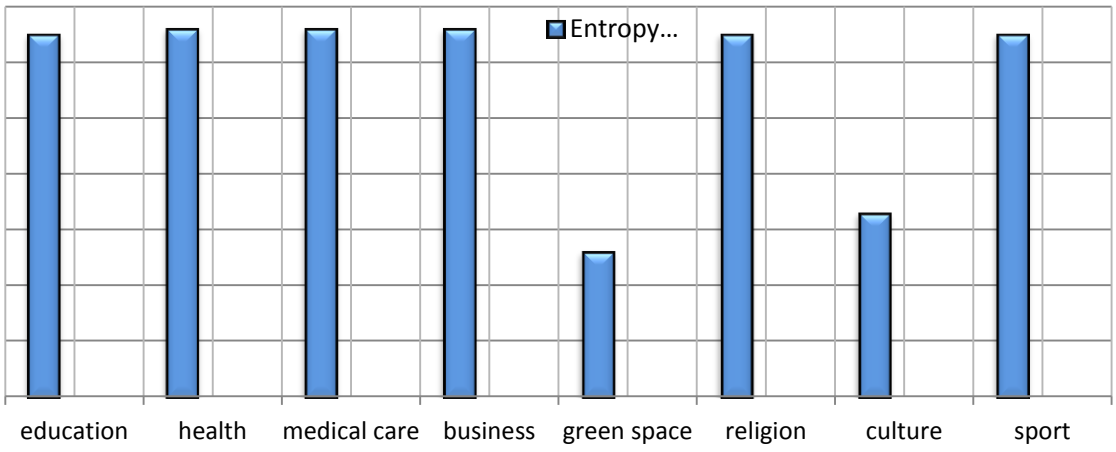
Table6. Calculating Entropy Coefficient in Zahedan, 2011

Entropy Coefficient in Zahedan	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
H	-1.570	-1.571	1.571	-1.571	-1.507	-1.570	-1.517	-1.570
LN	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
G	0.975	0.976	0.976	0.976	0.936	0.975	0.943	0.975

Source: (Researchers' calculations)

According to the obtained results in table 6, sanitary, medical, and commercial services at city level have been distributed more uniformly. Generally, among urban services in Zahedan, the rankings of urban services in the measurement of the distribution from the highest to the lowest balance respectively include sanitary, medical, commercial, cultural, religion, sport and green space (figure 2).

Diagram1. Calculating Entropy Coefficient in Zahedan



Source: (Researchers' calculations)

Table7. Calculating Entropy Coefficient in Zahedan

Land Use	Area 1	Area 2	Area 3	Area 4	Area 5
Education	-0.188	-0.181	-0.210	-0.173	-0.224
Health	-0.189	-0.181	-0.208	-0.172	-0.225
Medical Care	-0.188	-0.181	-0.209	-0.173	-0.224
Business	-0.188	-0.180	-0.210	-0.173	-0.224
Green Space	-0.226	-0.165	-0.189	-0.133	-0.223
Religion	-0.189	-0.180	-0.210	-0.172	-0.224
Culture	-0.180	-0.128	-0.210	-0.196	-0.228
Sport	-0.188	-0.181	-0.210	-0.173	-0.224

Source: (Researchers' calculations)

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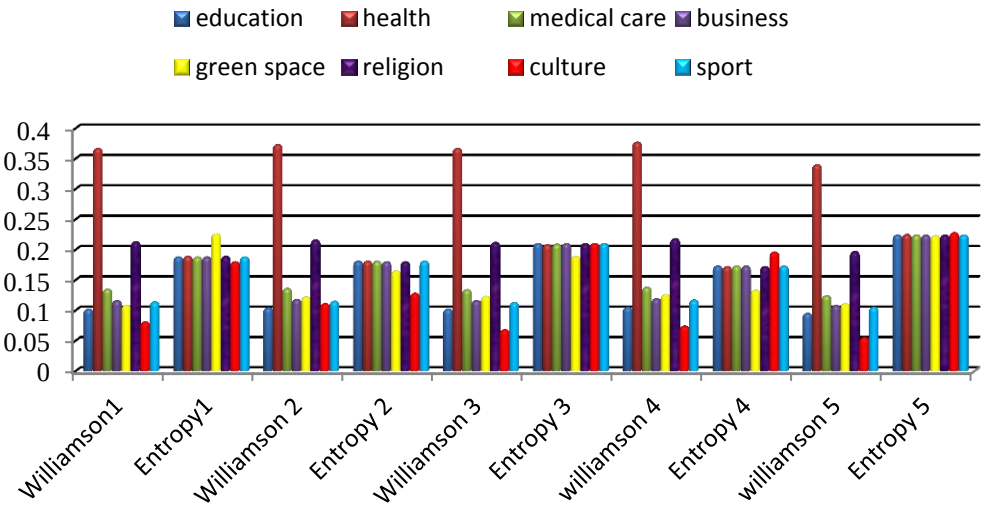
This model shows distribution of urban services at the level of areas on the basis of services' distribution. As coefficient tends to 1, it shows more balance in services, and as it tends to 0, it shows imbalance in the distribution of services in urban areas. On the basis of obtained results in table 6, district 5 has the most balance and district 4 has the least one among training services. Similarly, among sanitary, medical, commercial, religion, and sport services district 5 has the most and district 4 the least balance. Among green space services, district 1 has the most and district 4 has the least balance, and finally among cultural services, district 5 has the most and district 2 has the least balance. These results have been obtained by Williamson model. Williamson Coefficient and entropy coefficient of urban services in Zahedan have been compared separately for five districts.

Diagram2. Comparison of Williamson coefficient and Entropy coefficient of urban services for five areas



Source: (Researchers' calculations)

TOPSIS Technique

In the following, the manner of assessment process, privatization, and also explanation of model have been addressed. n×m matrix which has m as option and n as criterion are evaluated in TOPSIS method. In this algorithm, it is assumed that each indicator and criterion in decision making matrix has a uniform increasing or decreasing desirability. In this model, each selective agent should have the least distance with ideal factor and the furthest distance with negative ideal factor (Benite et al., 2007). The best option or factor should be the nearest factor to positive ideal and be the furthest factor to the negative ideal (Wang et al., 2007).

The phases of implementing TOPSIS algorithm:

1. Forming data Matrix on the basis of "n" as an indicator and "m" as an option

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2. Standardizing data and forming standard Matrix

$$ij=\begin{bmatrix} a_{11}a_{12}\cdots\cdots a_{1n} \\ a_{21}a_{22}\cdots\cdots a_{2n} \\ . \\ . \\ . \\ a_{m1}a_{m2}\cdots\cdots a_{mn} \end{bmatrix}$$

$$Rij=\begin{bmatrix} r_{11}r_{12}\cdots\cdots r_{1n} \\ r_{21}r_{22}\cdots\cdots r_{2n} \\ . \\ . \\ . \\ r_{m1}r_{m2}\cdots\cdots r_{mn} \end{bmatrix}$$

$$rij=\frac{aij}{\sqrt{\sum_{k=1}^{m} a_{kj}^2}} \quad , \quad \sum_{i=1}^{n} wi = 1$$

3. In this phase, the value of each indicator is obtained on the basis of the approaches and expert ideas. In this regard, indicators with more importance have more value. It is noteworthy that total obtained values should be equal for intended indicators of decision maker. In other words:

$\sum_{j=1}^{m} w = 1$: so that we have

$(\forall j = 1,2,\dots\dots,n)$

In this regard, new Matrix is formed called vij.

$$Vij=\begin{bmatrix} wr_{11}wr_{12}\cdots\cdots wr_{1n} \\ wr_{21}wr_{21}\cdots\cdots wr_{2n} \\ . \\ . \\ . \\ wr_{m1}wr_{m2}\cdots\cdots wr_{mn} \end{bmatrix}$$

4. This phase determines lower ideal alternative

$A^*=\{V_1^*, V_2^*, \dots\dots V_N^*\}$

For this purpose, the maximum should be specified in each column in vij Matrix. Accordingly, the number of indicators we will have maximum values.

5. Determining the alternative of ultimate drop or the reverse of performance limit of each indicator.

Here, minimum values or ultimate drop should be identified and shown in vij Matrix.

$A^-=\{V_1^-, V_2^-, \dots\dots, V_n^-\}$

6. Determining a distance criterion for each indicators is obtained by following equation both for ideal alternative and also ultimate drop alternative:

$s_i^*=\sqrt{\sum_{i=1}^{n}(v_{il}-v_i^*)^2}$

$s_i^-=\sqrt{\sum_{i=1}^{n} v_{il}-v_i^-)^2}$

7. Forming and determining a coefficient equals ultimate drop alternative divided by their total distance. The mathematical relationship is as follows:

$c_i^*=\frac{s_i^-}{s_i^- + s_i^*}$ always

$0 \leq c_i^* \leq 1$

The process and ranking technique algorithm based on the similarity to ideal solution are summarized in eight steps as follows:

Step 1: Forming indicator Matrix; K is alternative and N is data. According to this research, as table 7 shows , the alternatives consists of five districts in Zahedan and the indicator of available per capita of each urban land uses.

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Table8. Studied alternatives and indexes

facilities / Areas	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
1	2.67	0.21	1.54	2.06	3.67	0.62	2.17	2.16
2	2.44	0.19	1.41	1.88	1.50	0.56	1.15	1.97
3	3.56	0.27	2.05	2.74	2.00	0.82	3.21	2.87
4	2.23	0.17	1.29	1.72	1.01	0.51	2.63	1.80
5	4.65	0.36	2.68	3.57	3.30	1.07	4.72	3.75

Source: (Central Municipality of Zahedan)

Following notes should be considered in this step:

Quantitative and qualitative criteria can be used simultaneously in this model, provided that the quality criteria can be transformed into quantitative measures. In this regard, quality criteria should be scored and placed in data Matrix for analysis.

All criteria should be homogeneous; it means that all of them should be either positive or negative. If an indicator is negative, it cannot be tested along with positive criteria.

Step 2: Normalized matrix is prepared in this step. Since there is a strong possibility that allocated quantitative amounts to the criteria and indicators do not have the same amount, their single dimensions should be eliminated, and then these quantitative amounts change into numbers without dimensions. For this reason, all the allocated amounts to decision making matrices should transform to numbers without dimensions based on the following equation (table 9).

Table9. Matrix of normalized numbers

Facilities / Areas	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
1	0.98	0.08	0.57	0.76	2.39	0.23	0.70	0.80
2	0.82	0.06	0.48	0.63	0.40	0.19	0.20	0.66
3	1.75	0.13	1.01	1.35	0.71	0.40	1.53	1.41
4	0.69	0.05	0.40	0.53	0.18	0.16	1.03	0.55
5	2.99	0.23	1.72	2.29	1.94	0.69	3.30	2.41

Source: (Researchers' findings)

Step 3: After normalizing decision making matrix, criteria weighing occurs. The total weight of the criteria must be equal to 1 and data matrix is specified after multiplying the number of each criterion on the weight of the same criteria.

Shannon entropy method was used for weighting the criteria in this research (table 10).

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Table10. Weighting to indexes using Entropy method

Index	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
Weight	0.102	0.101	0.101	0.100	0.202	0.102	0.190	0.101

Source: (Researchers' findings)

Normalized numbers in table 8 are multiplied in the weight of each indicator in table 9 and then standard matrix is created (table11).

Table11. Standard Matrix of data

Facilities / Areas	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
1	0.100	0.008	0.057	0.077	0.484	0.023	0.133	0.081
2	0.084	0.007	0.048	0.064	0.081	0.019	0.037	0.067
3	0.178	0.013	0.102	0.135	0.144	0.041	0.291	0.143
4	0.070	0.005	0.040	0.053	0.037	0.016	0.195	0.056
5	0.304	0.024	0.174	0.230	0.392	0.070	0.629	0.244

Source: (Researchers' findings)

Step 4: Determining the alternative distance of "I" from ideal alternative. It means determining the highest performance of each indicator as shown with sign of A* (table 12).

Table12. Determining the highest performance of each index

Index	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
A^*	0.0304	0.024	0.174	0.230	0.484	0.070	0.629	0.243

Source: (Researchers' findings)

Step 5: The lowest performance of each indicator is specified by using standard matrix in step 3 (standardized weights matrix) (table 12).

Table13. Determining the lowest performance of each index

Index	Education	Health	Medical Care	Business	Green Space	Religion	Culture	Sport
A^-	0.070	0.005	0.040	0.053	0.037	0.016	0.037	0.056

Source: (Researchers' findings)

Step 6: Determining distance criteria for minimum and maximum alternatives. The results of this step are shown in table 14.

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Table14. Calculating relative distance to the best criteria

Area	Si^*	Si^-
1	0.594	0.460
2	0.799	0.049
3	0.521	0.326
4	0.728	0.157
5	0.093	0.780

Source: (Researchers' findings)

Step 7: In this step, a coefficient that equals with the division of minimum alternative on (minimum alternative + maximum alternative) is obtained. In other words, relative proximity (Aj) to (A*) is calculated by the following equation:

$$c_i^* = \frac{s_i^-}{s_i^- + s_i^*} \qquad \text{همیشه} \qquad 0 \leq c_i^* \leq 1$$

Step 8: Ranking the alternatives fluctuate C_i* based on descending order of 0 and 1. In this regard, $C_i^* = 1$ shows the highest ranking and $C_{i^*} = 0$ shows the lowest one.

Table15. Ranking options for determining priorities

Rank	Ci^*	Area
2	0.436	1
5	0.058	2
3	0.385	3
4	0.178	4
1	0.894	5

Source: (Researchers' findings)

As indicated in the table (15). Used technique has prioritized Zahedan areas based on access to urban facilities and services and presented the points of each neighborhood to score between 0 and 1. Zero shows the minimum facilities and services and number one shows the maximum access to services.

The results of classification of natural separation show that districts 2 and 4 are the most deprived areas with 0.003 and 0.033 respectively. There are a lot of differences with other districts. On the contrary, district 5 is the most prosperous of facilities and services.

6- Conclusions and Suggestion

Justice is a concept that has always been a human concern. Considering spatial justice and planning can help to achieve greater civil justice in urban planning. It distributes service concentration in different areas equally. Therefore, the most important criterion for the analysis of spatial justice in the city is the quality of the distribution of public urban services. Justice means proper distribution of services among citizens. Improper distribution causes

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destroy the justice and increase citizens' dissatisfaction from residence.

This research has been done by utilizing Williamson model, entropy coefficient, and TOPSIS technique to determine the rate of prosperity in urban areas. It is one of the methods of determining the distribution of services and facilities in the city and it reveals the inequality in the distribution of municipal services in Zahedan areas.

Studies in this city for spatial distribution of urban services represent unequal distribution of facilities and services in the areas. According to the results of the Williamson model, district 4 with 114475 people has the highest inequality among other districts and district 5 with 113875 people has the lowest inequality in terms of the distribution of urban services in Zahedan. The results in entropy coefficient for uniform measurement of the intended variables represents a balanced distribution of health, sanitary, and trade facilities with the coefficient of 0.976 and reducing the balance in the distribution of facilities of green space with the coefficient of 0.936 in the city. District 5 has the highest balance in the distribution of urban services and district 4 has the lowest balance in Zahedan. Also, the results of TOPSIS technique show a significant difference in the rate of the most prosperous areas and the most deprived one so that the score of district 5 is 0.894 and it has a great difference with the most deprived areas i.e. 2 and 4 with 0.058 and 0.178 scores respectively. However, the best residential places are located in district 5 and all services benefit from a high per capita while the per capita of district 4 from services is very insignificant and low due to the more marginalized neighborhoods such as Shirabad, Karimabad, Hemmatabad and etc.

To eliminate existing inequalities between urban areas, recommendations are presented as follows:

Encouraging people to invest in and build municipal services by the private sector

Providing the necessary measures related to municipal services by municipalities and organizations in the public participation before, during and after the implementation of urban services and urban planning

Investigating the needs and meeting them in terms of priority by municipality and other organizations associated with municipal services

Applying local authorities because of their complete understanding from the environment and the city

Identifying and providing services to the residents of district 4 as the most deprived neighborhood

Observing the hierarchical model in the redistribution of urban facilities and services

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